Hydrologic Assessment of the Reservoir Brook Watershed & Functional Assessment of Monkey Pond, Meredith, NH

A Final Report Prepared for the Lake Winnipesaukee Association & the Town of Meredith

Dubois & King, Inc.

January 14, 2021

With funding from a NHDES Local Source Water Protection Program Grant under the Drinking Water State Revolving Fund through a grant from the U.S. Environmental Protection Agency (EPA), and with supplemental funding from the Town of Meredith

LAKE WINNIPESAUKEE ASSOCIATION
Keep Winni Blue

TOWN OF MEREDITH NEW HAMPSHIRE

Meredith NEW HAMPSHIRE

DuBois & King inc.

Introduction and Overview

The Reservoir Brook subwatershed is part of the Lake Waukewan watershed, for which a watershed management plan was completed in 2016. In order to determine drainage flow and assess pollutant load, the 13 sq. mi. Waukewan watershed was delineated into 21 subwatersheds, 5 for Lake Winona, and 16 for Lake Waukewan. Of the 16 subwatersheds in the Lake Waukewan watershed, the Reservoir Brook subwatershed, located at the southern end of Lake Waukewan, was identified as the largest of the catchments directly contributing nutrient loading to the lake. Predictive modeling from the 2016 watershed plan shows this subwatershed contributes the second highest amount of phosphorus export to Lake Waukewan [second only to inputs from the Snake River, which includes the entire upstream Lake Winona watershed]. Reservoir Brook, the primary tributary in the subwatershed, drains to Monkey Pond, a 1-acre wetland located on a town-owned parcel immediately adjacent to Lake Waukewan.

The hydrologic assessment of the Reservoir Brook watershed and evaluation of the functionality of Monkey Pond is being funded by a NHDES Local Source Water Protection Program Grant under the Drinking Water State Revolving Fund through a grant from the U.S. Environmental Protection Agency (EPA) and supplemental funding provided by the Town of Meredith.

The purpose of this project is to evaluate the hydrologic characteristics of the catchment and conduct a functional assessment of the Monkey Pond wetland. Through this study, the Lake Winnipesaukee Association and the Town of Meredith seek to answer the following questions; 1) Where does the water come from? 2) What are the hydrological characteristics of the water entering Monkey Pond? and 3) How is Monkey Pond functioning at present? Is dredging appropriate? Is it a good candidate for wetland enhancement?

Monkey Pond includes three tributary inflows including that of Reservoir Brook. Additionally, there are several storm drains and one municipal parking lot that outlet directly into the pond. The pond is hydrologically connected to Lake Waukewan via two culverts beneath a railroad causeway that separates it from the lake. The rail line has a history of flood-related failures in the immediate area. The pond has silted in over time and has been dredged at least twice in the past.

The following tasks were completed as part of this evaluation and summarized in this report:

1. Identify and map existing conditions in the Reservoir Brook subwatershed;
2. Conduct a drainage analysis and hydrologic assessment of the Reservoir Brook watershed;
3. Conduct a wetland evaluation and functional assessment of Monkey Pond; and
4. Present findings to the Waukewan Watershed Advisory Committee and Town of Meredith.

Identify and Map Existing Conditions in the Reservoir Brook Watershed

The Reservoir Brook watershed was delineated into 10 catchments to reflect the drainage patterns observed and to inform the nutrient loading and hydraulic models. Mapping was separated into 3 maps for clearer identification for use in analyses. Showing soils, utilities, parcels, streams, etc. on one map proved to be too cluttered. Map 1 identifies the subcatchment areas that were delineated to different points of interest or culverts in the subwatershed. Map 2 provides additional detail depicting National Wetlands Inventory mapped areas, conservation parcels, and contours. Map 3 identifies parcel lots that are developed and parcels that are vacant. The developed parcels are categorized between those on septic systems and those on town sewer. The various maps are attached in Appendix A.

Modeling results indicate that the majority of the phosphorus contribution to Monkey Pond is from the main drainage stem of Reservoir Brook beginning with Basin 1, which contains Reservoir Pond and then flows into Basin 2, then into Basin 5, and then into Basin 9. The cumulative total phosphorus (TP) load from Basin 9 is approximately 18.5 kg per year. This represents approximately half (48%) of the total calculated load to Monkey Pond. The second highest load, approximately 9.9 kg TP, comes from Basin 8, which includes the loading from Basins 3 and 4. Of all the basins, Basin 5 contributes the highest individual TP load, approximately 15.6 kg, due to it having the most developed land of all the basins at 17.4 hectares.

A detailed summary of this task can be found in the memorandum to Bess Morrison at NHDES from Pat Tarpey at Lake Winnipesaukee Association dated 12/21/2020 and included as Appendix B.

Conduct a Drainage Analysis and Hydrologic Assessment of the Reservoir Brook Watershed

A watershed level drainage analysis was completed using HydroCAD computer modeling software. The software utilizes Natural Resources Conservation Service (NRCS) Technical Release 55 (TR-55) unit hydrograph methodology to predict stormwater flows for different rainfall events and various locations in the watershed. The evaluation reviewed seven (7) drainage culverts in the watershed that were selected based on significance to the Town and routing of the watershed. Results of the culvert evaluation highlighted significant deficiencies with hydraulic capacity for most storm events. The table below summarizes the culvert evaluation. A detailed summary of the Drainage Analysis and Hydrologic Assessment work can be found in Appendix C.

Table: Culvert Evaluation Summary

Culvert Location	Estimated Discharge Capacity	Pass 10 yr Storm	Pass 25 yr Storm	Pass 50 yr Storm	Pass 100 yr Storm	Notes
Reservoir Brook at Reservoir Road	205.67 cfs	Yes	No	No	No	48" Concrete Pipe, s=0.0147 ft/ft
Reservoir Brook at NH Route 104	1271.3 cfs	Yes	Yes	Yes	Yes	72" Concrete Pipe, s=0.0645 ft/ft
Reservoir Brook at Waukewan St. (Eastern Culvert into Monkey Pond)	30.24 cfs	No	No	No	No	48" Corrugated Metal, s=0.0016 ft/ft, pipe is sediment filled to 50%.
Waukewan St - Central Culvert into Monkey Pond	9.59 cfs	No	No	No	No	18" Plastic, s=0.0083 ft/ft
Waukewan St - Western Culvert into Monkey Pond	28.33 cfs	No	No	No	No	18" Plastic, s=0.0727 ft/ft
Eastern Railroad Culvert - Monkey Pond into Lake Waukewan	67.23 cfs	No	No	No	No	48" Steel Pipe, s=0.020 ft/ft, Lake Waukewan tailwater during normal lake levels
Western Railroad Culvert - Monkey Pond into Lake Waukewan	85.92 cfs	No	No	No	No	48" Concrete Pipe, s=0.0147 ft/ft, Lake Waukewan tailwater during normal lake levels

Conduct a Wetland Evaluation and Functional Assessment of Monkey Pond

DuBois & King, Inc. used the New *Hampshire Method for Inventorying and Evaluating Wetlands in New Hampshire (2015)* to assess the functions of values of the wetland within Monkey Pond. Twelve functions are evaluated and scored on a quantitative scale to assist with ranking of wetlands and for use as a baseline against which to measure changes resulting from future development or restoration in the watershed above.

A detailed summary of the Wetland Evaluation can be found in Appendix D.

Findings and Recommendations

The evaluation of Monkey Pond highlighted several functions that Monkey Pond is currently providing with regards to Water Quality improvement in the watershed. Specifically, noted were the benefits associated with sediment trapping, nutrient transformation, and shoreline anchoring. A good diversity of native wetland vegetation helps to provide these functions, as faster flowing water enters the wetland from Reservoir Brook and is slowed down and fanned out as it comes into Monkey Pond and the vegetated areas of the wetlands. Considering the watershed draining to Monkey Pond, there is limited volume available in the wetland to address flood storage. The pond has two outlet pipes under the railroad tracks discharging to Lake Waukewan. These pipes are limited in their capacity to pass larger storm events. Full-scale dredging of the pond to increase storage capacity for sediment is not recommended, as it will result in a loss of vegetation in the wetland that is providing valuable functions. Loss of vegetation will reduce the capability of the pond to trap sediment by fanning out flows and slowing velocities which allow for settling. There would be less capacity to sequester nutrients through their uptake by said vegetation. Wetland enhancement projects recommended for Monkey Pond should focus on how water is managed as it enters and exits the wetland. Entrance locations or pipe culverts should be designed to provide adequate hydraulic capacity for their respective watershed catchment areas. Plunge pools or sediment traps at these locations should be considered to encourage sediment trapping. Additional consideration should be given to areas that allow for routine maintenance and removal of accumulated sediments. Also, BMPs that remove sediment prior to reaching Monkey Pond should be considered. Any work within the jurisdictional wetland areas will require permitting through NH Department of Environmental Services and the Army Corps of Engineers. New permits for dredging Monkey Pond are not likely to be issued since it would be seen as a temporary solution and does not address the source of sediment coming into the pond.

Recommendations to address sediment sources in the Watershed must also be considered. These recommendations include:

The culverts reviewed in this study were found to be hydraulically under-sized for larger storm events. Evidence of erosion around these culverts was observed and can be attributed to higher velocities where drainage areas are constrained by undersized culverts. Undersized culverts along Reservoir Brook at Waukewan Street and at Reservoir Road should be properly designed for high flows and low flows to minimize erosion in those areas. Any proposed replacement should include a more detailed hydraulic review for the culvert and a design that meets current NHDES permitting requirements. The Town should continue to communicate with the NH Department of Transportation about the culvert under Route 104 at Reservoir Brook to see that damaged headwalls are repaired and monitor erosion at that crossing.

New developments and existing sites subject to review by the Planning Board should include stormwater management plans and stormwater treatment practices to address runoff from private development. Stormwater treatment practices and maintenance of these practices need to be identified during the approval process with enforcement mechanisms to ensure compliance with maintenance commitments. We encourage the Planning Board to utilize third-party review of proposed stormwater infrastructure during the development process for compliance with Town regulations and industry standards.

Existing developments and associated stormwater structural practices that currently exist in the watershed should be evaluated for efficacy and whether these practices are functioning according to their design intent. During our evaluation, several stormwater features were noted but could not be fully evaluated given the overall watershed project scope and budget. When opportunities present themselves, such as redevelopment or actions that would require planning board approval for these parcels, the Town should look to review these existing stormwater practices within the watershed.

The Town should review maintenance of roadside swales and ditches within the watershed and make improvements to reduce erosion in these areas. Improvements for roadside swales may include expanding ditches to accommodate larger storm events and reducing velocities, or installing surface treatments (rip rap armoring) designed to withstand higher velocities. Check dams and sediment removal maintenance should also be considered along roadside ditches. The Town should monitor sumps associated with the catch basins and closed drainage system along Waukewan Street adjacent to Monkey Pond. A review of sediment accumulation and catch basin cleaning frequency is suggested.

Appendix A

Reservoir Brook / Monkey Pond Sub-Watershed

Map 1 of 3

Lake Waukewan

Waukewan Street

Waukewan Street

Monkey Pond

10

104

6

7

8

9

104

3

4

5

Reservoir Road

3

106

2

Reservoir Brook

1

106

Legend

Drainage Evaluation Points

Reservoir Brook Catchments

December 18, 2020

0 150 300 600 Feet

Reservoir Brook / Monkey Pond Sub-Watershed

Map 2 of 3

N
W
E
S

Lake Waukewan

Waukewan Street

Waukewan Street

Monkey Pond

10

8

9

104

104

3

6

7

5

3

4

Reservoir Road

Reservoir Brook

2

106

3

106

1

Waukewan Highlands Park

600

700

800

900

1000

1100

Legend

- Drainage Evaluation Points
- Reservoir Brook Catchments
- Wetland
- Conservation Lands
- 100 foot Contour Line
- 20 foot Contour Line

December 18, 2020

0 150 300 600 Feet

Reservoir Brook / Monkey Pond Sub-Watershed

Map 3 of 3

N
W
E
S

Lake Waukewan

Waukewan Street

Waukewan Street

Monkey Pond

10

104

3

6

7

8

9

104

5

3

4

Reservoir Road

Reservoir Brook

106

3

2

1

Waukewan Highlands Park

106

Legend

- Drainage Evaluation Points
- Reservoir Brook Catchments
- Sewer
- Conservation Lands

UTILITIES

- Developed - No Utilities
- Developed - Septic System
- Developed - Town Sewer
- Vacant Lot

December 18, 2020

0 150 300 600 Feet

Appendix B

M E M O R A N D U M

To: Bess Morrison, NHDES

From: Pat Tarpey, Lake Winnipesaukee Association

Subject: Summary Report on the mapping of existing conditions and nutrient modeling for Reservoir Brook

Date: 12/21/2020

This memo provides the detailed maps of existing conditions in the Reservoir Brook watershed as well as the final results from the nutrient model used to estimate the nutrient load for each catchment in the Reservoir Brook watershed, a subwatershed of Lake Waukewan. The estimation of nutrient load is part of Task 1 of the project: *Hydrologic Assessment of the Reservoir Brook Watershed and Evaluation of the functionality of Monkey Pond.*

Task 1: Identify and map existing conditions in the Reservoir Brook watershed.

Deliverables: Detailed maps of the Reservoir Brook watershed and a summary report of modeled nutrient loads.

Watershed Delineation

The Reservoir Brook watershed was delineated into 10 catchments to reflect the drainage patterns observed and to inform the nutrient loading and hydraulic models. Mapping was separated into 3 maps for clearer identification for use in analyses. Showing soils, utilities, parcels, streams, etc. on one map proved to be too cluttered. The various maps are shown in Figures 1 through 4.

Water Routing

The water routing determined in the catchment delineations and drainage analysis is shown in Table 2. The Basin in the left-hand column passes through basin in column below if indicated by a 1. For example, drainage from Basin 1 flows to Basin 2, which then flows to Basin 5 to Basin 9 and finally into Basin 10 (Monkey Pond). Basin 3 drains to Basin 4 which drains to Basin 8. Basins 6,7,8, and 9 drain directly to Basin 10. The drainage from Basin 1 to 2 to 5 to 9 represents the flow of Reservoir Brook and cumulatively contributes the largest water and nutrient load to Monkey Pond.

Septic Data

- Septic data was compiled for the LLRM based on mathematical models which calculate output of septic systems based on population data, estimated system age and degree of seasonal use. Only parcels located within 250 feet of a stream and known to have septic systems were included in the calculation. All parcels were determined to be year-round; age of the systems was undetermined, so for purposes of the model, it was assumed all systems were old rather than new. A total of 11 septic systems were identified for a total estimated load of 3.2 kg TP per year.

Table 1. Septic System data for the Reservoir Brook catchments.

Catchment	# Septic Systems (Year Round)	Phosphorus Load (kg)
Basin 1	0	0
Basin 2	0	0
Basin 3	0	0
Basin 4	0	0
Basin 5	1	0.3
Basin 6	7	2.0
Basin 7	0	0
Basin 8	2	0.6
Basin 9	1	0.3
Basin 10	0	0
Totals	**11**	**3.2**

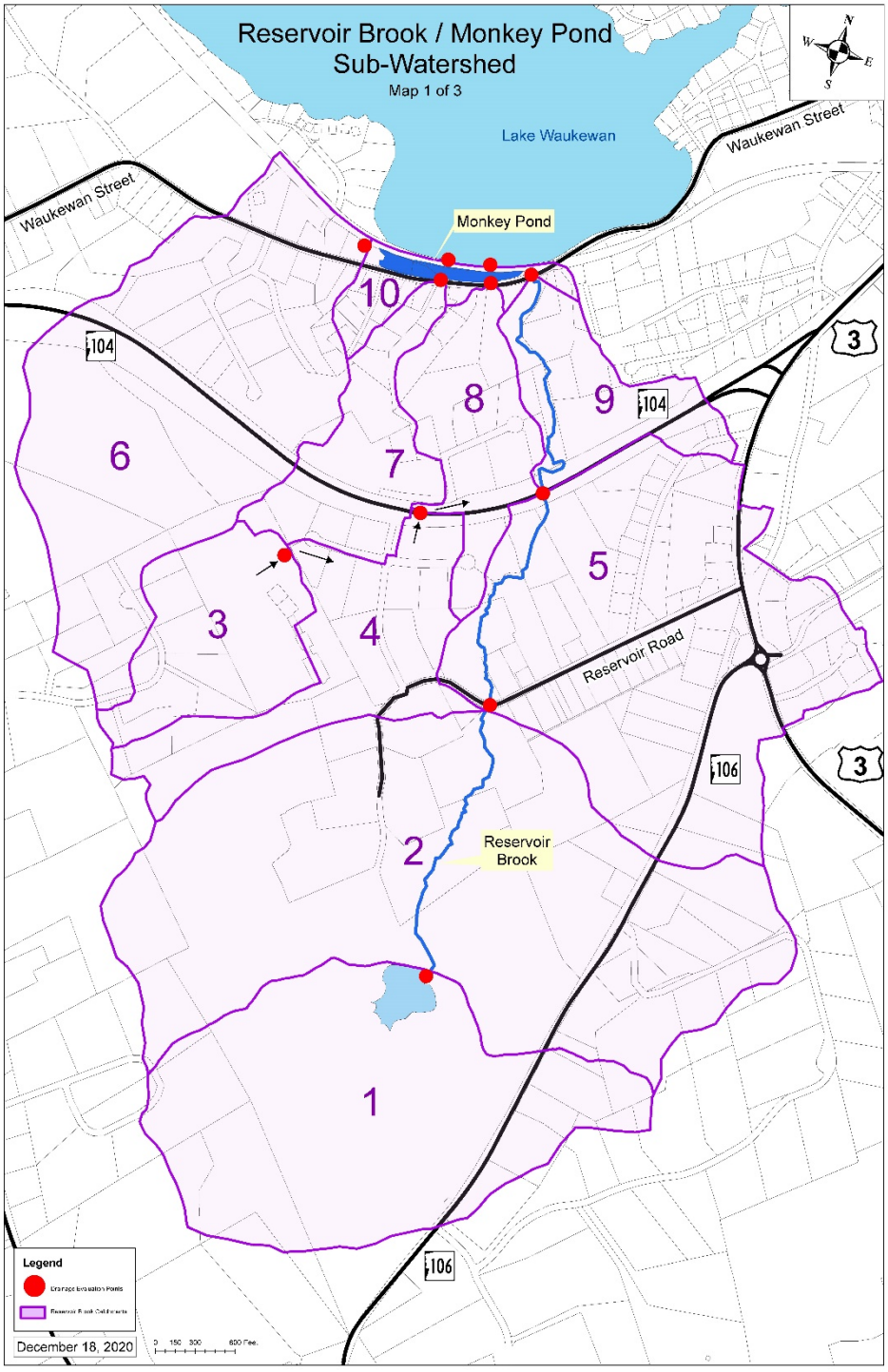


Figure 1: Reservoir Brook catchments.

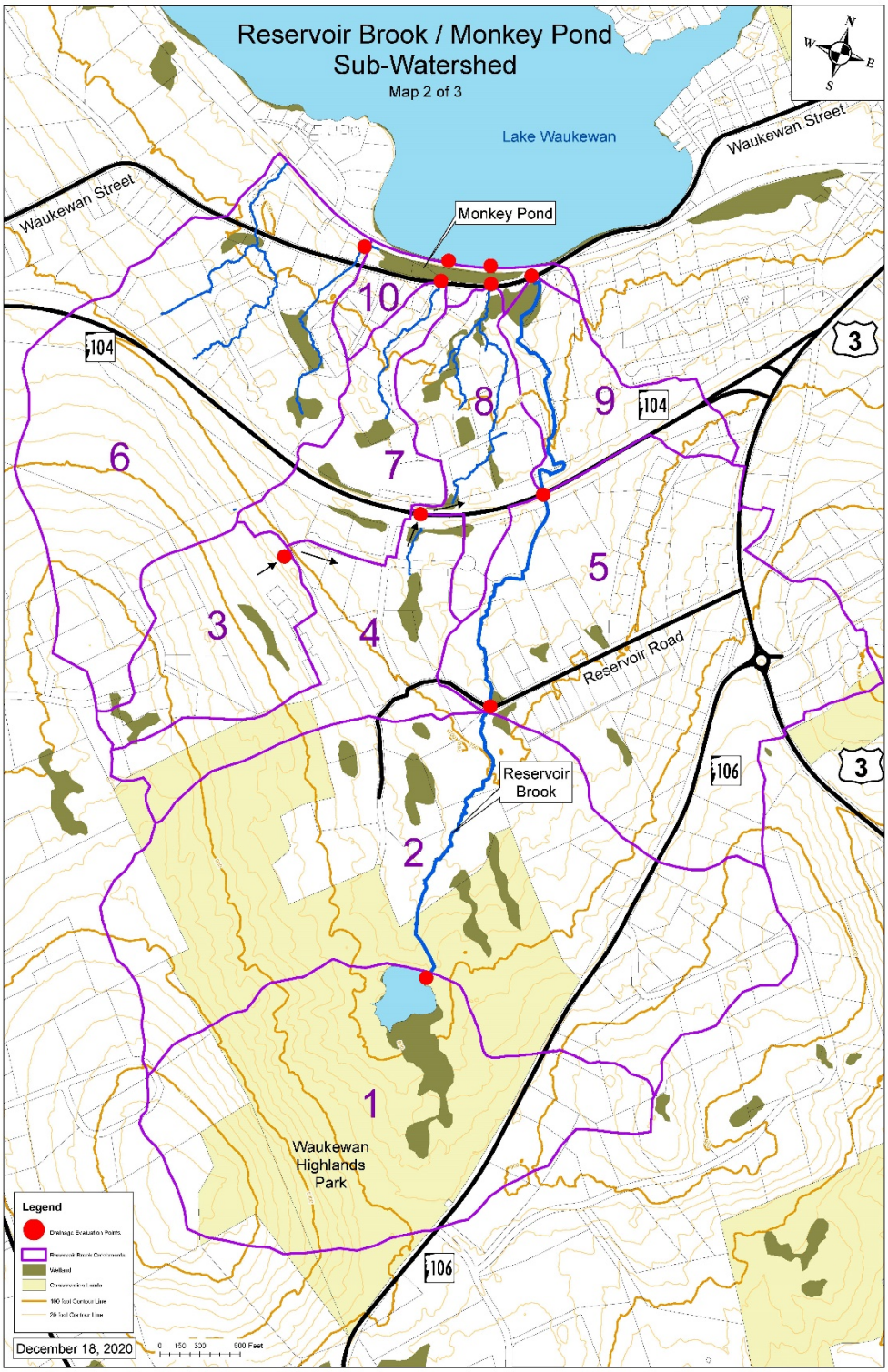


Figure 2. Map of Reservoir Brook catchments including streams parcels, roads, and 20 ft contours

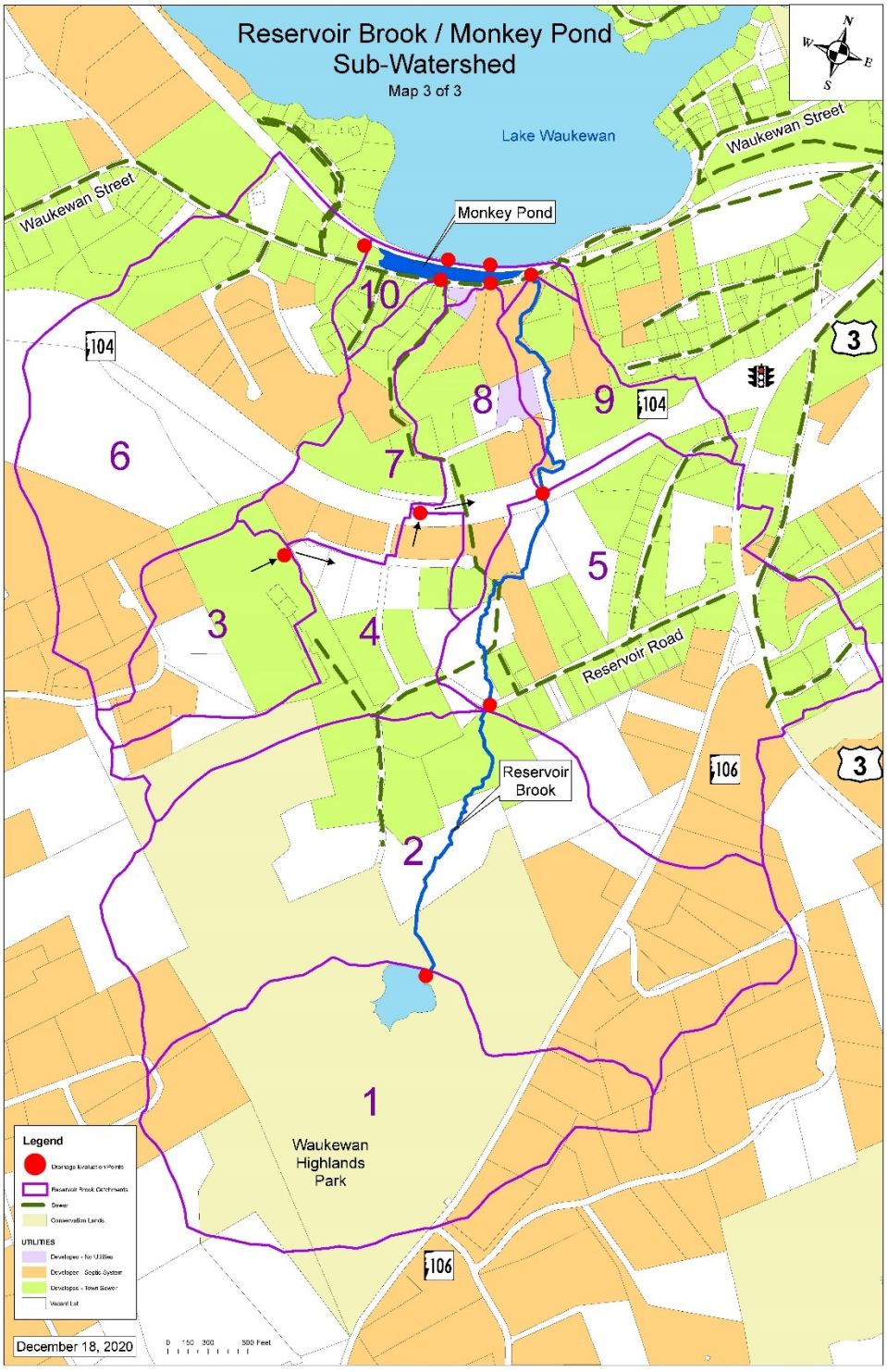


Figure 3: Reservoir Brook watershed showing parcels on town sewer and parcels with septic systems.

Table 2: Water Routing Pattern for the Reservoir Brook Watershed.

1=YES 0=NO XXX=BLANK	BASIN 1	BASIN 2	BASIN 3	BASIN 4	BASIN 5	BASIN 6 Direct	BASIN 7 Direct	BASIN 8 Direct	BASIN 9 Direct	BASIN 10
INDIVIDUAL BASIN	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**	**1**
BASIN 1 OUTPUT	XXX	**1**	0	0	0	0	0	0	0	0
BASIN 2 OUTPUT	0	XXX	0	0	**1**	0	0	0	0	0
BASIN 3 OUTPUT	0	0	XXX	**1**	0	0	0	0	0	0
BASIN 4 OUTPUT	0	0	0	XXX	0	0	0	**1**	0	0
BASIN 5 OUTPUT	0	0	0	0	XXX	0	0	0	**1**	0
BASIN 6 OUTPUT	0	0	0	0	0	XXX	0	0	0	**1**
BASIN 7 OUTPUT	0	0	0	0	0	0	XXX	0	0	**1**
BASIN 8 OUTPUT	0	0	0	0	0	0	0	XXX	0	**1**
BASIN 9 OUTPUT	0	0	0	0	0	0	0	0	XXX	**1**
BASIN 10 OUTPUT	0	0	0	0	0	0	0	0	0	XXX

Land Cover

Land cover data is used to estimate the transport and retention patterns of phosphorus as it moves through a watershed. An overlay of soil information from NRCS Web Soil Survey and Land cover data (NLCD 2011) for the study area has been verified and edited as necessary using aerial imagery by DuBois & King, Inc.

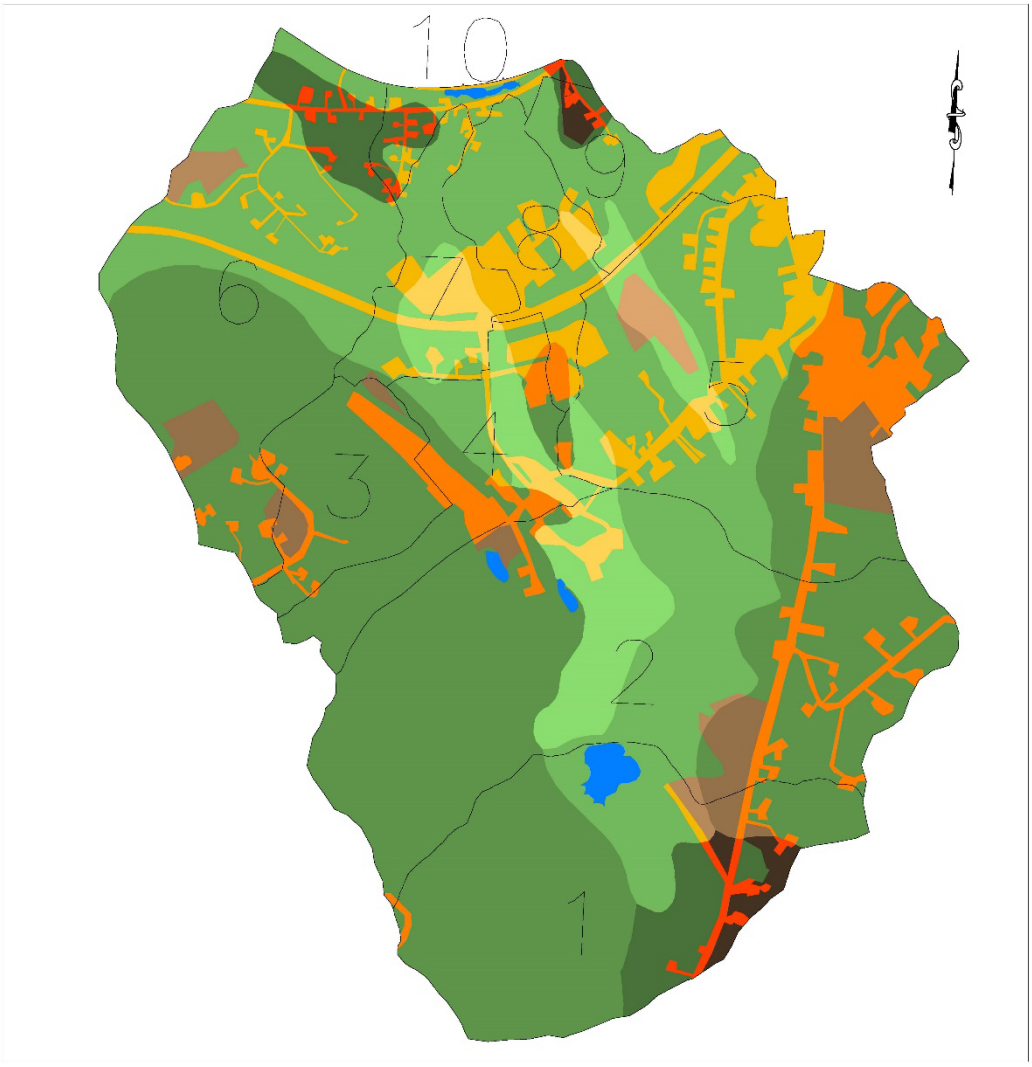
The land cover acreages for each basin are shown in Table 3, and Figure 4 shows the land cover and soils for the watershed.

Table 3. Reservoir Brook Land Cover

LAND USE	BASIN 1 AREA (HA)	BASIN 2 AREA (HA)	BASIN 3 AREA (HA)	BASIN 4 AREA (HA)	BASIN 5 AREA (HA)	BASIN 6 AREA (HA)	BASIN 7 AREA (HA)	BASIN 8 AREA (HA)	BASIN 9 AREA (HA)	BASIN 10 AREA (HA)	Total AREA (HA)
Urban 1 (Low Density Residential)	2.3	5.7	1.3	0.0	9.4	4.8	0.0	0.0	0.3	1.8	25.6
Urban 2 (Mid Density Residential/Commercial)	0.0	0.0	1.0	5.1	8.0	0.0	5.1	5.5	2.8	0.0	27.5
Urban 5 (Mowed Fields)	3.4	3.4	0.0	0.0	5.2	0.7	0.0	0.0	0.7	0.0	13.4
Agric 3 (Grazing)	0.0	0.0	1.0	0.0	0.0	2.8	0.0	0.0	0.0	0.0	3.9
Forest 3 (Mixed)	42.8	72.7	12.5	14.2	34.2	44.6	7.9	7.9	8.1	2.9	247.8
Open 1 (Wetland/Lake)	1.3	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	2.1
TOTAL	49.8	82.2	15.8	19.3	56.8	52.9	13.0	13.4	11.9	5.1	320.2

LOAD ROUTING AND ATTENUATION: PHOSPHORUS

	BASIN 1 (KG/YR)	BASIN 2 (KG/YR)	BASIN 3 (KG/YR)	BASIN 4 (KG/YR)	BASIN 5 (KG/YR)	BASIN 6 (KG/YR)	BASIN 7 (KG/YR)	BASIN 8 (KG/YR)	BASIN 9 (KG/YR)	BASIN 10 (KG/YR)
BASIN 1 INDIVIDUAL	4.5	7.0	2.7	5.1	15.6	6.3	4.9	5.3	3.4	0.9
BASIN 1 OUTPUT	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
BASIN 2 OUTPUT	0.0	0.0	0.0	0.0	5.8	0.0	0.0	0.0	0.0	0.0
BASIN 3 OUTPUT	0.0	0.0	0.0	2.0	0.0	0.0	0.0	0.0	0.0	0.0
BASIN 4 OUTPUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.7	0.0	0.0
BASIN 5 OUTPUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	17.2	0.0
BASIN 6 OUTPUT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0
BASIN 7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	4.2
BASIN 8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	9.9
BASIN 9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	18.5
BASIN 10	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
CUMULATIVE TOTAL	4.5	7.8	2.7	7.2	21.5	6.3	4.9	11.0	20.5	38.5
BASIN ATTENUATION - how much passes thru	0.65	0.75	0.75	0.80	0.80	0.80	0.85	0.90	0.90	0.80
OUTPUT LOAD	**3.0**	**5.8**	**2.0**	**5.7**	**17.2**	**5.0**	**4.2**	**9.9**	**18.5**	**30.8**



	Subcatchment Area									
	1	2	3	4	5	6	7	8	9	10
MIXED FOREST, B SOILS	645,580					460,494	7,368		68,717	154,176
MIXED FOREST, C SOILS	3,268,851	5,147,852	1,347,563	881,203	1,132,176	2,197,228	48,260	11830		
MIXED FOREST, CD SOILS	702,955	1,650,222		343,602	2,107,112	2,144,531	552,363	832785	723,051	162,381
MIXED FOREST, D SOILS		1,024,868		308,488	382,475		230,813	6988	79,089	
Total Mixed Forest	**4,605,186**	**7,822,372**	**1,347,563**	**1,533,518**	**3,681,763**	**4,805,351**	**845,809**	**851,603**	**870,807**	**316,567**
MIXED PASTURE, B SOILS	222,830								70,527	4,857
MIXED PASTURE, C SOILS	90,863	328,646	109,816		338,096	228,967	4,368			
MIXED PASTURE, CD SOILS	56,052	39,267			24,053	143,934				
MIXED PASTURE, D SOILS					168,801					
Total Mixed Pasture	**368,625**	**867,913**	**109,816**	**-**	**560,952**	**372,181**	**4,368**	**-**	**70,527**	**4,857**
DEVELOPED (90% IMPERVIOUS), B SOILS	344,381					85,845			31,730	72,333
DEVELOPED (90% IMPERVIOUS), C SOILS	74,397	484,154	247,317	377,345	859,093	111,423		67,004		
DEVELOPED (90% IMPERVIOUS), CD SOILS	25,252			102,059	912,862	319,498	249,738	467,516	276,008	116,003
DEVELOPED (90% IMPERVIOUS), D SOILS		127,411		122,809	96,975		295,830	57,502	21,813	
Total Developed (90% Impervious)	**245,685**	**611,565**	**242,512**	**547,215**	**1,868,864**	**516,766**	**545,568**	**592,022**	**329,551**	**188,336**
OPEN WATER	142,960	42,224								30,183
Total SF	**5,360,406**	**8,344,074**	**1,699,891**	**2,080,733**	**6,111,579**	**5,694,298**	**1,395,745**	**1,443,625**	**1,270,885**	**539,943**

LEGEND

- MIXED FOREST, B SOILS
- MIXED FOREST, C SOILS
- MIXED FOREST, CD SOILS
- MIXED FOREST, D SOILS
- MIXED PASTURE, B SOILS
- MIXED PASTURE, C SOILS
- MIXED PASTURE, CD SOILS
- MIXED PASTURE, D SOILS
- DEVELOPED (90% IMPERVIOUS), B SOILS
- DEVELOPED (90% IMPERVIOUS), C SOILS
- DEVELOPED (90% IMPERVIOUS), CD SOILS
- DEVELOPED (90% IMPERVIOUS), D SOILS
- OPEN WATER

Figure 4. Land Cover and Soils Map for Reservoir Brook watershed.

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LLRM Results

Modeling results indicate that the majority of the phosphorus contribution to Monkey Pond is from the main drainage of Reservoir Brook beginning with Basin 1, which contains Reservoir Pond (Table 3). The cumulative total phosphorus (TP) load from Basin 9 is 18.5 kg per year. This represents approximately half (48%) of the total load to Monkey Pond. The second highest load, 9.9 kg TP, comes from Basin 8, which includes the loading from Basins 3 and 4.

Of all the basins, Basin 5 contributes the highest individual TP load, 15.6 kg, due to it having the most developed land of all the basins at 17.4 hectares.

The contribution of phosphorus from septic systems appears to be quite small; 11 parcels were identified within 250 feet of the streams entering Monkey Pond, for an estimated phosphorus load of 3.2 kg/ year.

Table 3. Summary of total phosphorus (TP) loading by subdrainage for Monkey Pond

Drainage Routing	***Reservoir Brook Subwatershed***		
	Phosphorus (kg/yr)	Percent TP Contribution	Water Load (m3/yr)
Basin 1	3.0	7.8	310,372
Basin 2	5.8	15.1	514,407
Basin 5	17.2	49.6	794,332
Basin 9 (Cumulative)	**18.5**	**48.1**	**751,490**
Basin 3	2.0	5.2	99,415
Basin 4	5.7	14.8	208,811
Basin 8 (Cumulative)	**9.9**	**25.7**	**264,826**
Basin 6 Direct	**5.0**	**13.0**	**330,859**
Basin 7 Direct	**4.2**	**10.9**	**84,731**
Basin 10 Direct	**0.9**	**2.3**	**35,996**
Total	**38.5**	100%	
Attenuation Factor	**.80**		**.85**
Total Load to Monkey Pond)	**30.8**		**1,247,716**

Appendix C

831 Union Avenue
Laconia, NH 03246
(603) 524-1166
nsceggell@dubois-king.com

MEMORANDUM
226315

TO: **Patricia Tarpey, Lake Winnipesaukee Association;**
John Edgar, Town of Meredith
FROM: **Nicholas Sceggell, PE**
SUBJECT: **Reservoir Brook & Monkey Pond, Meredith, NH; Hydrologic & Hydraulic Evaluation**
DATE: **December 28, 2020**

1. The Lake Winnipesaukee Association has requested that DuBois & King, Inc. assist with a study of the Reservoir Brook and Monkey Pond subwatershed, in an effort to better understand the processes of excessive stormwater loading from land development into Lake Waukewan and further downstream. A part of this study is a drainage analysis and hydrologic assessment of the Reservoir Brook/Monkey Pond Watershed.
The watershed was split into subcatchments to evaluate locations in the watershed of interest, specifically looking at culverts along Reservoir Brook at Reservoir Road, NH Route 104, and on Waukewan Street. Two additional culverts under Waukewan Street that discharge into Monkey Pond were evaluated, as well as an area that drains along the railroad tracks from the west into Monkey Pond. The Meredith Reservoir, the headwaters for Reservoir Brook, was also included in the analysis.

2. The Town of Meredith provided subcatchment mapping of the watershed. The mapping was produced using LiDAR topography, and through field verification of drainage routing throughout the watershed. The town prepared GIS shapefiles of each subcatchment. The shapefiles were imported into AutoCAD software with an aerial overlay.

3. Land uses within each of the subcatchments were categorized in order to assign stormwater runoff characteristics. The initial land cover information was imported from NH GRANIT. Using updated aerial photography and ground-truthing to check questionable land use areas, the land cover information was updated using AutoCAD software. Subwatershed Maps are included in Appendix A.

4. Soil information was imported to overlay and further define the land cover by hydrologic soil grouping. Soils data from the Natural Resources Conservation Service (NRCS) web soil survey was used for this evaluation. A copy of the soils report is attached as Appendix B.

5. Rainfall data used for the evaluation was downloaded from the Northeast

Regional Climate Center. A copy of the precipitation table is attached as Appendix C.

6. HydroCAD water modeling software was used to evaluate the points of interest for each of the subwatershed areas. HydroCAD utilizes methodology developed through the NRCS TR-20 unit hydrograph routing model, and allows graphical representation of the watershed and subwatershed routing. Modeling of the watershed was done for various storm frequencies in order to identify the peak discharge rates that occur as a result of the 24-hour duration storms with a return frequency of once in 2 years, 10 years, 25 years, 50 years, and 100 years. Table 1 summarizes the peak discharges for each subwatershed and storm frequency.

Table 1: Peak Runoff in Reservoir Brook Subwatersheds

Subcatchment Area	2 Yr Rainfall Runoff	10 Yr Rainfall Runoff	25 Yr Rainfall Runoff	50 Yr Rainfall Runoff	100 Yr Rainfall Runoff
1S	39.23	101.84	157.57	213.12	281.01
2S	70.80	165.09	246.12	326.01	422.59
3S	18.28	41.30	61.11	80.49	103.78
4S	29.18	59.40	84.44	108.56	137.17
5S	84.16	167.98	236.68	302.08	379.49
6S	38.50	93.01	140.56	187.25	243.81
7S	24.40	45.73	62.80	78.85	97.70
8S	24.82	46.59	64.02	80.41	99.67
9S	16.61	34.68	49.70	64.14	81.41
10S	9.18	19.75	28.63	37.19	47.42

Runoff units are cubic feet per second (CFS)

7. A summary of the water routing can be found in the Summary Report on the mapping of existing conditions and nutrient modeling for Reservoir Brook Table 2, prepared by Pat Tarpey, Lake Winnipesaukee Association. A copy of Table 2 is attached below.

Table 2: Water Routing Pattern for the Reservoir Brook Watershed.

1=YES 0=NO XXX=BLANK	BASIN 1	BASIN 2	BASIN 3	BASIN 4	BASIN 5	BASIN 6 Direct	BASIN 7 Direct	BASIN 8 Direct	BASIN 9 Direct	BASIN 10
INDIVIDUAL BASIN	1	1	1	1	1	1	1	1	1	1
BASIN 1 OUTPUT	XXX	1	0	0	0	0	0	0	0	0
BASIN 2 OUTPUT	0	XXX	0	0	1	0	0	0	0	0
BASIN 3 OUTPUT	0	0	XXX	1	0	0	0	0	0	0
BASIN 4 OUTPUT	0	0	0	XXX	0	0	0	1	0	0
BASIN 5 OUTPUT	0	0	0	0	XXX	0	0	0	1	0
BASIN 6 OUTPUT	0	0	0	0	0	XXX	0	0	0	1
BASIN 7 OUTPUT	0	0	0	0	0	0	XXX	0	0	1
BASIN 8 OUTPUT	0	0	0	0	0	0	0	XXX	0	1
BASIN 9 OUTPUT	0	0	0	0	0	0	0	0	XXX	1
BASIN 10 OUTPUT	0	0	0	0	0	0	0	0	0	XXX

8. Seven culverts were evaluated comparing the estimated hydraulic capacity of the culvert to the estimated peak discharge from the HydroCAD model. Capacity for each culvert was estimated using HydroCAD modeling software and physical characteristics of the pipe, including size, material of construction, and approximate slope. Information was gathered from the NH Statewide Asset Data Exchange System (SADES) and field work. Results are presented in Table 3: Culvert Evaluation.

9. The Meredith Reservoir is the headworks of Reservoir Brook and was incorporated into the hydraulic model as a pond with some limited storage capacity. The size of the low flow outlet of the pond was estimated at 18" diameter but could not be confirmed because the outlet was blocked with leaves and debris. The secondary outlet consists of three (3) 36" smooth plastic culverts. The pond is able to store and discharge all storm events evaluated without overtopping the dam embankment. Discharge flows from the dam were routed downstream along the Reservoir Brook channel for this evaluation. Also incorporated into the model was the constructed stormwater pond on Tax Map S24, Lot 17, to best represent flows impacted by the pond.

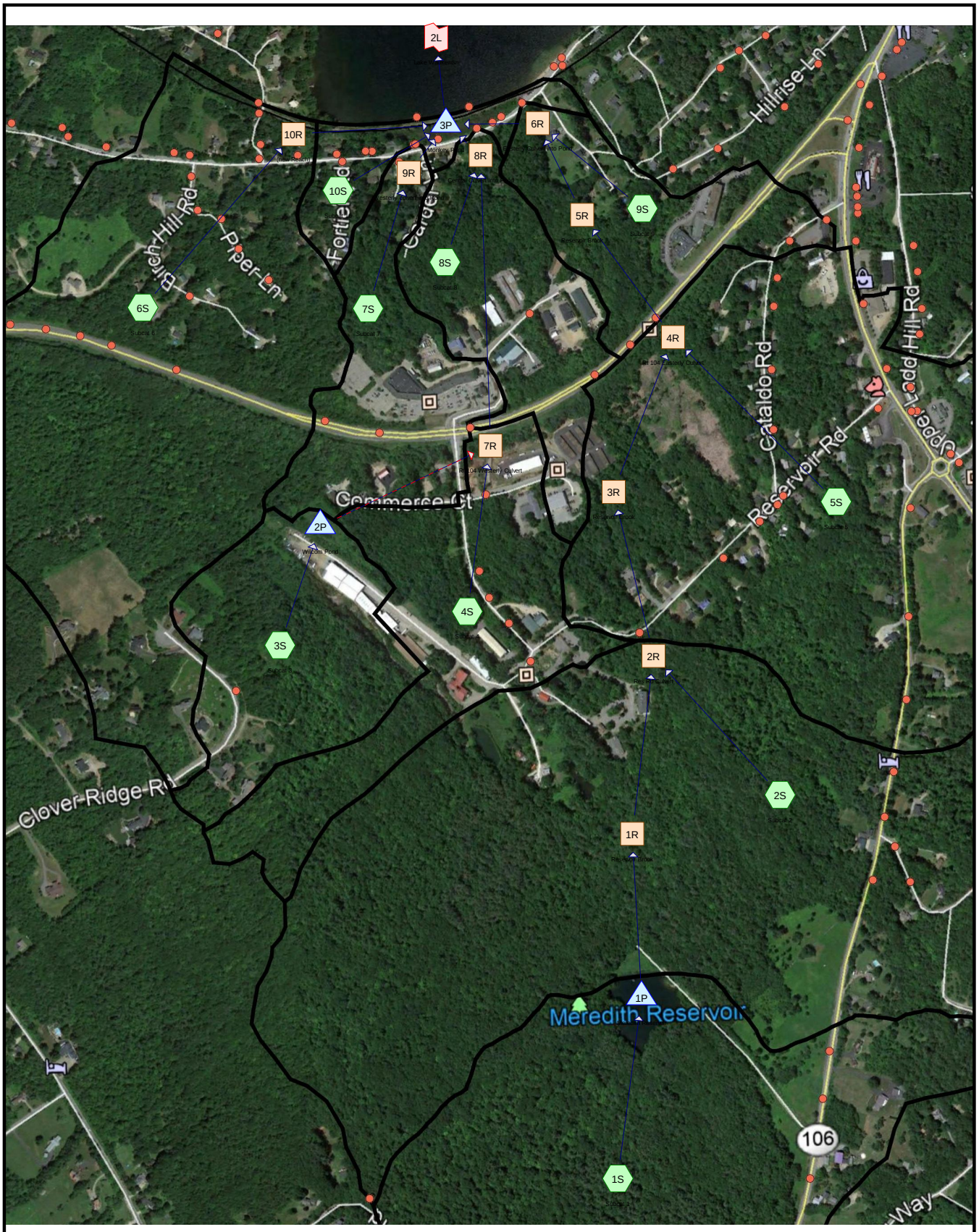
10. The area draining to the pond from the West was routed through an open channel into the pond which simulates the drainage ditch along the south side of the railroad which directs water into Monkey Pond. The hydraulic model indicates that the ditch has capacity to carry the 25 year storm event but overtops for larger storm events.

11. Field review of Reservoir Brook was completed to accurately model the stream reach in the hydraulic model. Preliminary observations of the stream's geomorphology indicate a stream that is moderately entrenched with a stream slope of 2-4%, and moderate sinuosity. A more comprehensive geomorphic analysis of the stream was not part of this project scope. Any culvert or stream restoration work would include a more detailed review of the stream and reference reaches adjacent to proposed work.

12. NH Stream Crossing Guidelines published by University of NH were utilized to evaluate the Reservoir Brook culverts at Reservoir Rd, Route 104, and Waukewan Street. Deficiencies were noted for organic material transport, sediment transport, aquatic organism passage, and lack of capacity for flood events.

Table 3: Culvert Evaluation

Culvert Location	Estimated Discharge Capacity	Pass 10 yr Storm	Pass 25 yr Storm	Pass 50 yr Storm	Pass 100 yr Storm	Notes
Reservoir Brook at Reservoir Road	205.67 cfs	Yes	No	No	No	48" Concrete Pipe, s=0.0147 ft/ft
Reservoir Brook at NH Route 104	1271.3 cfs	Yes	Yes	Yes	Yes	72" Concrete Pipe, s=0.0645 ft/ft
Reservoir Brook at Waukewan St. (Eastern Culvert into Monkey Pond)	30.24 cfs	No	No	No	No	48" Corrugated Metal, s=0.0016 ft/ft, pipe is sediment filled to 50%.
Waukewan St - Central Culvert into Monkey Pond	9.59 cfs	No	No	No	No	18" Plastic, s=0.0083 ft/ft
Waukewan St - Western Culvert into Monkey Pond	28.33 cfs	No	No	No	No	18" Plastic, s=0.0727 ft/ft
Eastern Railroad Culvert - Monkey Pond into Lake Waukewan	67.23 cfs	No	No	No	No	48" Steel Pipe, s=0.020 ft/ft, Lake Waukewan tailwater during normal lake levels
Western Railroad Culvert - Monkey Pond into Lake Waukewan	85.92 cfs	No	No	No	No	48" Concrete Pipe, s=0.0147 ft/ft, Lake Waukewan tailwater during normal lake levels



Subcat | Reach | Pond | Link

Routing Diagram for Existing
Prepared by {enter your company name here}, Printed 12/23/2020
HydroCAD® 10.00-18 s/n 00761 © 2016 HydroCAD Software Solutions LLC

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
6.030	79	50-75% Grass cover, Fair, HSG C (1S, 2S, 5S, 6S)
6.830	61	>75% Grass cover, Good, HSG B (1S, 9S, 10S)
25.240	74	>75% Grass cover, Good, HSG C (1S, 2S, 3S, 5S, 6S, 7S)
4.560	80	>75% Grass cover, Good, HSG D (5S)
7.670	92	Urban commercial, 85% imp, HSG B (1S, 6S, 9S, 10S)
106.270	94	Urban commercial, 85% imp, HSG C (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S)
16.580	95	Urban commercial, 85% imp, HSG D (2S, 4S, 5S, 7S, 8S, 9S)
4.940	98	Water Surface, 0% imp, HSG A (1S, 2S, 10S)
213.030	73	Woods, Fair, HSG C (1S, 2S, 4S, 5S, 6S, 7S, 8S, 9S, 10S)
30.370	55	Woods, Good, HSG B (1S, 6S, 7S, 9S, 10S)
321.880	70	Woods, Good, HSG C (1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S)
46.860	77	Woods, Good, HSG D (2S, 4S, 5S, 7S, 8S, 9S)
790.260	**75**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
4.940	HSG A	1S, 2S, 10S
44.870	HSG B	1S, 6S, 7S, 9S, 10S
672.450	HSG C	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
68.000	HSG D	2S, 4S, 5S, 7S, 8S, 9S
0.000	Other	
790.260		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.000	0.000	6.030	0.000	0.000	6.030	50-75% Grass cover, Fair	1S, 2S, 5S, 6S
0.000	6.830	25.240	4.560	0.000	36.630	>75% Grass cover, Good	1S, 2S, 3S, 5S, 6S, 7S, 9S, 10S
0.000	7.670	106.270	16.580	0.000	130.520	Urban commercial, 85% imp	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
4.940	0.000	0.000	0.000	0.000	4.940	Water Surface, 0% imp	1S, 2S, 10S
0.000	0.000	213.030	0.000	0.000	213.030	Woods, Fair	1S, 2S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
0.000	30.370	321.880	46.860	0.000	399.110	Woods, Good	1S, 2S, 3S, 4S, 5S, 6S, 7S, 8S, 9S, 10S
4.940	**44.870**	**672.450**	**68.000**	**0.000**	**790.260**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	2R	682.31	681.40	62.0	0.0147	0.011	48.0	0.0	0.0
2	4R	622.00	614.00	124.0	0.0645	0.011	72.0	0.0	0.0
3	6R	542.00	541.90	61.0	0.0016	0.025	54.0	0.0	18.0
4	7R	640.00	636.00	120.0	0.0333	0.013	36.0	0.0	0.0
5	8R	542.50	542.00	60.0	0.0083	0.013	16.0	0.0	0.0
6	9R	544.00	540.00	55.0	0.0727	0.013	18.0	0.0	0.0
7	1P	778.00	777.40	30.0	0.0200	0.013	30.0	0.0	0.0
8	3P	541.00	540.20	40.0	0.0200	0.011	48.0	0.0	0.0
9	3P	541.00	540.00	47.0	0.0213	0.012	48.0	0.0	0.0

Time span=2.00-48.00 hrs, dt=0.01 hrs, 4601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat 1 Runoff Area=123.050 ac 3.86% Impervious Runoff Depth=0.56"
Flow Length=2,832' Slope=0.1200 '/' Tc=28.2 min CN=70 Runoff=39.23 cfs 5.787 af

Subcatchment 2S: Subcat 2 Runoff Area=203.010 ac 5.87% Impervious Runoff Depth=0.69"
Flow Length=4,382' Slope=0.0950 '/' Tc=41.3 min CN=73 Runoff=70.80 cfs 11.682 af

Subcatchment 3S: Subcat 3 Runoff Area=39.030 ac 12.13% Impervious Runoff Depth=0.74"
Flow Length=2,511' Slope=0.0910 '/' Tc=26.3 min CN=74 Runoff=18.28 cfs 2.393 af

Subcatchment 4S: Subcat 4 Runoff Area=47.760 ac 22.35% Impervious Runoff Depth=0.93"
Flow Length=3,272' Slope=0.0980 '/' Tc=27.9 min CN=78 Runoff=29.18 cfs 3.717 af

Subcatchment 5S: Subcat 5 Runoff Area=140.300 ac 26.00% Impervious Runoff Depth=0.99"
Flow Length=3,798' Slope=0.0810 '/' Tc=33.5 min CN=79 Runoff=84.16 cfs 11.553 af

Subcatchment 6S: Subcat 6 Runoff Area=130.360 ac 7.73% Impervious Runoff Depth=0.65"
Flow Length=4,593' Slope=0.0810 '/' Tc=47.8 min CN=72 Runoff=38.50 cfs 7.028 af

Subcatchment 7S: Subcat 7 Runoff Area=32.040 ac 33.21% Impervious Runoff Depth=1.16"
Flow Length=3,154' Slope=0.0630 '/' Tc=29.8 min CN=82 Runoff=24.40 cfs 3.104 af

Subcatchment 8S: Subcat 8 Runoff Area=33.140 ac 34.86% Impervious Runoff Depth=1.16"
Flow Length=2,745' Slope=0.0470 '/' Tc=30.8 min CN=82 Runoff=24.82 cfs 3.210 af

Subcatchment 9S: Subcat 9 Runoff Area=29.180 ac 22.05% Impervious Runoff Depth=0.88"
Flow Length=2,576' Slope=0.0700 '/' Tc=28.0 min CN=77 Runoff=16.61 cfs 2.144 af

Subcatchment 10S: Subcat 10 Runoff Area=12.390 ac 29.64% Impervious Runoff Depth=0.83"
Flow Length=961' Slope=0.0830 '/' Tc=12.1 min CN=76 Runoff=9.18 cfs 0.858 af

Reach 1R: Reservoir Brook Avg. Flow Depth=0.42' Max Vel=3.79 fps Inflow=8.21 cfs 5.570 af
n=0.040 L=2,356.0' S=0.0398 '/' Capacity=202.98 cfs Outflow=8.20 cfs 5.560 af

Reach 2R: Res Rd Culvert Avg. Flow Depth=1.62' Max Vel=14.86 fps Inflow=70.93 cfs 17.243 af
48.0" Round Pipe n=0.011 L=62.0' S=0.0147 '/' Capacity=205.67 cfs Outflow=70.92 cfs 17.242 af

Reach 3R: Reservoir Brook Avg. Flow Depth=1.99' Max Vel=7.06 fps Inflow=70.92 cfs 17.242 af
n=0.040 L=1,983.0' S=0.0300 '/' Capacity=156.15 cfs Outflow=69.92 cfs 17.236 af

Reach 4R: Rt 104 Easterly Culvert Avg. Flow Depth=1.34' Max Vel=29.51 fps Inflow=139.01 cfs 28.788 af
72.0" Round Pipe n=0.011 L=124.0' S=0.0645 '/' Capacity=1,271.30 cfs Outflow=138.98 cfs 28.788 af

Reach 5R: Reservoir Brook Avg. Flow Depth=2.46' Max Vel=8.67 fps Inflow=138.98 cfs 28.788 af
n=0.040 L=2,167.0' S=0.0332 '/' Capacity=201.12 cfs Outflow=137.39 cfs 28.781 af

Reach 6R: Easterly Culvert into Pond Avg. Flow Depth=3.00' Max Vel=2.49 fps Inflow=147.84 cfs 30.925 af
54.0" Round Pipe w/ 18.0" inside fill n=0.025 L=61.0' S=0.0016 '/' Capacity=24.84 cfs Outflow=25.57 cfs 30.924 af

Reach 7R: Rt 104 Westerly Culvert Avg. Flow Depth=1.00' Max Vel=14.15 fps Inflow=29.18 cfs 4.571 af
36.0" Round Pipe n=0.013 L=120.0' S=0.0333 '/' Capacity=121.77 cfs Outflow=29.16 cfs 4.571 af

Reach 8R: Central Culvert into Pond Avg. Flow Depth=1.33' Max Vel=5.72 fps Inflow=53.99 cfs 7.781 af
16.0" Round Pipe n=0.013 L=60.0' S=0.0083 '/' Capacity=7.00 cfs Outflow=7.30 cfs 7.781 af

Reach 9R: Westerly culvert into Pond Avg. Flow Depth=1.07' Max Vel=18.03 fps Inflow=24.40 cfs 3.104 af
18.0" Round Pipe n=0.013 L=55.0' S=0.0727 '/' Capacity=28.33 cfs Outflow=24.40 cfs 3.104 af

Reach 10R: (new Reach) Avg. Flow Depth=1.31' Max Vel=4.22 fps Inflow=38.50 cfs 7.028 af
n=0.040 L=116.0' S=0.0172 '/' Capacity=96.39 cfs Outflow=38.49 cfs 7.028 af

Pond 1P: Meredith Reservoir Peak Elev=778.64' Storage=2.199 af Inflow=39.23 cfs 5.787 af
30.0" Round Culvert x 3.00 n=0.013 L=30.0' S=0.0200 '/' Outflow=8.21 cfs 5.570 af

Pond 2P: Wilcom Pond Peak Elev=715.93' Storage=1.603 af Inflow=18.28 cfs 2.393 af
Primary=1.99 cfs 0.854 af Secondary=0.00 cfs 0.000 af Outflow=1.99 cfs 0.854 af

Pond 3P: Monkey Pond Peak Elev=543.22' Storage=4.388 af Inflow=90.96 cfs 49.695 af
Outflow=68.42 cfs 48.557 af

Link 2L: Lake Waukewan Inflow=68.42 cfs 48.557 af
Primary=68.42 cfs 48.557 af

Total Runoff Area = 790.260 ac Runoff Volume = 51.476 af Average Runoff Depth = 0.78"
85.96% Pervious = 679.318 ac 14.04% Impervious = 110.942 ac

Summary for Subcatchment 1S: Subcat 1

Runoff = 39.23 cfs @ 12.47 hrs, Volume= 5.787 af, Depth= 0.56"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
14.820	55	Woods, Good, HSG B
74.760	70	Woods, Good, HSG C
16.140	73	Woods, Fair, HSG C
5.100	61	>75% Grass cover, Good, HSG B
2.070	74	>75% Grass cover, Good, HSG C
1.290	79	50-75% Grass cover, Fair, HSG C
3.310	92	Urban commercial, 85% imp, HSG B
1.700	94	Urban commercial, 85% imp, HSG C
0.580	94	Urban commercial, 85% imp, HSG C
3.280	98	Water Surface, 0% imp, HSG A
123.050	70	Weighted Average
118.298		96.14% Pervious Area
4.751		3.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	2,832	0.1200	1.68		**Lag/CN Method,**

Summary for Subcatchment 2S: Subcat 2

Runoff = 70.80 cfs @ 12.63 hrs, Volume= 11.682 af, Depth= 0.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
118.170	70	Woods, Good, HSG C
37.880	73	Woods, Fair, HSG C
23.520	77	Woods, Good, HSG D
7.540	74	>75% Grass cover, Good, HSG C
0.900	79	50-75% Grass cover, Fair, HSG C
11.110	94	Urban commercial, 85% imp, HSG C
2.920	95	Urban commercial, 85% imp, HSG D
0.970	98	Water Surface, 0% imp, HSG A
203.010	73	Weighted Average
191.085		94.13% Pervious Area
11.925		5.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.3	4,382	0.0950	1.77		**Lag/CN Method,**

Summary for Subcatchment 3S: Subcat 3

Runoff = 18.28 cfs @ 12.42 hrs, Volume= 2.393 af, Depth= 0.74"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
30.940	70	Woods, Good, HSG C
2.520	74	>75% Grass cover, Good, HSG C
5.570	94	Urban commercial, 85% imp, HSG C
39.030	74	Weighted Average
34.295		87.87% Pervious Area
4.734		12.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	2,511	0.0910	1.59		**Lag/CN Method,**

Summary for Subcatchment 4S: Subcat 4

Runoff = 29.18 cfs @ 12.43 hrs, Volume= 3.717 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
20.230	70	Woods, Good, HSG C
7.890	73	Woods, Fair, HSG C
7.080	77	Woods, Good, HSG D
7.400	94	Urban commercial, 85% imp, HSG C
2.340	94	Urban commercial, 85% imp, HSG C
2.820	95	Urban commercial, 85% imp, HSG D
47.760	78	Weighted Average
37.084		77.65% Pervious Area
10.676		22.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	3,272	0.0980	1.96		**Lag/CN Method,**

Summary for Subcatchment 5S: Subcat 5

Runoff = 84.16 cfs @ 12.50 hrs, Volume= 11.553 af, Depth= 0.99"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
25.990	70	Woods, Good, HSG C
49.750	73	Woods, Fair, HSG C
8.780	77	Woods, Good, HSG D
7.760	74	>75% Grass cover, Good, HSG C
0.550	79	50-75% Grass cover, Fair, HSG C
4.560	80	>75% Grass cover, Good, HSG D
19.720	94	Urban commercial, 85% imp, HSG C
20.960	94	Urban commercial, 85% imp, HSG C
2.230	95	Urban commercial, 85% imp, HSG D
140.300	79	Weighted Average
103.826		74.00% Pervious Area
36.473		26.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.5	3,798	0.0810	1.89		**Lag/CN Method,**

Summary for Subcatchment 6S: Subcat 6

Runoff = 38.50 cfs @ 12.75 hrs, Volume= 7.028 af, Depth= 0.65"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
10.260	55	Woods, Good, HSG B
50.460	70	Woods, Good, HSG C
49.240	73	Woods, Fair, HSG C
5.250	74	>75% Grass cover, Good, HSG C
3.290	79	50-75% Grass cover, Fair, HSG C
1.970	92	Urban commercial, 85% imp, HSG B
2.560	94	Urban commercial, 85% imp, HSG C
7.330	94	Urban commercial, 85% imp, HSG C
130.360	72	Weighted Average
120.279		92.27% Pervious Area
10.081		7.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.8	4,593	0.0810	1.60		**Lag/CN Method,**

Summary for Subcatchment 7S: Subcat 7

Runoff = 24.40 cfs @ 12.42 hrs, Volume= 3.104 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
0.170	55	Woods, Good, HSG B
1.060	70	Woods, Good, HSG C
12.680	73	Woods, Fair, HSG C
5.510	77	Woods, Good, HSG D
0.100	74	>75% Grass cover, Good, HSG C
5.730	94	Urban commercial, 85% imp, HSG C
6.790	95	Urban commercial, 85% imp, HSG D
32.040	82	Weighted Average
21.398		66.79% Pervious Area
10.642		33.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	3,154	0.0630	1.77		**Lag/CN Method,**

Summary for Subcatchment 8S: Subcat 8

Runoff = 24.82 cfs @ 12.45 hrs, Volume= 3.210 af, Depth= 1.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
0.270	70	Woods, Good, HSG C
19.120	73	Woods, Fair, HSG C
0.160	77	Woods, Good, HSG D
1.540	94	Urban commercial, 85% imp, HSG C
10.730	94	Urban commercial, 85% imp, HSG C
1.320	95	Urban commercial, 85% imp, HSG D
33.140	82	Weighted Average
21.588		65.14% Pervious Area
11.551		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	2,745	0.0470	1.48		**Lag/CN Method,**

Summary for Subcatchment 9S: Subcat 9

Runoff = 16.61 cfs @ 12.42 hrs, Volume= 2.144 af, Depth= 0.88"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
1.580	55	Woods, Good, HSG B
16.600	73	Woods, Fair, HSG C
1.810	77	Woods, Good, HSG D
1.620	61	>75% Grass cover, Good, HSG B
0.730	92	Urban commercial, 85% imp, HSG B
6.340	94	Urban commercial, 85% imp, HSG C
0.500	95	Urban commercial, 85% imp, HSG D
29.180	77	Weighted Average
22.745		77.95% Pervious Area
6.435		22.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	2,576	0.0700	1.53		**Lag/CN Method,**

Summary for Subcatchment 10S: Subcat 10

Runoff = 9.18 cfs @ 12.18 hrs, Volume= 0.858 af, Depth= 0.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 2yr Rainfall=2.72"

Area (ac)	CN	Description
3.540	55	Woods, Good, HSG B
3.730	73	Woods, Fair, HSG C
0.110	61	>75% Grass cover, Good, HSG B
1.660	92	Urban commercial, 85% imp, HSG B
2.660	94	Urban commercial, 85% imp, HSG C
0.690	98	Water Surface, 0% imp, HSG A
12.390	76	Weighted Average
8.718		70.36% Pervious Area
3.672		29.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	961	0.0830	1.33		**Lag/CN Method,**

Summary for Reach 1R: Reservoir Brook

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth > 0.54" for 2yr event
Inflow = 8.21 cfs @ 13.99 hrs, Volume= 5.570 af
Outflow = 8.20 cfs @ 14.29 hrs, Volume= 5.560 af, Atten= 0%, Lag= 17.6 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 3.79 fps, Min. Travel Time= 10.4 min
Avg. Velocity = 1.77 fps, Avg. Travel Time= 22.1 min

Peak Storage= 5,103 cf @ 14.11 hrs
Average Depth at Peak Storage= 0.42'
Bank-Full Depth= 3.00' Flow Area= 19.5 sf, Capacity= 202.98 cfs

5.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 0.5 '/' Top Width= 8.00'
Length= 2,356.0' Slope= 0.0398 '/'
Inlet Invert= 776.00', Outlet Invert= 682.31'

Summary for Reach 2R: Res Rd Culvert

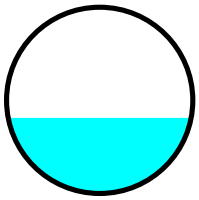
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 1R OUTLET depth by 1.51' @ 12.57 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 0.63" for 2yr event
Inflow = 70.93 cfs @ 12.63 hrs, Volume= 17.243 af
Outflow = 70.92 cfs @ 12.64 hrs, Volume= 17.242 af, Atten= 0%, Lag= 0.6 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 14.86 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 5.17 fps, Avg. Travel Time= 0.2 min

Peak Storage= 296 cf @ 12.64 hrs
Average Depth at Peak Storage= 1.62'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 205.67 cfs

48.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0147 '/'
Inlet Invert= 682.31', Outlet Invert= 681.40'



Summary for Reach 3R: Reservoir Brook

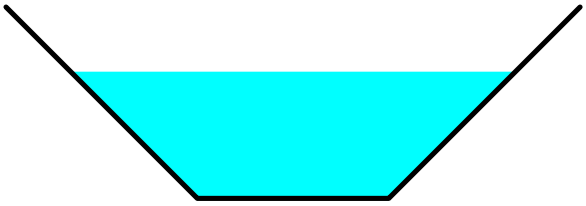
[62] Hint: Exceeded Reach 2R OUTLET depth by 0.41' @ 12.85 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 0.63" for 2yr event
Inflow = 70.92 cfs @ 12.64 hrs, Volume= 17.242 af
Outflow = 69.92 cfs @ 12.79 hrs, Volume= 17.236 af, Atten= 1%, Lag= 9.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.06 fps, Min. Travel Time= 4.7 min
Avg. Velocity = 2.35 fps, Avg. Travel Time= 14.1 min

Peak Storage= 19,650 cf @ 12.71 hrs
Average Depth at Peak Storage= 1.99'
Bank-Full Depth= 3.00' Flow Area= 18.0 sf, Capacity= 156.15 cfs

3.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 9.00'
Length= 1,983.0' Slope= 0.0300 '/'
Inlet Invert= 681.40', Outlet Invert= 622.00'



Summary for Reach 4R: Rt 104 Easterly Culvert

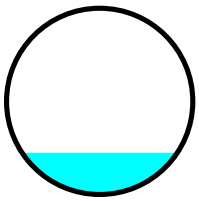
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 3R OUTLET depth by 0.27' @ 11.86 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 0.74" for 2yr event
Inflow = 139.01 cfs @ 12.62 hrs, Volume= 28.788 af
Outflow = 138.98 cfs @ 12.63 hrs, Volume= 28.788 af, Atten= 0%, Lag= 0.3 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 29.51 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 9.14 fps, Avg. Travel Time= 0.2 min

Peak Storage= 584 cf @ 12.63 hrs
Average Depth at Peak Storage= 1.34'
Bank-Full Depth= 6.00' Flow Area= 28.3 sf, Capacity= 1,271.30 cfs

72.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 124.0' Slope= 0.0645 '/'
Inlet Invert= 622.00', Outlet Invert= 614.00'



Summary for Reach 5R: Reservoir Brook

[62] Hint: Exceeded Reach 4R OUTLET depth by 1.13' @ 12.74 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 0.74" for 2yr event
Inflow = 138.98 cfs @ 12.63 hrs, Volume= 28.788 af
Outflow = 137.39 cfs @ 12.76 hrs, Volume= 28.781 af, Atten= 1%, Lag= 7.9 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.67 fps, Min. Travel Time= 4.2 min
Avg. Velocity = 2.52 fps, Avg. Travel Time= 14.3 min

Peak Storage= 34,348 cf @ 12.69 hrs
Average Depth at Peak Storage= 2.46'
Bank-Full Depth= 3.00' Flow Area= 21.0 sf, Capacity= 201.12 cfs

4.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 10.00'
Length= 2,167.0' Slope= 0.0332 '/'
Inlet Invert= 614.00', Outlet Invert= 542.00'

Summary for Reach 6R: Easterly Culvert into Pond

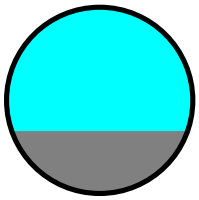
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 595% of Manning's capacity
[76] Warning: Detained 11.607 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 5R OUTLET depth by 4.33' @ 26.63 hrs

Inflow Area = 495.540 ac, 12.02% Impervious, Inflow Depth > 0.75" for 2yr event
Inflow = 147.84 cfs @ 12.74 hrs, Volume= 30.925 af
Outflow = 25.57 cfs @ 12.18 hrs, Volume= 30.924 af, Atten= 83%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.24 fps, Avg. Travel Time= 0.8 min

Peak Storage= 687 cf @ 12.18 hrs
Average Depth at Peak Storage= 4.50' above invert (3.00' above fill)
Bank-Full Depth= 4.50' above invert (3.00' above fill) Flow Area= 11.3 sf, Capacity= 24.84 cfs

54.0" Round Pipe w/ 18.0" inside fill
n= 0.025 Corrugated metal
Length= 61.0' Slope= 0.0016 '/' (101 Elevation Intervals)
Inlet Invert= 542.00', Outlet Invert= 541.90'



Summary for Reach 7R: Rt 104 Westerly Culvert

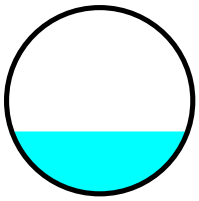
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 86.790 ac, 17.76% Impervious, Inflow Depth = 0.63" for 2yr event
Inflow = 29.18 cfs @ 12.43 hrs, Volume= 4.571 af
Outflow = 29.16 cfs @ 12.43 hrs, Volume= 4.571 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 14.15 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 4.93 fps, Avg. Travel Time= 0.4 min

Peak Storage= 247 cf @ 12.43 hrs
Average Depth at Peak Storage= 1.00'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 121.77 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 120.0' Slope= 0.0333 '/'
Inlet Invert= 640.00', Outlet Invert= 636.00'



Summary for Reach 8R: Central Culvert into Pond

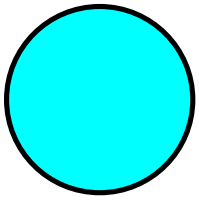
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 771% of Manning's capacity
[76] Warning: Detained 2.875 af (Pond w/culvert advised)

Inflow Area = 119.930 ac, 22.48% Impervious, Inflow Depth = 0.78" for 2yr event
Inflow = 53.99 cfs @ 12.43 hrs, Volume= 7.781 af
Outflow = 7.30 cfs @ 11.90 hrs, Volume= 7.781 af, Atten= 86%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.72 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 3.01 fps, Avg. Travel Time= 0.3 min

Peak Storage= 84 cf @ 11.91 hrs
Average Depth at Peak Storage= 1.33'
Bank-Full Depth= 1.33' Flow Area= 1.4 sf, Capacity= 7.00 cfs

16.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0083 '/'
Inlet Invert= 542.50', Outlet Invert= 542.00'



Summary for Reach 9R: Westerly culvert into Pond

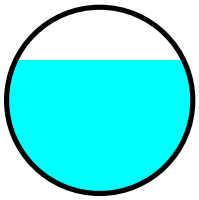
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 32.040 ac, 33.21% Impervious, Inflow Depth = 1.16" for 2yr event
Inflow = 24.40 cfs @ 12.42 hrs, Volume= 3.104 af
Outflow = 24.40 cfs @ 12.42 hrs, Volume= 3.104 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 18.03 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 8.01 fps, Avg. Travel Time= 0.1 min

Peak Storage= 74 cf @ 12.42 hrs
Average Depth at Peak Storage= 1.07'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 28.33 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 544.00', Outlet Invert= 540.00'



Summary for Reach 10R: (new Reach)

Inflow Area = 130.360 ac, 7.73% Impervious, Inflow Depth = 0.65" for 2yr event
Inflow = 38.50 cfs @ 12.75 hrs, Volume= 7.028 af
Outflow = 38.49 cfs @ 12.76 hrs, Volume= 7.028 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 4.22 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 2.06 fps, Avg. Travel Time= 0.9 min

Peak Storage= 1,057 cf @ 12.75 hrs
Average Depth at Peak Storage= 1.31'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 96.39 cfs

3.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 116.0' Slope= 0.0172 '/'
Inlet Invert= 546.00', Outlet Invert= 544.00'

‡

Summary for Pond 1P: Meredith Reservoir

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth = 0.56" for 2yr event
Inflow = 39.23 cfs @ 12.47 hrs, Volume= 5.787 af
Outflow = 8.21 cfs @ 13.99 hrs, Volume= 5.570 af, Atten= 79%, Lag= 91.4 min
Primary = 8.21 cfs @ 13.99 hrs, Volume= 5.570 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 778.64' @ 13.99 hrs Surf.Area= 3.438 ac Storage= 2.199 af

Plug-Flow detention time= 264.4 min calculated for 5.570 af (96% of inflow)
Center-of-Mass det. time= 244.6 min (1,154.3 - 909.7)

Volume	Invert	Avail.Storage	Storage Description
#1	778.00'	14.178 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
778.00	3.387	0.000	0.000
782.00	3.702	14.178	14.178

Device	Routing	Invert	Outlet Devices
#1	Primary	778.00'	**30.0" Round Culvert X 3.00** L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 778.00' / 777.40' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf

Primary OutFlow Max=8.21 cfs @ 13.99 hrs HW=778.64' (Free Discharge)
1=Culvert (Inlet Controls 8.21 cfs @ 2.73 fps)

Summary for Pond 2P: Wilcom Pond

Inflow Area = 39.030 ac, 12.13% Impervious, Inflow Depth = 0.74" for 2yr event
Inflow = 18.28 cfs @ 12.42 hrs, Volume= 2.393 af
Outflow = 1.99 cfs @ 15.64 hrs, Volume= 0.854 af, Atten= 89%, Lag= 193.6 min
Primary = 1.99 cfs @ 15.64 hrs, Volume= 0.854 af
Secondary = 0.00 cfs @ 2.00 hrs, Volume= 0.000 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 715.93' @ 15.64 hrs Surf.Area= 0.348 ac Storage= 1.603 af

Plug-Flow detention time= 387.3 min calculated for 0.854 af (36% of inflow)
Center-of-Mass det. time= 239.8 min (1,131.7 - 891.9)

Volume	Invert	Avail.Storage	Storage Description
#1	710.00'	1.626 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
710.00	0.192	0.000	0.000
716.00	0.350	1.626	1.626

Device	Routing	Invert	Outlet Devices
#1	Primary	715.75'	**1.0" x 1.0" Horiz. Orifice/Grate X 12.00 columns** X 12 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#2	Secondary	715.95'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=2.04 cfs @ 15.64 hrs HW=715.93' (Free Discharge)
1=Orifice/Grate (Weir Controls 2.04 cfs @ 1.40 fps)

Secondary OutFlow Max=0.00 cfs @ 2.00 hrs HW=710.00' (Free Discharge)
2=Broad-Crested Rectangular Weir (Controls 0.00 cfs)

Summary for Pond 3P: Monkey Pond

[61] Hint: Exceeded Reach 6R outlet invert by 1.32' @ 13.12 hrs
[62] Hint: Exceeded Reach 8R OUTLET depth by 0.45' @ 24.93 hrs
[62] Hint: Exceeded Reach 9R OUTLET depth by 2.74' @ 13.31 hrs

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 0.75" for 2yr event
Inflow = 90.96 cfs @ 12.60 hrs, Volume= 49.695 af
Outflow = 68.42 cfs @ 13.12 hrs, Volume= 48.557 af, Atten= 25%, Lag= 31.1 min
Primary = 68.42 cfs @ 13.12 hrs, Volume= 48.557 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 543.22' @ 13.12 hrs Surf.Area= 1.758 ac Storage= 4.388 af
Flood Elev= 545.00' Surf.Area= 2.000 ac Storage= 7.766 af

Plug-Flow detention time= 68.6 min calculated for 48.547 af (98% of inflow)
Center-of-Mass det. time= 51.9 min (1,154.3 - 1,102.4)

Volume	Invert	Avail.Storage	Storage Description
#1	540.00'	7.766 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
540.00	0.867	0.000	0.000
542.00	1.517	2.384	2.384
544.00	1.910	3.427	5.811
545.00	2.000	1.955	7.766

Device	Routing	Invert	Outlet Devices
#1	Primary	541.00'	**48.0" Round RCP_Round 48"** L= 40.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 541.00' / 540.20' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 12.57 sf
#2	Primary	541.00'	**48.0" Round Steel Culvert** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 541.00' / 540.00' S= 0.0213 '/' Cc= 0.900 n= 0.012 Steel, smooth, Flow Area= 12.57 sf

Primary OutFlow Max=68.42 cfs @ 13.12 hrs HW=543.22' (Free Discharge)
↑—**1=RCP_Round 48"** (Barrel Controls 39.65 cfs @ 7.99 fps)
└—**2=Steel Culvert** (Inlet Controls 28.77 cfs @ 4.01 fps)

Summary for Link 2L: Lake Waukewan

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 0.74" for 2yr event
Inflow = 68.42 cfs @ 13.12 hrs, Volume= 48.557 af
Primary = 68.42 cfs @ 13.12 hrs, Volume= 48.557 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs

Time span=2.00-48.00 hrs, dt=0.01 hrs, 4601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat 1 Runoff Area=123.050 ac 3.86% Impervious Runoff Depth=1.28"
Flow Length=2,832' Slope=0.1200 '/' Tc=28.2 min CN=70 Runoff=101.84 cfs 13.158 af

Subcatchment 2S: Subcat 2 Runoff Area=203.010 ac 5.87% Impervious Runoff Depth=1.48"
Flow Length=4,382' Slope=0.0950 '/' Tc=41.3 min CN=73 Runoff=165.09 cfs 24.994 af

Subcatchment 3S: Subcat 3 Runoff Area=39.030 ac 12.13% Impervious Runoff Depth=1.55"
Flow Length=2,511' Slope=0.0910 '/' Tc=26.3 min CN=74 Runoff=41.30 cfs 5.026 af

Subcatchment 4S: Subcat 4 Runoff Area=47.760 ac 22.35% Impervious Runoff Depth=1.83"
Flow Length=3,272' Slope=0.0980 '/' Tc=27.9 min CN=78 Runoff=59.40 cfs 7.289 af

Subcatchment 5S: Subcat 5 Runoff Area=140.300 ac 26.00% Impervious Runoff Depth=1.91"
Flow Length=3,798' Slope=0.0810 '/' Tc=33.5 min CN=79 Runoff=167.98 cfs 22.294 af

Subcatchment 6S: Subcat 6 Runoff Area=130.360 ac 7.73% Impervious Runoff Depth=1.41"
Flow Length=4,593' Slope=0.0810 '/' Tc=47.8 min CN=72 Runoff=93.01 cfs 15.330 af

Subcatchment 7S: Subcat 7 Runoff Area=32.040 ac 33.21% Impervious Runoff Depth=2.14"
Flow Length=3,154' Slope=0.0630 '/' Tc=29.8 min CN=82 Runoff=45.73 cfs 5.723 af

Subcatchment 8S: Subcat 8 Runoff Area=33.140 ac 34.86% Impervious Runoff Depth=2.14"
Flow Length=2,745' Slope=0.0470 '/' Tc=30.8 min CN=82 Runoff=46.59 cfs 5.919 af

Subcatchment 9S: Subcat 9 Runoff Area=29.180 ac 22.05% Impervious Runoff Depth=1.76"
Flow Length=2,576' Slope=0.0700 '/' Tc=28.0 min CN=77 Runoff=34.68 cfs 4.273 af

Subcatchment 10S: Subcat 10 Runoff Area=12.390 ac 29.64% Impervious Runoff Depth=1.69"
Flow Length=961' Slope=0.0830 '/' Tc=12.1 min CN=76 Runoff=19.75 cfs 1.740 af

Reach 1R: Reservoir Brook Avg. Flow Depth=0.97' Max Vel=6.09 fps Inflow=32.68 cfs 12.928 af
n=0.040 L=2,356.0' S=0.0398 '/' Capacity=202.98 cfs Outflow=32.52 cfs 12.918 af

Reach 2R: Res Rd Culvert Avg. Flow Depth=2.83' Max Vel=18.37 fps Inflow=174.72 cfs 37.913 af
48.0" Round Pipe n=0.011 L=62.0' S=0.0147 '/' Capacity=205.67 cfs Outflow=174.71 cfs 37.913 af

Reach 3R: Reservoir Brook Avg. Flow Depth=3.17' Max Vel=8.90 fps Inflow=174.71 cfs 37.913 af
n=0.040 L=1,983.0' S=0.0300 '/' Capacity=156.15 cfs Outflow=173.35 cfs 37.906 af

Reach 4R: Rt 104 Easterly Culvert Avg. Flow Depth=2.02' Max Vel=37.17 fps Inflow=311.61 cfs 60.200 af
72.0" Round Pipe n=0.011 L=124.0' S=0.0645 '/' Capacity=1,271.30 cfs Outflow=311.60 cfs 60.200 af

Reach 5R: Reservoir Brook Avg. Flow Depth=3.84' Max Vel=10.52 fps Inflow=311.60 cfs 60.200 af
n=0.040 L=2,167.0' S=0.0332 '/' Capacity=201.12 cfs Outflow=308.76 cfs 60.192 af

Reach 6R: Easterly Culvert into Pond Avg. Flow Depth=3.00' Max Vel=2.49 fps Inflow=331.24 cfs 64.465 af
54.0" Round Pipe w/ 18.0" inside fill n=0.025 L=61.0' S=0.0016 '/' Capacity=24.84 cfs Outflow=26.42 cfs 64.465 af

Reach 7R: Rt 104 Westerly Culvert Avg. Flow Depth=1.95' Max Vel=18.95 fps Inflow=93.02 cfs 11.182 af
36.0" Round Pipe n=0.013 L=120.0' S=0.0333 '/' Capacity=121.77 cfs Outflow=91.02 cfs 11.182 af

Reach 8R: Central Culvert into Pond Avg. Flow Depth=1.33' Max Vel=5.72 fps Inflow=133.77 cfs 17.101 af
16.0" Round Pipe n=0.013 L=60.0' S=0.0083 '/' Capacity=7.00 cfs Outflow=7.51 cfs 17.101 af

Reach 9R: Westerly culvert into Pond Avg. Flow Depth=1.50' Max Vel=18.27 fps Inflow=45.73 cfs 5.723 af
18.0" Round Pipe n=0.013 L=55.0' S=0.0727 '/' Capacity=28.33 cfs Outflow=29.93 cfs 5.723 af

Reach 10R: (new Reach) Avg. Flow Depth=1.97' Max Vel=5.31 fps Inflow=93.01 cfs 15.330 af
n=0.040 L=116.0' S=0.0172 '/' Capacity=96.39 cfs Outflow=92.95 cfs 15.330 af

Pond 1P: Meredith Reservoir Peak Elev=779.37' Storage=4.700 af Inflow=101.84 cfs 13.158 af
30.0" Round Culvert x 3.00 n=0.013 L=30.0' S=0.0200 '/' Outflow=32.68 cfs 12.928 af

Pond 2P: Wilcom Pond Peak Elev=717.06' Storage=1.626 af Inflow=41.30 cfs 5.026 af
Primary=5.52 cfs 2.191 af Secondary=31.39 cfs 1.702 af Outflow=36.91 cfs 3.893 af

Pond 3P: Monkey Pond Peak Elev=544.38' Storage=6.551 af Inflow=157.51 cfs 104.359 af
Outflow=131.46 cfs 103.137 af

Link 2L: Lake Waukewan Inflow=131.46 cfs 103.137 af
Primary=131.46 cfs 103.137 af

Total Runoff Area = 790.260 ac Runoff Volume = 105.746 af Average Runoff Depth = 1.61"
85.96% Pervious = 679.318 ac 14.04% Impervious = 110.942 ac

Summary for Subcatchment 1S: Subcat 1

Runoff = 101.84 cfs @ 12.44 hrs, Volume= 13.158 af, Depth= 1.28"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
14.820	55	Woods, Good, HSG B
74.760	70	Woods, Good, HSG C
16.140	73	Woods, Fair, HSG C
5.100	61	>75% Grass cover, Good, HSG B
2.070	74	>75% Grass cover, Good, HSG C
1.290	79	50-75% Grass cover, Fair, HSG C
3.310	92	Urban commercial, 85% imp, HSG B
1.700	94	Urban commercial, 85% imp, HSG C
0.580	94	Urban commercial, 85% imp, HSG C
3.280	98	Water Surface, 0% imp, HSG A
123.050	70	Weighted Average
118.298		96.14% Pervious Area
4.751		3.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	2,832	0.1200	1.68		**Lag/CN Method,**

Summary for Subcatchment 2S: Subcat 2

Runoff = 165.09 cfs @ 12.62 hrs, Volume= 24.994 af, Depth= 1.48"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
118.170	70	Woods, Good, HSG C
37.880	73	Woods, Fair, HSG C
23.520	77	Woods, Good, HSG D
7.540	74	>75% Grass cover, Good, HSG C
0.900	79	50-75% Grass cover, Fair, HSG C
11.110	94	Urban commercial, 85% imp, HSG C
2.920	95	Urban commercial, 85% imp, HSG D
0.970	98	Water Surface, 0% imp, HSG A
203.010	73	Weighted Average
191.085		94.13% Pervious Area
11.925		5.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.3	4,382	0.0950	1.77		**Lag/CN Method,**

Summary for Subcatchment 3S: Subcat 3

Runoff = 41.30 cfs @ 12.39 hrs, Volume= 5.026 af, Depth= 1.55"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
30.940	70	Woods, Good, HSG C
2.520	74	>75% Grass cover, Good, HSG C
5.570	94	Urban commercial, 85% imp, HSG C
39.030	74	Weighted Average
34.295		87.87% Pervious Area
4.734		12.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	2,511	0.0910	1.59		**Lag/CN Method,**

Summary for Subcatchment 4S: Subcat 4

Runoff = 59.40 cfs @ 12.40 hrs, Volume= 7.289 af, Depth= 1.83"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
20.230	70	Woods, Good, HSG C
7.890	73	Woods, Fair, HSG C
7.080	77	Woods, Good, HSG D
7.400	94	Urban commercial, 85% imp, HSG C
2.340	94	Urban commercial, 85% imp, HSG C
2.820	95	Urban commercial, 85% imp, HSG D
47.760	78	Weighted Average
37.084		77.65% Pervious Area
10.676		22.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	3,272	0.0980	1.96		**Lag/CN Method,**

Summary for Subcatchment 5S: Subcat 5

Runoff = 167.98 cfs @ 12.47 hrs, Volume= 22.294 af, Depth= 1.91"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
25.990	70	Woods, Good, HSG C
49.750	73	Woods, Fair, HSG C
8.780	77	Woods, Good, HSG D
7.760	74	>75% Grass cover, Good, HSG C
0.550	79	50-75% Grass cover, Fair, HSG C
4.560	80	>75% Grass cover, Good, HSG D
19.720	94	Urban commercial, 85% imp, HSG C
20.960	94	Urban commercial, 85% imp, HSG C
2.230	95	Urban commercial, 85% imp, HSG D
140.300	79	Weighted Average
103.826		74.00% Pervious Area
36.473		26.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.5	3,798	0.0810	1.89		**Lag/CN Method,**

Summary for Subcatchment 6S: Subcat 6

Runoff = 93.01 cfs @ 12.69 hrs, Volume= 15.330 af, Depth= 1.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
10.260	55	Woods, Good, HSG B
50.460	70	Woods, Good, HSG C
49.240	73	Woods, Fair, HSG C
5.250	74	>75% Grass cover, Good, HSG C
3.290	79	50-75% Grass cover, Fair, HSG C
1.970	92	Urban commercial, 85% imp, HSG B
2.560	94	Urban commercial, 85% imp, HSG C
7.330	94	Urban commercial, 85% imp, HSG C
130.360	72	Weighted Average
120.279		92.27% Pervious Area
10.081		7.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.8	4,593	0.0810	1.60		**Lag/CN Method,**

Summary for Subcatchment 7S: Subcat 7

Runoff = 45.73 cfs @ 12.42 hrs, Volume= 5.723 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
0.170	55	Woods, Good, HSG B
1.060	70	Woods, Good, HSG C
12.680	73	Woods, Fair, HSG C
5.510	77	Woods, Good, HSG D
0.100	74	>75% Grass cover, Good, HSG C
5.730	94	Urban commercial, 85% imp, HSG C
6.790	95	Urban commercial, 85% imp, HSG D
32.040	82	Weighted Average
21.398		66.79% Pervious Area
10.642		33.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	3,154	0.0630	1.77		**Lag/CN Method,**

Summary for Subcatchment 8S: Subcat 8

Runoff = 46.59 cfs @ 12.42 hrs, Volume= 5.919 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
0.270	70	Woods, Good, HSG C
19.120	73	Woods, Fair, HSG C
0.160	77	Woods, Good, HSG D
1.540	94	Urban commercial, 85% imp, HSG C
10.730	94	Urban commercial, 85% imp, HSG C
1.320	95	Urban commercial, 85% imp, HSG D
33.140	82	Weighted Average
21.588		65.14% Pervious Area
11.551		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	2,745	0.0470	1.48		**Lag/CN Method,**

Summary for Subcatchment 9S: Subcat 9

Runoff = 34.68 cfs @ 12.41 hrs, Volume= 4.273 af, Depth= 1.76"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
1.580	55	Woods, Good, HSG B
16.600	73	Woods, Fair, HSG C
1.810	77	Woods, Good, HSG D
1.620	61	>75% Grass cover, Good, HSG B
0.730	92	Urban commercial, 85% imp, HSG B
6.340	94	Urban commercial, 85% imp, HSG C
0.500	95	Urban commercial, 85% imp, HSG D
29.180	77	Weighted Average
22.745		77.95% Pervious Area
6.435		22.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	2,576	0.0700	1.53		**Lag/CN Method,**

Summary for Subcatchment 10S: Subcat 10

Runoff = 19.75 cfs @ 12.17 hrs, Volume= 1.740 af, Depth= 1.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 10yr Rainfall=3.93"

Area (ac)	CN	Description
3.540	55	Woods, Good, HSG B
3.730	73	Woods, Fair, HSG C
0.110	61	>75% Grass cover, Good, HSG B
1.660	92	Urban commercial, 85% imp, HSG B
2.660	94	Urban commercial, 85% imp, HSG C
0.690	98	Water Surface, 0% imp, HSG A
12.390	76	Weighted Average
8.718		70.36% Pervious Area
3.672		29.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	961	0.0830	1.33		**Lag/CN Method,**

Summary for Reach 1R: Reservoir Brook

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth > 1.26" for 10yr event
Inflow = 32.68 cfs @ 13.09 hrs, Volume= 12.928 af
Outflow = 32.52 cfs @ 13.29 hrs, Volume= 12.918 af, Atten= 0%, Lag= 11.7 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.09 fps, Min. Travel Time= 6.5 min
Avg. Velocity = 2.17 fps, Avg. Travel Time= 18.1 min

Peak Storage= 12,589 cf @ 13.18 hrs
Average Depth at Peak Storage= 0.97'
Bank-Full Depth= 3.00' Flow Area= 19.5 sf, Capacity= 202.98 cfs

5.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 0.5 '/' Top Width= 8.00'
Length= 2,356.0' Slope= 0.0398 '/'
Inlet Invert= 776.00', Outlet Invert= 682.31'

Summary for Reach 2R: Res Rd Culvert

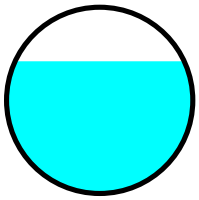
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 1R OUTLET depth by 2.24' @ 12.53 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 1.40" for 10yr event
Inflow = 174.72 cfs @ 12.66 hrs, Volume= 37.913 af
Outflow = 174.71 cfs @ 12.66 hrs, Volume= 37.913 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 18.37 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.04 fps, Avg. Travel Time= 0.2 min

Peak Storage= 590 cf @ 12.66 hrs
Average Depth at Peak Storage= 2.83'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 205.67 cfs

48.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0147 '/'
Inlet Invert= 682.31', Outlet Invert= 681.40'



Summary for Reach 3R: Reservoir Brook

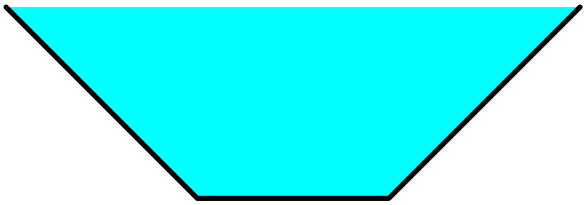
[91] Warning: Storage range exceeded by 0.17'
[55] Hint: Peak inflow is 112% of Manning's capacity
[62] Hint: Exceeded Reach 2R OUTLET depth by 0.51' @ 13.12 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 1.40" for 10yr event
Inflow = 174.71 cfs @ 12.66 hrs, Volume= 37.913 af
Outflow = 173.35 cfs @ 12.77 hrs, Volume= 37.906 af, Atten= 1%, Lag= 6.5 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.90 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 2.77 fps, Avg. Travel Time= 11.9 min

Peak Storage= 38,639 cf @ 12.71 hrs
Average Depth at Peak Storage= 3.17'
Bank-Full Depth= 3.00' Flow Area= 18.0 sf, Capacity= 156.15 cfs

3.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 9.00'
Length= 1,983.0' Slope= 0.0300 '/'
Inlet Invert= 681.40', Outlet Invert= 622.00'



Summary for Reach 4R: Rt 104 Easterly Culvert

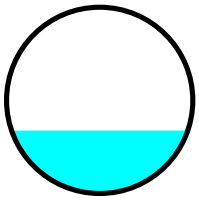
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 3R OUTLET depth by 0.23' @ 10.48 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 1.55" for 10yr event
Inflow = 311.61 cfs @ 12.61 hrs, Volume= 60.200 af
Outflow = 311.60 cfs @ 12.61 hrs, Volume= 60.200 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 37.17 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 10.67 fps, Avg. Travel Time= 0.2 min

Peak Storage= 1,039 cf @ 12.61 hrs
Average Depth at Peak Storage= 2.02'
Bank-Full Depth= 6.00' Flow Area= 28.3 sf, Capacity= 1,271.30 cfs

72.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 124.0' Slope= 0.0645 '/'
Inlet Invert= 622.00', Outlet Invert= 614.00'



Summary for Reach 5R: Reservoir Brook

[91] Warning: Storage range exceeded by 0.84'
[55] Hint: Peak inflow is 155% of Manning's capacity
[62] Hint: Exceeded Reach 4R OUTLET depth by 1.83' @ 12.69 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 1.55" for 10yr event
Inflow = 311.60 cfs @ 12.61 hrs, Volume= 60.200 af
Outflow = 308.76 cfs @ 12.72 hrs, Volume= 60.192 af, Atten= 1%, Lag= 6.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 10.52 fps, Min. Travel Time= 3.4 min
Avg. Velocity = 2.99 fps, Avg. Travel Time= 12.1 min

Peak Storage= 63,600 cf @ 12.66 hrs
Average Depth at Peak Storage= 3.84'
Bank-Full Depth= 3.00' Flow Area= 21.0 sf, Capacity= 201.12 cfs

4.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 10.00'
Length= 2,167.0' Slope= 0.0332 '/'
Inlet Invert= 614.00', Outlet Invert= 542.00'

Summary for Reach 6R: Easterly Culvert into Pond

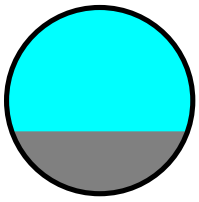
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 1334% of Manning's capacity
[76] Warning: Detained 38.273 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 5R OUTLET depth by 4.45' @ 42.53 hrs

Inflow Area = 495.540 ac, 12.02% Impervious, Inflow Depth > 1.56" for 10yr event
Inflow = 331.24 cfs @ 12.69 hrs, Volume= 64.465 af
Outflow = 26.42 cfs @ 11.83 hrs, Volume= 64.465 af, Atten= 92%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.89 fps, Avg. Travel Time= 0.5 min

Peak Storage= 687 cf @ 11.84 hrs
Average Depth at Peak Storage= 4.50' above invert (3.00' above fill)
Bank-Full Depth= 4.50' above invert (3.00' above fill) Flow Area= 11.3 sf, Capacity= 24.84 cfs

54.0" Round Pipe w/ 18.0" inside fill
n= 0.025 Corrugated metal
Length= 61.0' Slope= 0.0016 '/' (101 Elevation Intervals)
Inlet Invert= 542.00', Outlet Invert= 541.90'



Summary for Reach 7R: Rt 104 Westerly Culvert

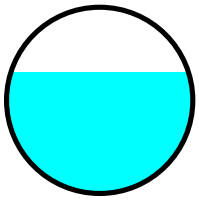
[52] Hint: Inlet/Outlet conditions not evaluated

Inflow Area = 86.790 ac, 17.76% Impervious, Inflow Depth = 1.55" for 10yr event
Inflow = 93.02 cfs @ 12.54 hrs, Volume= 11.182 af
Outflow = 91.02 cfs @ 12.55 hrs, Volume= 11.182 af, Atten= 2%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 18.95 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 5.95 fps, Avg. Travel Time= 0.3 min

Peak Storage= 585 cf @ 12.55 hrs
Average Depth at Peak Storage= 1.95'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 121.77 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 120.0' Slope= 0.0333 '/'
Inlet Invert= 640.00', Outlet Invert= 636.00'



Summary for Reach 8R: Central Culvert into Pond

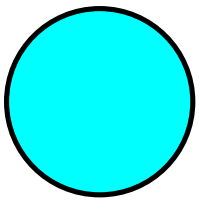
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 1910% of Manning's capacity
[76] Warning: Detained 10.286 af (Pond w/culvert advised)

Inflow Area = 119.930 ac, 22.48% Impervious, Inflow Depth = 1.71" for 10yr event
Inflow = 133.77 cfs @ 12.55 hrs, Volume= 17.101 af
Outflow = 7.51 cfs @ 11.47 hrs, Volume= 17.101 af, Atten= 94%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.72 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.85 fps, Avg. Travel Time= 0.2 min

Peak Storage= 84 cf @ 11.48 hrs
Average Depth at Peak Storage= 1.33'
Bank-Full Depth= 1.33' Flow Area= 1.4 sf, Capacity= 7.00 cfs

16.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0083 '/'
Inlet Invert= 542.50', Outlet Invert= 542.00'



Summary for Reach 9R: Westerly culvert into Pond

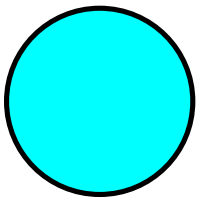
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 161% of Manning's capacity
[76] Warning: Detained 0.489 af (Pond w/culvert advised)
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=1)

Inflow Area = 32.040 ac, 33.21% Impervious, Inflow Depth = 2.14" for 10yr event
Inflow = 45.73 cfs @ 12.42 hrs, Volume= 5.723 af
Outflow = 29.93 cfs @ 12.20 hrs, Volume= 5.723 af, Atten= 35%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 18.27 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 9.02 fps, Avg. Travel Time= 0.1 min

Peak Storage= 97 cf @ 12.21 hrs
Average Depth at Peak Storage= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 28.33 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 544.00', Outlet Invert= 540.00'



Summary for Reach 10R: (new Reach)

Inflow Area = 130.360 ac, 7.73% Impervious, Inflow Depth = 1.41" for 10yr event
Inflow = 93.01 cfs @ 12.69 hrs, Volume= 15.330 af
Outflow = 92.95 cfs @ 12.71 hrs, Volume= 15.330 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.31 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.44 fps, Avg. Travel Time= 0.8 min

Peak Storage= 2,033 cf @ 12.70 hrs
Average Depth at Peak Storage= 1.97'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 96.39 cfs

3.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 116.0' Slope= 0.0172 '/'
Inlet Invert= 546.00', Outlet Invert= 544.00'

‡

Summary for Pond 1P: Meredith Reservoir

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth = 1.28" for 10yr event
Inflow = 101.84 cfs @ 12.44 hrs, Volume= 13.158 af
Outflow = 32.68 cfs @ 13.09 hrs, Volume= 12.928 af, Atten= 68%, Lag= 39.3 min
Primary = 32.68 cfs @ 13.09 hrs, Volume= 12.928 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 779.37' @ 13.09 hrs Surf.Area= 3.495 ac Storage= 4.700 af

Plug-Flow detention time= 172.8 min calculated for 12.925 af (98% of inflow)
Center-of-Mass det. time= 163.1 min (1,045.4 - 882.2)

Volume	Invert	Avail.Storage	Storage Description
#1	778.00'	14.178 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
778.00	3.387	0.000	0.000
782.00	3.702	14.178	14.178

Device	Routing	Invert	Outlet Devices
#1	Primary	778.00'	**30.0" Round Culvert X 3.00** L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 778.00' / 777.40' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf

Primary OutFlow Max=32.68 cfs @ 13.09 hrs HW=779.37' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 32.68 cfs @ 5.75 fps)

Summary for Pond 2P: Wilcom Pond

[93] Warning: Storage range exceeded by 1.06'

Inflow Area = 39.030 ac, 12.13% Impervious, Inflow Depth = 1.55" for 10yr event
Inflow = 41.30 cfs @ 12.39 hrs, Volume= 5.026 af
Outflow = 36.91 cfs @ 12.54 hrs, Volume= 3.893 af, Atten= 11%, Lag= 9.2 min
Primary = 5.52 cfs @ 12.54 hrs, Volume= 2.191 af
Secondary = 31.39 cfs @ 12.54 hrs, Volume= 1.702 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 717.06' @ 12.54 hrs Surf.Area= 0.350 ac Storage= 1.626 af

Plug-Flow detention time= 152.1 min calculated for 3.893 af (77% of inflow)
Center-of-Mass det. time= 65.4 min (934.2 - 868.8)

Volume	Invert	Avail.Storage	Storage Description
#1	710.00'	1.626 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
710.00	0.192	0.000	0.000
716.00	0.350	1.626	1.626

Device	Routing	Invert	Outlet Devices
#1	Primary	715.75'	**1.0" x 1.0" Horiz. Orifice/Grate X 12.00 columns** X 12 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#2	Secondary	715.95'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.52 cfs @ 12.54 hrs HW=717.06' (Free Discharge)
1=Orifice/Grate (Orifice Controls 5.52 cfs @ 5.52 fps)

Secondary OutFlow Max=31.39 cfs @ 12.54 hrs HW=717.06' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 31.39 cfs @ 2.82 fps)

Summary for Pond 3P: Monkey Pond

[61] Hint: Exceeded Reach 6R outlet invert by 2.48' @ 13.04 hrs
[63] Warning: Exceeded Reach 8R INLET depth by 0.55' @ 13.04 hrs
[62] Hint: Exceeded Reach 9R OUTLET depth by 3.70' @ 13.28 hrs
[61] Hint: Exceeded Reach 10R outlet invert by 0.38' @ 13.04 hrs

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 1.58" for 10yr event
Inflow = 157.51 cfs @ 12.70 hrs, Volume= 104.359 af
Outflow = 131.46 cfs @ 13.04 hrs, Volume= 103.137 af, Atten= 17%, Lag= 20.5 min
Primary = 131.46 cfs @ 13.04 hrs, Volume= 103.137 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 544.38' @ 13.04 hrs Surf.Area= 1.945 ac Storage= 6.551 af
Flood Elev= 545.00' Surf.Area= 2.000 ac Storage= 7.766 af

Plug-Flow detention time= 61.4 min calculated for 103.137 af (99% of inflow)
Center-of-Mass det. time= 48.3 min (1,486.1 - 1,437.8)

Volume	Invert	Avail.Storage	Storage Description
#1	540.00'	7.766 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
540.00	0.867	0.000	0.000
542.00	1.517	2.384	2.384
544.00	1.910	3.427	5.811
545.00	2.000	1.955	7.766

Device	Routing	Invert	Outlet Devices
#1	Primary	541.00'	**48.0" Round RCP_Round 48"** L= 40.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 541.00' / 540.20' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 12.57 sf
#2	Primary	541.00'	**48.0" Round Steel Culvert** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 541.00' / 540.00' S= 0.0213 '/' Cc= 0.900 n= 0.012 Steel, smooth, Flow Area= 12.57 sf

Primary OutFlow Max=131.46 cfs @ 13.04 hrs HW=544.38' (Free Discharge)
└─**1=RCP_Round 48"** (Barrel Controls 75.39 cfs @ 8.97 fps)
└─**2=Steel Culvert** (Inlet Controls 56.07 cfs @ 4.94 fps)

Summary for Link 2L: Lake Waukewan

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 1.57" for 10yr event
Inflow = 131.46 cfs @ 13.04 hrs, Volume= 103.137 af
Primary = 131.46 cfs @ 13.04 hrs, Volume= 103.137 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs

Time span=2.00-48.00 hrs, dt=0.01 hrs, 4601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat 1 Runoff Area=123.050 ac 3.86% Impervious Runoff Depth=1.93"
Flow Length=2,832' Slope=0.1200 '/' Tc=28.2 min CN=70 Runoff=157.57 cfs 19.748 af

Subcatchment 2S: Subcat 2 Runoff Area=203.010 ac 5.87% Impervious Runoff Depth=2.16"
Flow Length=4,382' Slope=0.0950 '/' Tc=41.3 min CN=73 Runoff=246.12 cfs 36.601 af

Subcatchment 3S: Subcat 3 Runoff Area=39.030 ac 12.13% Impervious Runoff Depth=2.25"
Flow Length=2,511' Slope=0.0910 '/' Tc=26.3 min CN=74 Runoff=61.11 cfs 7.303 af

Subcatchment 4S: Subcat 4 Runoff Area=47.760 ac 22.35% Impervious Runoff Depth=2.58"
Flow Length=3,272' Slope=0.0980 '/' Tc=27.9 min CN=78 Runoff=84.44 cfs 10.288 af

Subcatchment 5S: Subcat 5 Runoff Area=140.300 ac 26.00% Impervious Runoff Depth=2.67"
Flow Length=3,798' Slope=0.0810 '/' Tc=33.5 min CN=79 Runoff=236.68 cfs 31.251 af

Subcatchment 6S: Subcat 6 Runoff Area=130.360 ac 7.73% Impervious Runoff Depth=2.08"
Flow Length=4,593' Slope=0.0810 '/' Tc=47.8 min CN=72 Runoff=140.56 cfs 22.628 af

Subcatchment 7S: Subcat 7 Runoff Area=32.040 ac 33.21% Impervious Runoff Depth=2.95"
Flow Length=3,154' Slope=0.0630 '/' Tc=29.8 min CN=82 Runoff=62.80 cfs 7.864 af

Subcatchment 8S: Subcat 8 Runoff Area=33.140 ac 34.86% Impervious Runoff Depth=2.95"
Flow Length=2,745' Slope=0.0470 '/' Tc=30.8 min CN=82 Runoff=64.02 cfs 8.134 af

Subcatchment 9S: Subcat 9 Runoff Area=29.180 ac 22.05% Impervious Runoff Depth=2.50"
Flow Length=2,576' Slope=0.0700 '/' Tc=28.0 min CN=77 Runoff=49.70 cfs 6.074 af

Subcatchment 10S: Subcat 10 Runoff Area=12.390 ac 29.64% Impervious Runoff Depth=2.41"
Flow Length=961' Slope=0.0830 '/' Tc=12.1 min CN=76 Runoff=28.63 cfs 2.491 af

Reach 1R: Reservoir Brook Avg. Flow Depth=1.40' Max Vel=7.33 fps Inflow=58.93 cfs 19.511 af
n=0.040 L=2,356.0' S=0.0398 '/' Capacity=202.98 cfs Outflow=58.65 cfs 19.502 af

Reach 2R: Res Rd Culvert Avg. Flow Depth=4.00' Max Vel=18.66 fps Inflow=277.03 cfs 56.103 af
48.0" Round Pipe n=0.011 L=62.0' S=0.0147 '/' Capacity=205.67 cfs Outflow=217.90 cfs 56.090 af

Reach 3R: Reservoir Brook Avg. Flow Depth=3.48' Max Vel=9.23 fps Inflow=217.90 cfs 56.090 af
n=0.040 L=1,983.0' S=0.0300 '/' Capacity=156.15 cfs Outflow=205.67 cfs 56.083 af

Reach 4R: Rt 104 Easterly Culvert Avg. Flow Depth=2.42' Max Vel=40.73 fps Inflow=434.83 cfs 87.334 af
72.0" Round Pipe n=0.011 L=124.0' S=0.0645 '/' Capacity=1,271.30 cfs Outflow=434.80 cfs 87.334 af

Reach 5R: Reservoir Brook Avg. Flow Depth=4.77' Max Vel=11.09 fps Inflow=434.80 cfs 87.334 af
n=0.040 L=2,167.0' S=0.0332 '/' Capacity=201.12 cfs Outflow=428.01 cfs 87.326 af

Reach 6R: Easterly Culvert into Pond Avg. Flow Depth=3.00' Max Vel=2.49 fps Inflow=465.83 cfs 93.401 af
54.0" Round Pipe w/ 18.0" inside fill n=0.025 L=61.0' S=0.0016 '/' Capacity=24.84 cfs Outflow=26.58 cfs 76.992 af

Reach 7R: Rt 104 Westerly Culvert Avg. Flow Depth=2.63' Max Vel=19.64 fps Inflow=125.39 cfs 13.578 af
36.0" Round Pipe n=0.013 L=120.0' S=0.0333 '/' Capacity=121.77 cfs Outflow=125.66 cfs 13.578 af

Reach 8R: Central Culvert into Pond Avg. Flow Depth=1.33' Max Vel=5.72 fps Inflow=188.72 cfs 21.712 af
16.0" Round Pipe n=0.013 L=60.0' S=0.0083 '/' Capacity=7.00 cfs Outflow=7.55 cfs 21.712 af

Reach 9R: Westerly culvert into Pond Avg. Flow Depth=1.50' Max Vel=18.27 fps Inflow=62.80 cfs 7.864 af
18.0" Round Pipe n=0.013 L=55.0' S=0.0727 '/' Capacity=28.33 cfs Outflow=30.21 cfs 7.864 af

Reach 10R: (new Reach) Avg. Flow Depth=2.41' Max Vel=5.82 fps Inflow=140.56 cfs 22.628 af
n=0.040 L=116.0' S=0.0172 '/' Capacity=96.39 cfs Outflow=140.46 cfs 22.628 af

Pond 1P: Meredith Reservoir Peak Elev=780.00' Storage=6.939 af Inflow=157.57 cfs 19.748 af
30.0" Round Culvert x 3.00 n=0.013 L=30.0' S=0.0200 '/' Outflow=58.93 cfs 19.511 af

Pond 2P: Wilcom Pond Peak Elev=717.16' Storage=1.626 af Inflow=61.11 cfs 7.303 af
Primary=5.71 cfs 2.271 af Secondary=35.23 cfs 1.019 af Outflow=40.94 cfs 3.291 af

Pond 3P: Monkey Pond Peak Elev=545.89' Storage=7.766 af Inflow=206.77 cfs 131.687 af
Outflow=202.15 cfs 128.891 af

Link 2L: Lake Waukewan Inflow=202.15 cfs 128.891 af
Primary=202.15 cfs 128.891 af

Total Runoff Area = 790.260 ac Runoff Volume = 152.381 af Average Runoff Depth = 2.31"
85.96% Pervious = 679.318 ac 14.04% Impervious = 110.942 ac

Summary for Subcatchment 1S: Subcat 1

Runoff = 157.57 cfs @ 12.41 hrs, Volume= 19.748 af, Depth= 1.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
14.820	55	Woods, Good, HSG B
74.760	70	Woods, Good, HSG C
16.140	73	Woods, Fair, HSG C
5.100	61	>75% Grass cover, Good, HSG B
2.070	74	>75% Grass cover, Good, HSG C
1.290	79	50-75% Grass cover, Fair, HSG C
3.310	92	Urban commercial, 85% imp, HSG B
1.700	94	Urban commercial, 85% imp, HSG C
0.580	94	Urban commercial, 85% imp, HSG C
3.280	98	Water Surface, 0% imp, HSG A
123.050	70	Weighted Average
118.298		96.14% Pervious Area
4.751		3.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	2,832	0.1200	1.68		**Lag/CN Method,**

Summary for Subcatchment 2S: Subcat 2

Runoff = 246.12 cfs @ 12.58 hrs, Volume= 36.601 af, Depth= 2.16"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
118.170	70	Woods, Good, HSG C
37.880	73	Woods, Fair, HSG C
23.520	77	Woods, Good, HSG D
7.540	74	>75% Grass cover, Good, HSG C
0.900	79	50-75% Grass cover, Fair, HSG C
11.110	94	Urban commercial, 85% imp, HSG C
2.920	95	Urban commercial, 85% imp, HSG D
0.970	98	Water Surface, 0% imp, HSG A
203.010	73	Weighted Average
191.085		94.13% Pervious Area
11.925		5.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.3	4,382	0.0950	1.77		**Lag/CN Method,**

Summary for Subcatchment 3S: Subcat 3

Runoff = 61.11 cfs @ 12.37 hrs, Volume= 7.303 af, Depth= 2.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
30.940	70	Woods, Good, HSG C
2.520	74	>75% Grass cover, Good, HSG C
5.570	94	Urban commercial, 85% imp, HSG C
39.030	74	Weighted Average
34.295		87.87% Pervious Area
4.734		12.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	2,511	0.0910	1.59		**Lag/CN Method,**

Summary for Subcatchment 4S: Subcat 4

Runoff = 84.44 cfs @ 12.38 hrs, Volume= 10.288 af, Depth= 2.58"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
20.230	70	Woods, Good, HSG C
7.890	73	Woods, Fair, HSG C
7.080	77	Woods, Good, HSG D
7.400	94	Urban commercial, 85% imp, HSG C
2.340	94	Urban commercial, 85% imp, HSG C
2.820	95	Urban commercial, 85% imp, HSG D
47.760	78	Weighted Average
37.084		77.65% Pervious Area
10.676		22.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	3,272	0.0980	1.96		**Lag/CN Method,**

Summary for Subcatchment 5S: Subcat 5

Runoff = 236.68 cfs @ 12.47 hrs, Volume= 31.251 af, Depth= 2.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
25.990	70	Woods, Good, HSG C
49.750	73	Woods, Fair, HSG C
8.780	77	Woods, Good, HSG D
7.760	74	>75% Grass cover, Good, HSG C
0.550	79	50-75% Grass cover, Fair, HSG C
4.560	80	>75% Grass cover, Good, HSG D
19.720	94	Urban commercial, 85% imp, HSG C
20.960	94	Urban commercial, 85% imp, HSG C
2.230	95	Urban commercial, 85% imp, HSG D
140.300	79	Weighted Average
103.826		74.00% Pervious Area
36.473		26.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.5	3,798	0.0810	1.89		**Lag/CN Method,**

Summary for Subcatchment 6S: Subcat 6

Runoff = 140.56 cfs @ 12.69 hrs, Volume= 22.628 af, Depth= 2.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
10.260	55	Woods, Good, HSG B
50.460	70	Woods, Good, HSG C
49.240	73	Woods, Fair, HSG C
5.250	74	>75% Grass cover, Good, HSG C
3.290	79	50-75% Grass cover, Fair, HSG C
1.970	92	Urban commercial, 85% imp, HSG B
2.560	94	Urban commercial, 85% imp, HSG C
7.330	94	Urban commercial, 85% imp, HSG C
130.360	72	Weighted Average
120.279		92.27% Pervious Area
10.081		7.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.8	4,593	0.0810	1.60		**Lag/CN Method,**

Summary for Subcatchment 7S: Subcat 7

Runoff = 62.80 cfs @ 12.42 hrs, Volume= 7.864 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
0.170	55	Woods, Good, HSG B
1.060	70	Woods, Good, HSG C
12.680	73	Woods, Fair, HSG C
5.510	77	Woods, Good, HSG D
0.100	74	>75% Grass cover, Good, HSG C
5.730	94	Urban commercial, 85% imp, HSG C
6.790	95	Urban commercial, 85% imp, HSG D
32.040	82	Weighted Average
21.398		66.79% Pervious Area
10.642		33.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	3,154	0.0630	1.77		**Lag/CN Method,**

Summary for Subcatchment 8S: Subcat 8

Runoff = 64.02 cfs @ 12.42 hrs, Volume= 8.134 af, Depth= 2.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
0.270	70	Woods, Good, HSG C
19.120	73	Woods, Fair, HSG C
0.160	77	Woods, Good, HSG D
1.540	94	Urban commercial, 85% imp, HSG C
10.730	94	Urban commercial, 85% imp, HSG C
1.320	95	Urban commercial, 85% imp, HSG D
33.140	82	Weighted Average
21.588		65.14% Pervious Area
11.551		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	2,745	0.0470	1.48		**Lag/CN Method,**

Summary for Subcatchment 9S: Subcat 9

Runoff = 49.70 cfs @ 12.41 hrs, Volume= 6.074 af, Depth= 2.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
1.580	55	Woods, Good, HSG B
16.600	73	Woods, Fair, HSG C
1.810	77	Woods, Good, HSG D
1.620	61	>75% Grass cover, Good, HSG B
0.730	92	Urban commercial, 85% imp, HSG B
6.340	94	Urban commercial, 85% imp, HSG C
0.500	95	Urban commercial, 85% imp, HSG D
29.180	77	Weighted Average
22.745		77.95% Pervious Area
6.435		22.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	2,576	0.0700	1.53		**Lag/CN Method,**

Summary for Subcatchment 10S: Subcat 10

Runoff = 28.63 cfs @ 12.17 hrs, Volume= 2.491 af, Depth= 2.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 25yr Rainfall=4.85"

Area (ac)	CN	Description
3.540	55	Woods, Good, HSG B
3.730	73	Woods, Fair, HSG C
0.110	61	>75% Grass cover, Good, HSG B
1.660	92	Urban commercial, 85% imp, HSG B
2.660	94	Urban commercial, 85% imp, HSG C
0.690	98	Water Surface, 0% imp, HSG A
12.390	76	Weighted Average
8.718		70.36% Pervious Area
3.672		29.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	961	0.0830	1.33		**Lag/CN Method,**

Summary for Reach 1R: Reservoir Brook

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth > 1.90" for 25yr event
Inflow = 58.93 cfs @ 12.97 hrs, Volume= 19.511 af
Outflow = 58.65 cfs @ 13.13 hrs, Volume= 19.502 af, Atten= 0%, Lag= 9.8 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 7.33 fps, Min. Travel Time= 5.4 min
Avg. Velocity = 2.38 fps, Avg. Travel Time= 16.5 min

Peak Storage= 18,860 cf @ 13.04 hrs
Average Depth at Peak Storage= 1.40'
Bank-Full Depth= 3.00' Flow Area= 19.5 sf, Capacity= 202.98 cfs

5.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 0.5 '/' Top Width= 8.00'
Length= 2,356.0' Slope= 0.0398 '/'
Inlet Invert= 776.00', Outlet Invert= 682.31'

Summary for Reach 2R: Res Rd Culvert

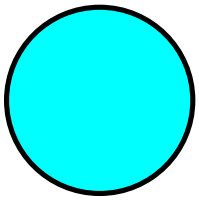
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 135% of Manning's capacity
[76] Warning: Detained 2.257 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 1R OUTLET depth by 3.33' @ 12.42 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 2.06" for 25yr event
Inflow = 277.03 cfs @ 12.65 hrs, Volume= 56.103 af
Outflow = 217.90 cfs @ 12.41 hrs, Volume= 56.090 af, Atten= 21%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 18.66 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.45 fps, Avg. Travel Time= 0.2 min

Peak Storage= 779 cf @ 12.42 hrs
Average Depth at Peak Storage= 4.00'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 205.67 cfs

48.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0147 '/'
Inlet Invert= 682.31', Outlet Invert= 681.40'



Summary for Reach 3R: Reservoir Brook

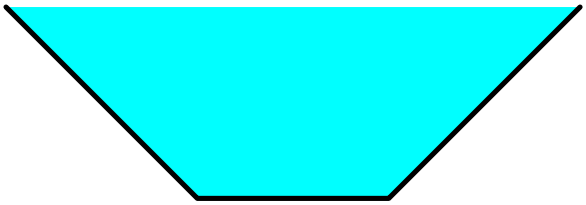
[91] Warning: Storage range exceeded by 0.48'
[55] Hint: Peak inflow is 140% of Manning's capacity
[63] Warning: Exceeded Reach 2R INLET depth by 0.43' @ 13.56 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 2.06" for 25yr event
Inflow = 217.90 cfs @ 12.41 hrs, Volume= 56.090 af
Outflow = 205.67 cfs @ 13.60 hrs, Volume= 56.083 af, Atten= 6%, Lag= 71.5 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.23 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 3.02 fps, Avg. Travel Time= 11.0 min

Peak Storage= 44,171 cf @ 13.55 hrs
Average Depth at Peak Storage= 3.48'
Bank-Full Depth= 3.00' Flow Area= 18.0 sf, Capacity= 156.15 cfs

3.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 9.00'
Length= 1,983.0' Slope= 0.0300 '/'
Inlet Invert= 681.40', Outlet Invert= 622.00'



Summary for Reach 4R: Rt 104 Easterly Culvert

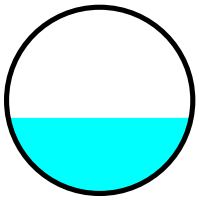
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 3R OUTLET depth by 0.23' @ 9.68 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 2.25" for 25yr event
Inflow = 434.83 cfs @ 12.51 hrs, Volume= 87.334 af
Outflow = 434.80 cfs @ 12.51 hrs, Volume= 87.334 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 40.73 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 11.57 fps, Avg. Travel Time= 0.2 min

Peak Storage= 1,324 cf @ 12.51 hrs
Average Depth at Peak Storage= 2.42'
Bank-Full Depth= 6.00' Flow Area= 28.3 sf, Capacity= 1,271.30 cfs

72.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 124.0' Slope= 0.0645 '/'
Inlet Invert= 622.00', Outlet Invert= 614.00'



Summary for Reach 5R: Reservoir Brook

[91] Warning: Storage range exceeded by 1.77'
[55] Hint: Peak inflow is 216% of Manning's capacity
[62] Hint: Exceeded Reach 4R OUTLET depth by 2.37' @ 12.60 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 2.25" for 25yr event
Inflow = 434.80 cfs @ 12.51 hrs, Volume= 87.334 af
Outflow = 428.01 cfs @ 12.62 hrs, Volume= 87.326 af, Atten= 2%, Lag= 6.9 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 11.09 fps, Min. Travel Time= 3.3 min
Avg. Velocity = 3.26 fps, Avg. Travel Time= 11.1 min

Peak Storage= 83,645 cf @ 12.57 hrs
Average Depth at Peak Storage= 4.77'
Bank-Full Depth= 3.00' Flow Area= 21.0 sf, Capacity= 201.12 cfs

4.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 10.00'
Length= 2,167.0' Slope= 0.0332 '/'
Inlet Invert= 614.00', Outlet Invert= 542.00'

Summary for Reach 6R: Easterly Culvert into Pond

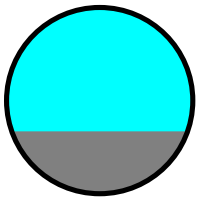
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 1875% of Manning's capacity
[76] Warning: Detained 63.482 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 5R OUTLET depth by 4.46' @ 47.99 hrs

Inflow Area = 495.540 ac, 12.02% Impervious, Inflow Depth > 2.26" for 25yr event
Inflow = 465.83 cfs @ 12.61 hrs, Volume= 93.401 af
Outflow = 26.58 cfs @ 11.37 hrs, Volume= 76.992 af, Atten= 94%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.14 fps, Avg. Travel Time= 0.5 min

Peak Storage= 687 cf @ 11.38 hrs
Average Depth at Peak Storage= 4.50' above invert (3.00' above fill)
Bank-Full Depth= 4.50' above invert (3.00' above fill) Flow Area= 11.3 sf, Capacity= 24.84 cfs

54.0" Round Pipe w/ 18.0" inside fill
n= 0.025 Corrugated metal
Length= 61.0' Slope= 0.0016 '/' (101 Elevation Intervals)
Inlet Invert= 542.00', Outlet Invert= 541.90'



Summary for Reach 7R: Rt 104 Westerly Culvert

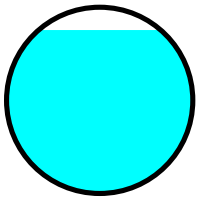
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 103% of Manning's capacity
[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 86.790 ac, 17.76% Impervious, Inflow Depth = 1.88" for 25yr event
Inflow = 125.39 cfs @ 12.37 hrs, Volume= 13.578 af
Outflow = 125.66 cfs @ 12.37 hrs, Volume= 13.578 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 19.64 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.22 fps, Avg. Travel Time= 0.3 min

Peak Storage= 788 cf @ 12.35 hrs
Average Depth at Peak Storage= 2.63'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 121.77 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 120.0' Slope= 0.0333 '/'
Inlet Invert= 640.00', Outlet Invert= 636.00'



Summary for Reach 8R: Central Culvert into Pond

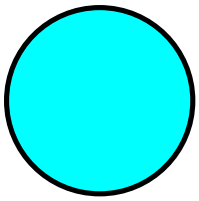
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 2694% of Manning's capacity
[76] Warning: Detained 13.779 af (Pond w/culvert advised)

Inflow Area = 119.930 ac, 22.48% Impervious, Inflow Depth = 2.17" for 25yr event
Inflow = 188.72 cfs @ 12.39 hrs, Volume= 21.712 af
Outflow = 7.55 cfs @ 10.92 hrs, Volume= 21.712 af, Atten= 96%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.72 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.88 fps, Avg. Travel Time= 0.2 min

Peak Storage= 84 cf @ 10.93 hrs
Average Depth at Peak Storage= 1.33'
Bank-Full Depth= 1.33' Flow Area= 1.4 sf, Capacity= 7.00 cfs

16.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0083 '/'
Inlet Invert= 542.50', Outlet Invert= 542.00'



Summary for Reach 9R: Westerly culvert into Pond

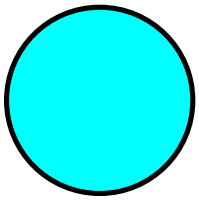
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 222% of Manning's capacity
[76] Warning: Detained 1.243 af (Pond w/culvert advised)

Inflow Area = 32.040 ac, 33.21% Impervious, Inflow Depth = 2.95" for 25yr event
Inflow = 62.80 cfs @ 12.42 hrs, Volume= 7.864 af
Outflow = 30.21 cfs @ 12.12 hrs, Volume= 7.864 af, Atten= 52%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 18.27 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 9.63 fps, Avg. Travel Time= 0.1 min

Peak Storage= 97 cf @ 12.13 hrs
Average Depth at Peak Storage= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 28.33 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 544.00', Outlet Invert= 540.00'



Summary for Reach 10R: (new Reach)

[91] Warning: Storage range exceeded by 0.41'
[55] Hint: Peak inflow is 146% of Manning's capacity

Inflow Area = 130.360 ac, 7.73% Impervious, Inflow Depth = 2.08" for 25yr event
Inflow = 140.56 cfs @ 12.69 hrs, Volume= 22.628 af
Outflow = 140.46 cfs @ 12.70 hrs, Volume= 22.628 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.82 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.65 fps, Avg. Travel Time= 0.7 min

Peak Storage= 2,801 cf @ 12.69 hrs
Average Depth at Peak Storage= 2.41'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 96.39 cfs

3.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 116.0' Slope= 0.0172 '/'
Inlet Invert= 546.00', Outlet Invert= 544.00'

‡

Summary for Pond 1P: Meredith Reservoir

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth = 1.93" for 25yr event
Inflow = 157.57 cfs @ 12.41 hrs, Volume= 19.748 af
Outflow = 58.93 cfs @ 12.97 hrs, Volume= 19.511 af, Atten= 63%, Lag= 33.3 min
Primary = 58.93 cfs @ 12.97 hrs, Volume= 19.511 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 780.00' @ 12.97 hrs Surf.Area= 3.545 ac Storage= 6.939 af

Plug-Flow detention time= 142.6 min calculated for 19.511 af (99% of inflow)
Center-of-Mass det. time= 135.6 min (1,005.5 - 869.9)

Volume	Invert	Avail.Storage	Storage Description
#1	778.00'	14.178 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
778.00	3.387	0.000	0.000
782.00	3.702	14.178	14.178

Device	Routing	Invert	Outlet Devices
#1	Primary	778.00'	**30.0" Round Culvert X 3.00** L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 778.00' / 777.40' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf

Primary OutFlow Max=58.93 cfs @ 12.97 hrs HW=780.00' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 58.93 cfs @ 6.38 fps)

Summary for Pond 2P: Wilcom Pond

[93] Warning: Storage range exceeded by 1.16'

Inflow Area = 39.030 ac, 12.13% Impervious, Inflow Depth = 2.25" for 25yr event
Inflow = 61.11 cfs @ 12.37 hrs, Volume= 7.303 af
Outflow = 40.94 cfs @ 12.37 hrs, Volume= 3.291 af, Atten= 33%, Lag= 0.0 min
Primary = 5.71 cfs @ 12.37 hrs, Volume= 2.271 af
Secondary = 35.23 cfs @ 12.37 hrs, Volume= 1.019 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 717.16' @ 12.37 hrs Surf.Area= 0.350 ac Storage= 1.626 af

Plug-Flow detention time= 242.2 min calculated for 3.290 af (45% of inflow)
Center-of-Mass det. time= 117.9 min (975.6 - 857.8)

Volume	Invert	Avail.Storage	Storage Description
#1	710.00'	1.626 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
710.00	0.192	0.000	0.000
716.00	0.350	1.626	1.626

Device	Routing	Invert	Outlet Devices
#1	Primary	715.75'	**1.0" x 1.0" Horiz. Orifice/Grate X 12.00 columns** X 12 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#2	Secondary	715.95'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.71 cfs @ 12.37 hrs HW=717.16' (Free Discharge)
1=Orifice/Grate (Orifice Controls 5.71 cfs @ 5.71 fps)

Secondary OutFlow Max=35.21 cfs @ 12.37 hrs HW=717.16' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 35.21 cfs @ 2.92 fps)

Summary for Pond 3P: Monkey Pond

[93] Warning: Storage range exceeded by 0.89'
[58] Hint: Peaked 0.89' above defined flood level
[61] Hint: Exceeded Reach 6R outlet invert by 3.91' @ 12.83 hrs
[63] Warning: Exceeded Reach 8R INLET depth by 1.97' @ 12.83 hrs
[63] Warning: Exceeded Reach 9R INLET depth by 0.31' @ 12.83 hrs
[61] Hint: Exceeded Reach 10R outlet invert by 1.81' @ 12.83 hrs

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 2.00" for 25yr event
Inflow = 206.77 cfs @ 12.69 hrs, Volume= 131.687 af
Outflow = 202.15 cfs @ 12.83 hrs, Volume= 128.891 af, Atten= 2%, Lag= 8.8 min
Primary = 202.15 cfs @ 12.83 hrs, Volume= 128.891 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 545.89' @ 12.83 hrs Surf.Area= 2.000 ac Storage= 7.766 af
Flood Elev= 545.00' Surf.Area= 2.000 ac Storage= 7.766 af

Plug-Flow detention time= 58.2 min calculated for 128.863 af (98% of inflow)
Center-of-Mass det. time= 29.7 min (1,556.8 - 1,527.0)

Volume	Invert	Avail.Storage	Storage Description
#1	540.00'	7.766 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
540.00	0.867	0.000	0.000
542.00	1.517	2.384	2.384
544.00	1.910	3.427	5.811
545.00	2.000	1.955	7.766

Device	Routing	Invert	Outlet Devices
#1	Primary	541.00'	**48.0" Round RCP_Round 48"** L= 40.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 541.00' / 540.20' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 12.57 sf
#2	Primary	541.00'	**48.0" Round Steel Culvert** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 541.00' / 540.00' S= 0.0213 '/' Cc= 0.900 n= 0.012 Steel, smooth, Flow Area= 12.57 sf

Primary OutFlow Max=197.56 cfs @ 12.83 hrs HW=545.79' (Free Discharge)
└─**1=RCP_Round 48"** (Barrel Controls 117.77 cfs @ 9.90 fps)
└─**2=Steel Culvert** (Inlet Controls 79.78 cfs @ 6.35 fps)

Summary for Link 2L: Lake Waukewan

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 1.96" for 25yr event
Inflow = 202.15 cfs @ 12.83 hrs, Volume= 128.891 af
Primary = 202.15 cfs @ 12.83 hrs, Volume= 128.891 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs

Time span=2.00-48.00 hrs, dt=0.01 hrs, 4601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat 1 Runoff Area=123.050 ac 3.86% Impervious Runoff Depth=2.57"
Flow Length=2,832' Slope=0.1200 '/' Tc=28.2 min CN=70 Runoff=213.12 cfs 26.345 af

Subcatchment 2S: Subcat 2 Runoff Area=203.010 ac 5.87% Impervious Runoff Depth=2.84"
Flow Length=4,382' Slope=0.0950 '/' Tc=41.3 min CN=73 Runoff=326.01 cfs 48.071 af

Subcatchment 3S: Subcat 3 Runoff Area=39.030 ac 12.13% Impervious Runoff Depth=2.93"
Flow Length=2,511' Slope=0.0910 '/' Tc=26.3 min CN=74 Runoff=80.49 cfs 9.544 af

Subcatchment 4S: Subcat 4 Runoff Area=47.760 ac 22.35% Impervious Runoff Depth=3.32"
Flow Length=3,272' Slope=0.0980 '/' Tc=27.9 min CN=78 Runoff=108.56 cfs 13.195 af

Subcatchment 5S: Subcat 5 Runoff Area=140.300 ac 26.00% Impervious Runoff Depth=3.41"
Flow Length=3,798' Slope=0.0810 '/' Tc=33.5 min CN=79 Runoff=302.08 cfs 39.903 af

Subcatchment 6S: Subcat 6 Runoff Area=130.360 ac 7.73% Impervious Runoff Depth=2.75"
Flow Length=4,593' Slope=0.0810 '/' Tc=47.8 min CN=72 Runoff=187.25 cfs 29.871 af

Subcatchment 7S: Subcat 7 Runoff Area=32.040 ac 33.21% Impervious Runoff Depth=3.71"
Flow Length=3,154' Slope=0.0630 '/' Tc=29.8 min CN=82 Runoff=78.85 cfs 9.911 af

Subcatchment 8S: Subcat 8 Runoff Area=33.140 ac 34.86% Impervious Runoff Depth=3.71"
Flow Length=2,745' Slope=0.0470 '/' Tc=30.8 min CN=82 Runoff=80.41 cfs 10.252 af

Subcatchment 9S: Subcat 9 Runoff Area=29.180 ac 22.05% Impervious Runoff Depth=3.22"
Flow Length=2,576' Slope=0.0700 '/' Tc=28.0 min CN=77 Runoff=64.14 cfs 7.826 af

Subcatchment 10S: Subcat 10 Runoff Area=12.390 ac 29.64% Impervious Runoff Depth=3.12"
Flow Length=961' Slope=0.0830 '/' Tc=12.1 min CN=76 Runoff=37.19 cfs 3.224 af

Reach 1R: Reservoir Brook Avg. Flow Depth=1.74' Max Vel=8.13 fps Inflow=83.48 cfs 26.105 af
n=0.040 L=2,356.0' S=0.0398 '/' Capacity=202.98 cfs Outflow=83.23 cfs 26.096 af

Reach 2R: Res Rd Culvert Avg. Flow Depth=4.00' Max Vel=18.65 fps Inflow=380.60 cfs 74.167 af
48.0" Round Pipe n=0.011 L=62.0' S=0.0147 '/' Capacity=205.67 cfs Outflow=215.29 cfs 74.155 af

Reach 3R: Reservoir Brook Avg. Flow Depth=3.48' Max Vel=9.23 fps Inflow=215.29 cfs 74.155 af
n=0.040 L=1,983.0' S=0.0300 '/' Capacity=156.15 cfs Outflow=205.67 cfs 74.148 af

Reach 4R: Rt 104 Easterly Culvert Avg. Flow Depth=2.63' Max Vel=42.40 fps Inflow=505.95 cfs 114.051 af
72.0" Round Pipe n=0.011 L=124.0' S=0.0645 '/' Capacity=1,271.30 cfs Outflow=505.88 cfs 114.051 af

Reach 5R: Reservoir Brook Avg. Flow Depth=5.32' Max Vel=11.32 fps Inflow=505.88 cfs 114.051 af
n=0.040 L=2,167.0' S=0.0332 '/' Capacity=201.12 cfs Outflow=499.65 cfs 114.043 af

Reach 6R: Easterly Culvert into Pond Avg. Flow Depth=3.00' Max Vel=2.49 fps Inflow=552.24 cfs 121.869 af
54.0" Round Pipe w/ 18.0" inside fill n=0.025 L=61.0' S=0.0016 '/' Capacity=24.84 cfs Outflow=26.58 cfs 78.194 af

Reach 7R: Rt 104 Westerly Culvert Avg. Flow Depth=3.00' Max Vel=19.64 fps Inflow=145.18 cfs 16.640 af
36.0" Round Pipe n=0.013 L=120.0' S=0.0333 '/' Capacity=121.77 cfs Outflow=130.65 cfs 16.640 af

Reach 8R: Central Culvert into Pond Avg. Flow Depth=1.33' Max Vel=5.72 fps Inflow=202.19 cfs 26.892 af
16.0" Round Pipe n=0.013 L=60.0' S=0.0083 '/' Capacity=7.00 cfs Outflow=7.54 cfs 22.452 af

Reach 9R: Westerly culvert into Pond Avg. Flow Depth=1.50' Max Vel=18.27 fps Inflow=78.85 cfs 9.911 af
18.0" Round Pipe n=0.013 L=55.0' S=0.0727 '/' Capacity=28.33 cfs Outflow=30.38 cfs 9.911 af

Reach 10R: (new Reach) Avg. Flow Depth=2.85' Max Vel=6.11 fps Inflow=187.25 cfs 29.871 af
n=0.040 L=116.0' S=0.0172 '/' Capacity=96.39 cfs Outflow=187.15 cfs 29.871 af

Pond 1P: Meredith Reservoir Peak Elev=780.64' Storage=9.202 af Inflow=213.12 cfs 26.345 af
30.0" Round Culvert x 3.00 n=0.013 L=30.0' S=0.0200 '/' Outflow=83.48 cfs 26.105 af

Pond 2P: Wilcom Pond Peak Elev=717.06' Storage=1.626 af Inflow=80.49 cfs 9.544 af
Primary=5.51 cfs 2.452 af Secondary=31.23 cfs 0.993 af Outflow=36.74 cfs 3.445 af

Pond 3P: Monkey Pond Peak Elev=548.04' Storage=7.766 af Inflow=255.48 cfs 143.653 af
Outflow=276.99 cfs 141.649 af

Link 2L: Lake Waukewan Inflow=276.99 cfs 141.649 af
Primary=276.99 cfs 141.649 af

Total Runoff Area = 790.260 ac Runoff Volume = 198.143 af Average Runoff Depth = 3.01"
85.96% Pervious = 679.318 ac 14.04% Impervious = 110.942 ac

Summary for Subcatchment 1S: Subcat 1

Runoff = 213.12 cfs @ 12.41 hrs, Volume= 26.345 af, Depth= 2.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
14.820	55	Woods, Good, HSG B
74.760	70	Woods, Good, HSG C
16.140	73	Woods, Fair, HSG C
5.100	61	>75% Grass cover, Good, HSG B
2.070	74	>75% Grass cover, Good, HSG C
1.290	79	50-75% Grass cover, Fair, HSG C
3.310	92	Urban commercial, 85% imp, HSG B
1.700	94	Urban commercial, 85% imp, HSG C
0.580	94	Urban commercial, 85% imp, HSG C
3.280	98	Water Surface, 0% imp, HSG A
123.050	70	Weighted Average
118.298		96.14% Pervious Area
4.751		3.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	2,832	0.1200	1.68		**Lag/CN Method,**

Summary for Subcatchment 2S: Subcat 2

Runoff = 326.01 cfs @ 12.58 hrs, Volume= 48.071 af, Depth= 2.84"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
118.170	70	Woods, Good, HSG C
37.880	73	Woods, Fair, HSG C
23.520	77	Woods, Good, HSG D
7.540	74	>75% Grass cover, Good, HSG C
0.900	79	50-75% Grass cover, Fair, HSG C
11.110	94	Urban commercial, 85% imp, HSG C
2.920	95	Urban commercial, 85% imp, HSG D
0.970	98	Water Surface, 0% imp, HSG A
203.010	73	Weighted Average
191.085		94.13% Pervious Area
11.925		5.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.3	4,382	0.0950	1.77		**Lag/CN Method,**

Summary for Subcatchment 3S: Subcat 3

Runoff = 80.49 cfs @ 12.36 hrs, Volume= 9.544 af, Depth= 2.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
30.940	70	Woods, Good, HSG C
2.520	74	>75% Grass cover, Good, HSG C
5.570	94	Urban commercial, 85% imp, HSG C
39.030	74	Weighted Average
34.295		87.87% Pervious Area
4.734		12.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	2,511	0.0910	1.59		**Lag/CN Method,**

Summary for Subcatchment 4S: Subcat 4

Runoff = 108.56 cfs @ 12.37 hrs, Volume= 13.195 af, Depth= 3.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
20.230	70	Woods, Good, HSG C
7.890	73	Woods, Fair, HSG C
7.080	77	Woods, Good, HSG D
7.400	94	Urban commercial, 85% imp, HSG C
2.340	94	Urban commercial, 85% imp, HSG C
2.820	95	Urban commercial, 85% imp, HSG D
47.760	78	Weighted Average
37.084		77.65% Pervious Area
10.676		22.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	3,272	0.0980	1.96		**Lag/CN Method,**

Summary for Subcatchment 5S: Subcat 5

Runoff = 302.08 cfs @ 12.47 hrs, Volume= 39.903 af, Depth= 3.41"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
25.990	70	Woods, Good, HSG C
49.750	73	Woods, Fair, HSG C
8.780	77	Woods, Good, HSG D
7.760	74	>75% Grass cover, Good, HSG C
0.550	79	50-75% Grass cover, Fair, HSG C
4.560	80	>75% Grass cover, Good, HSG D
19.720	94	Urban commercial, 85% imp, HSG C
20.960	94	Urban commercial, 85% imp, HSG C
2.230	95	Urban commercial, 85% imp, HSG D
140.300	79	Weighted Average
103.826		74.00% Pervious Area
36.473		26.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.5	3,798	0.0810	1.89		**Lag/CN Method,**

Summary for Subcatchment 6S: Subcat 6

Runoff = 187.25 cfs @ 12.69 hrs, Volume= 29.871 af, Depth= 2.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
10.260	55	Woods, Good, HSG B
50.460	70	Woods, Good, HSG C
49.240	73	Woods, Fair, HSG C
5.250	74	>75% Grass cover, Good, HSG C
3.290	79	50-75% Grass cover, Fair, HSG C
1.970	92	Urban commercial, 85% imp, HSG B
2.560	94	Urban commercial, 85% imp, HSG C
7.330	94	Urban commercial, 85% imp, HSG C
130.360	72	Weighted Average
120.279		92.27% Pervious Area
10.081		7.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.8	4,593	0.0810	1.60		**Lag/CN Method,**

Summary for Subcatchment 7S: Subcat 7

Runoff = 78.85 cfs @ 12.41 hrs, Volume= 9.911 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
0.170	55	Woods, Good, HSG B
1.060	70	Woods, Good, HSG C
12.680	73	Woods, Fair, HSG C
5.510	77	Woods, Good, HSG D
0.100	74	>75% Grass cover, Good, HSG C
5.730	94	Urban commercial, 85% imp, HSG C
6.790	95	Urban commercial, 85% imp, HSG D
32.040	82	Weighted Average
21.398		66.79% Pervious Area
10.642		33.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	3,154	0.0630	1.77		**Lag/CN Method,**

Summary for Subcatchment 8S: Subcat 8

Runoff = 80.41 cfs @ 12.42 hrs, Volume= 10.252 af, Depth= 3.71"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
0.270	70	Woods, Good, HSG C
19.120	73	Woods, Fair, HSG C
0.160	77	Woods, Good, HSG D
1.540	94	Urban commercial, 85% imp, HSG C
10.730	94	Urban commercial, 85% imp, HSG C
1.320	95	Urban commercial, 85% imp, HSG D
33.140	82	Weighted Average
21.588		65.14% Pervious Area
11.551		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	2,745	0.0470	1.48		**Lag/CN Method,**

Summary for Subcatchment 9S: Subcat 9

Runoff = 64.14 cfs @ 12.39 hrs, Volume= 7.826 af, Depth= 3.22"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
1.580	55	Woods, Good, HSG B
16.600	73	Woods, Fair, HSG C
1.810	77	Woods, Good, HSG D
1.620	61	>75% Grass cover, Good, HSG B
0.730	92	Urban commercial, 85% imp, HSG B
6.340	94	Urban commercial, 85% imp, HSG C
0.500	95	Urban commercial, 85% imp, HSG D
29.180	77	Weighted Average
22.745		77.95% Pervious Area
6.435		22.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	2,576	0.0700	1.53		**Lag/CN Method,**

Summary for Subcatchment 10S: Subcat 10

Runoff = 37.19 cfs @ 12.17 hrs, Volume= 3.224 af, Depth= 3.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 50yr Rainfall=5.70"

Area (ac)	CN	Description
3.540	55	Woods, Good, HSG B
3.730	73	Woods, Fair, HSG C
0.110	61	>75% Grass cover, Good, HSG B
1.660	92	Urban commercial, 85% imp, HSG B
2.660	94	Urban commercial, 85% imp, HSG C
0.690	98	Water Surface, 0% imp, HSG A
12.390	76	Weighted Average
8.718		70.36% Pervious Area
3.672		29.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	961	0.0830	1.33		**Lag/CN Method,**

Summary for Reach 1R: Reservoir Brook

[79] Warning: Submerged Pond 1P Primary device # 1 OUTLET by 0.34'

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth > 2.55" for 50yr event
Inflow = 83.48 cfs @ 12.93 hrs, Volume= 26.105 af
Outflow = 83.23 cfs @ 13.07 hrs, Volume= 26.096 af, Atten= 0%, Lag= 8.7 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.13 fps, Min. Travel Time= 4.8 min
Avg. Velocity = 2.54 fps, Avg. Travel Time= 15.5 min

Peak Storage= 24,112 cf @ 12.99 hrs
Average Depth at Peak Storage= 1.74'
Bank-Full Depth= 3.00' Flow Area= 19.5 sf, Capacity= 202.98 cfs

5.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 0.5 '/' Top Width= 8.00'
Length= 2,356.0' Slope= 0.0398 '/'
Inlet Invert= 776.00', Outlet Invert= 682.31'

Summary for Reach 2R: Res Rd Culvert

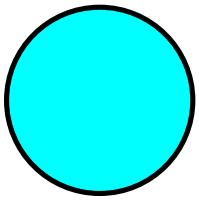
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 185% of Manning's capacity
[76] Warning: Detained 8.042 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 1R OUTLET depth by 3.32' @ 12.30 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 2.73" for 50yr event
Inflow = 380.60 cfs @ 12.62 hrs, Volume= 74.167 af
Outflow = 215.29 cfs @ 12.29 hrs, Volume= 74.155 af, Atten= 43%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 18.65 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.76 fps, Avg. Travel Time= 0.2 min

Peak Storage= 779 cf @ 12.30 hrs
Average Depth at Peak Storage= 4.00'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 205.67 cfs

48.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0147 '/'
Inlet Invert= 682.31', Outlet Invert= 681.40'



Summary for Reach 3R: Reservoir Brook

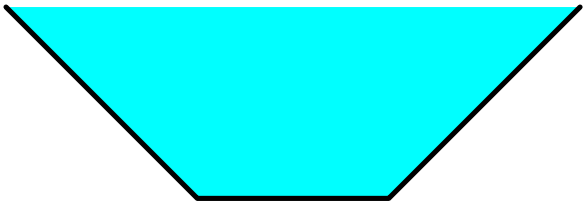
[91] Warning: Storage range exceeded by 0.48'
[55] Hint: Peak inflow is 138% of Manning's capacity
[63] Warning: Exceeded Reach 2R INLET depth by 0.43' @ 14.60 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 2.73" for 50yr event
Inflow = 215.29 cfs @ 12.29 hrs, Volume= 74.155 af
Outflow = 205.67 cfs @ 13.90 hrs, Volume= 74.148 af, Atten= 4%, Lag= 96.6 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.23 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 3.21 fps, Avg. Travel Time= 10.3 min

Peak Storage= 44,171 cf @ 13.84 hrs
Average Depth at Peak Storage= 3.48'
Bank-Full Depth= 3.00' Flow Area= 18.0 sf, Capacity= 156.15 cfs

3.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 9.00'
Length= 1,983.0' Slope= 0.0300 '/'
Inlet Invert= 681.40', Outlet Invert= 622.00'



Summary for Reach 4R: Rt 104 Easterly Culvert

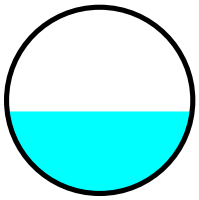
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 3R OUTLET depth by 0.23' @ 9.08 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 2.93" for 50yr event
Inflow = 505.95 cfs @ 12.47 hrs, Volume= 114.051 af
Outflow = 505.88 cfs @ 12.47 hrs, Volume= 114.051 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 42.40 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 12.32 fps, Avg. Travel Time= 0.2 min

Peak Storage= 1,480 cf @ 12.47 hrs
Average Depth at Peak Storage= 2.63'
Bank-Full Depth= 6.00' Flow Area= 28.3 sf, Capacity= 1,271.30 cfs

72.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 124.0' Slope= 0.0645 '/'
Inlet Invert= 622.00', Outlet Invert= 614.00'



Summary for Reach 5R: Reservoir Brook

[91] Warning: Storage range exceeded by 2.32'
[55] Hint: Peak inflow is 252% of Manning's capacity
[62] Hint: Exceeded Reach 4R OUTLET depth by 2.72' @ 12.56 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 2.93" for 50yr event
Inflow = 505.88 cfs @ 12.47 hrs, Volume= 114.051 af
Outflow = 499.65 cfs @ 12.58 hrs, Volume= 114.043 af, Atten= 1%, Lag= 6.6 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 11.32 fps, Min. Travel Time= 3.2 min
Avg. Velocity = 3.47 fps, Avg. Travel Time= 10.4 min

Peak Storage= 95,682 cf @ 12.53 hrs
Average Depth at Peak Storage= 5.32'
Bank-Full Depth= 3.00' Flow Area= 21.0 sf, Capacity= 201.12 cfs

4.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 10.00'
Length= 2,167.0' Slope= 0.0332 '/'
Inlet Invert= 614.00', Outlet Invert= 542.00'

Summary for Reach 6R: Easterly Culvert into Pond

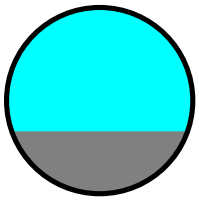
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 2223% of Manning's capacity
[76] Warning: Detained 89.705 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 5R OUTLET depth by 4.46' @ 47.99 hrs

Inflow Area = 495.540 ac, 12.02% Impervious, Inflow Depth > 2.95" for 50yr event
Inflow = 552.24 cfs @ 12.56 hrs, Volume= 121.869 af
Outflow = 26.58 cfs @ 10.86 hrs, Volume= 78.194 af, Atten= 95%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.14 fps, Avg. Travel Time= 0.5 min

Peak Storage= 687 cf @ 10.87 hrs
Average Depth at Peak Storage= 4.50' above invert (3.00' above fill)
Bank-Full Depth= 4.50' above invert (3.00' above fill) Flow Area= 11.3 sf, Capacity= 24.84 cfs

54.0" Round Pipe w/ 18.0" inside fill
n= 0.025 Corrugated metal
Length= 61.0' Slope= 0.0016 '/' (101 Elevation Intervals)
Inlet Invert= 542.00', Outlet Invert= 541.90'



Summary for Reach 7R: Rt 104 Westerly Culvert

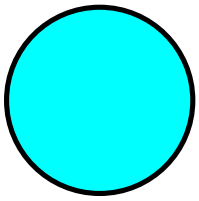
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 119% of Manning's capacity
[76] Warning: Detained 0.309 af (Pond w/culvert advised)

Inflow Area = 86.790 ac, 17.76% Impervious, Inflow Depth = 2.30" for 50yr event
Inflow = 145.18 cfs @ 12.37 hrs, Volume= 16.640 af
Outflow = 130.65 cfs @ 12.29 hrs, Volume= 16.640 af, Atten= 10%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 19.64 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 6.50 fps, Avg. Travel Time= 0.3 min

Peak Storage= 848 cf @ 12.30 hrs
Average Depth at Peak Storage= 3.00'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 121.77 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 120.0' Slope= 0.0333 '/'
Inlet Invert= 640.00', Outlet Invert= 636.00'



Summary for Reach 8R: Central Culvert into Pond

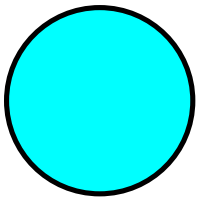
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 2887% of Manning's capacity
[76] Warning: Detained 18.230 af (Pond w/culvert advised)

Inflow Area = 119.930 ac, 22.48% Impervious, Inflow Depth = 2.69" for 50yr event
Inflow = 202.19 cfs @ 12.42 hrs, Volume= 26.892 af
Outflow = 7.54 cfs @ 10.42 hrs, Volume= 22.452 af, Atten= 96%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.72 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.88 fps, Avg. Travel Time= 0.2 min

Peak Storage= 84 cf @ 10.43 hrs
Average Depth at Peak Storage= 1.33'
Bank-Full Depth= 1.33' Flow Area= 1.4 sf, Capacity= 7.00 cfs

16.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0083 '/'
Inlet Invert= 542.50', Outlet Invert= 542.00'



Summary for Reach 9R: Westerly culvert into Pond

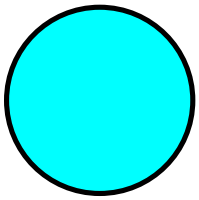
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 278% of Manning's capacity
[76] Warning: Detained 2.062 af (Pond w/culvert advised)
[85] Warning: Oscillations may require smaller dt or Finer Routing (severity=2)

Inflow Area = 32.040 ac, 33.21% Impervious, Inflow Depth = 3.71" for 50yr event
Inflow = 78.85 cfs @ 12.41 hrs, Volume= 9.911 af
Outflow = 30.38 cfs @ 12.06 hrs, Volume= 9.911 af, Atten= 61%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 18.27 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 10.10 fps, Avg. Travel Time= 0.1 min

Peak Storage= 97 cf @ 12.07 hrs
Average Depth at Peak Storage= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 28.33 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 544.00', Outlet Invert= 540.00'



Summary for Reach 10R: (new Reach)

[91] Warning: Storage range exceeded by 0.85'
[55] Hint: Peak inflow is 194% of Manning's capacity

Inflow Area = 130.360 ac, 7.73% Impervious, Inflow Depth = 2.75" for 50yr event
Inflow = 187.25 cfs @ 12.69 hrs, Volume= 29.871 af
Outflow = 187.15 cfs @ 12.70 hrs, Volume= 29.871 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.11 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.81 fps, Avg. Travel Time= 0.7 min

Peak Storage= 3,556 cf @ 12.69 hrs
Average Depth at Peak Storage= 2.85'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 96.39 cfs

3.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 116.0' Slope= 0.0172 '/'
Inlet Invert= 546.00', Outlet Invert= 544.00'

‡

Summary for Pond 1P: Meredith Reservoir

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth = 2.57" for 50yr event
Inflow = 213.12 cfs @ 12.41 hrs, Volume= 26.345 af
Outflow = 83.48 cfs @ 12.93 hrs, Volume= 26.105 af, Atten= 61%, Lag= 31.2 min
Primary = 83.48 cfs @ 12.93 hrs, Volume= 26.105 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 780.64' @ 12.93 hrs Surf.Area= 3.595 ac Storage= 9.202 af

Plug-Flow detention time= 126.3 min calculated for 26.105 af (99% of inflow)
Center-of-Mass det. time= 120.9 min (982.3 - 861.4)

Volume	Invert	Avail.Storage	Storage Description
#1	778.00'	14.178 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
778.00	3.387	0.000	0.000
782.00	3.702	14.178	14.178

Device	Routing	Invert	Outlet Devices
#1	Primary	778.00'	**30.0" Round Culvert X 3.00** L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 778.00' / 777.40' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf

Primary OutFlow Max=83.48 cfs @ 12.93 hrs HW=780.64' (Free Discharge)
↑**1=Culvert** (Inlet Controls 83.48 cfs @ 5.67 fps)

Summary for Pond 2P: Wilcom Pond

[93] Warning: Storage range exceeded by 1.06'

Inflow Area = 39.030 ac, 12.13% Impervious, Inflow Depth = 2.93" for 50yr event
Inflow = 80.49 cfs @ 12.36 hrs, Volume= 9.544 af
Outflow = 36.74 cfs @ 12.36 hrs, Volume= 3.445 af, Atten= 54%, Lag= 0.0 min
Primary = 5.51 cfs @ 12.36 hrs, Volume= 2.452 af
Secondary = 31.23 cfs @ 12.36 hrs, Volume= 0.993 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 717.06' @ 12.36 hrs Surf.Area= 0.350 ac Storage= 1.626 af

Plug-Flow detention time= 274.8 min calculated for 3.445 af (36% of inflow)
Center-of-Mass det. time= 146.0 min (996.0 - 850.0)

Volume	Invert	Avail.Storage	Storage Description
#1	710.00'	1.626 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
710.00	0.192	0.000	0.000
716.00	0.350	1.626	1.626

Device	Routing	Invert	Outlet Devices
#1	Primary	715.75'	**1.0" x 1.0" Horiz. Orifice/Grate X 12.00 columns** X 12 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#2	Secondary	715.95'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=5.51 cfs @ 12.36 hrs HW=717.06' (Free Discharge)
1=Orifice/Grate (Orifice Controls 5.51 cfs @ 5.51 fps)

Secondary OutFlow Max=31.17 cfs @ 12.36 hrs HW=717.06' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 31.17 cfs @ 2.81 fps)

Summary for Pond 3P: Monkey Pond

[93] Warning: Storage range exceeded by 3.04'
[58] Hint: Peaked 3.04' above defined flood level
[88] Warning: Qout>Qin may require smaller dt or Finer Routing
[63] Warning: Exceeded Reach 6R INLET depth by 1.54' @ 12.65 hrs
[63] Warning: Exceeded Reach 8R INLET depth by 4.20' @ 12.65 hrs
[63] Warning: Exceeded Reach 9R INLET depth by 2.54' @ 12.65 hrs
[62] Hint: Exceeded Reach 10R OUTLET depth by 1.20' @ 12.65 hrs

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 2.18" for 50yr event
Inflow = 255.48 cfs @ 12.65 hrs, Volume= 143.653 af
Outflow = 276.99 cfs @ 12.65 hrs, Volume= 141.649 af, Atten= 0%, Lag= 0.0 min
Primary = 276.99 cfs @ 12.65 hrs, Volume= 141.649 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 548.04' @ 12.65 hrs Surf.Area= 2.000 ac Storage= 7.766 af
Flood Elev= 545.00' Surf.Area= 2.000 ac Storage= 7.766 af

Plug-Flow detention time= 40.6 min calculated for 141.618 af (99% of inflow)
Center-of-Mass det. time= 21.0 min (1,494.3 - 1,473.3)

Volume	Invert	Avail.Storage	Storage Description
#1	540.00'	7.766 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
540.00	0.867	0.000	0.000
542.00	1.517	2.384	2.384
544.00	1.910	3.427	5.811
545.00	2.000	1.955	7.766

Device	Routing	Invert	Outlet Devices
#1	Primary	541.00'	**48.0" Round RCP_Round 48"** L= 40.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 541.00' / 540.20' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 12.57 sf
#2	Primary	541.00'	**48.0" Round Steel Culvert** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 541.00' / 540.00' S= 0.0213 '/' Cc= 0.900 n= 0.012 Steel, smooth, Flow Area= 12.57 sf

Primary OutFlow Max=276.96 cfs @ 12.65 hrs HW=548.04' (Free Discharge)
└─**1=RCP_Round 48"** (Inlet Controls 169.75 cfs @ 13.51 fps)
└─**2=Steel Culvert** (Inlet Controls 107.21 cfs @ 8.53 fps)

Summary for Link 2L: Lake Waukewan

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 2.15" for 50yr event
Inflow = 276.99 cfs @ 12.65 hrs, Volume= 141.649 af
Primary = 276.99 cfs @ 12.65 hrs, Volume= 141.649 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs

Time span=2.00-48.00 hrs, dt=0.01 hrs, 4601 points
Runoff by SCS TR-20 method, UH=SCS, Weighted-CN
Reach routing by Stor-Ind+Trans method - Pond routing by Stor-Ind method

Subcatchment 1S: Subcat 1 Runoff Area=123.050 ac 3.86% Impervious Runoff Depth=3.36"
Flow Length=2,832' Slope=0.1200 '/' Tc=28.2 min CN=70 Runoff=281.01 cfs 34.478 af

Subcatchment 2S: Subcat 2 Runoff Area=203.010 ac 5.87% Impervious Runoff Depth=3.67"
Flow Length=4,382' Slope=0.0950 '/' Tc=41.3 min CN=73 Runoff=422.59 cfs 62.077 af

Subcatchment 3S: Subcat 3 Runoff Area=39.030 ac 12.13% Impervious Runoff Depth=3.77"
Flow Length=2,511' Slope=0.0910 '/' Tc=26.3 min CN=74 Runoff=103.78 cfs 12.272 af

Subcatchment 4S: Subcat 4 Runoff Area=47.760 ac 22.35% Impervious Runoff Depth=4.19"
Flow Length=3,272' Slope=0.0980 '/' Tc=27.9 min CN=78 Runoff=137.17 cfs 16.695 af

Subcatchment 5S: Subcat 5 Runoff Area=140.300 ac 26.00% Impervious Runoff Depth=4.30"
Flow Length=3,798' Slope=0.0810 '/' Tc=33.5 min CN=79 Runoff=379.49 cfs 50.293 af

Subcatchment 6S: Subcat 6 Runoff Area=130.360 ac 7.73% Impervious Runoff Depth=3.57"
Flow Length=4,593' Slope=0.0810 '/' Tc=47.8 min CN=72 Runoff=243.81 cfs 38.743 af

Subcatchment 7S: Subcat 7 Runoff Area=32.040 ac 33.21% Impervious Runoff Depth=4.63"
Flow Length=3,154' Slope=0.0630 '/' Tc=29.8 min CN=82 Runoff=97.70 cfs 12.352 af

Subcatchment 8S: Subcat 8 Runoff Area=33.140 ac 34.86% Impervious Runoff Depth=4.63"
Flow Length=2,745' Slope=0.0470 '/' Tc=30.8 min CN=82 Runoff=99.67 cfs 12.776 af

Subcatchment 9S: Subcat 9 Runoff Area=29.180 ac 22.05% Impervious Runoff Depth=4.09"
Flow Length=2,576' Slope=0.0700 '/' Tc=28.0 min CN=77 Runoff=81.41 cfs 9.941 af

Subcatchment 10S: Subcat 10 Runoff Area=12.390 ac 29.64% Impervious Runoff Depth=3.98"
Flow Length=961' Slope=0.0830 '/' Tc=12.1 min CN=76 Runoff=47.42 cfs 4.112 af

Reach 1R: Reservoir Brook Avg. Flow Depth=2.02' Max Vel=8.71 fps Inflow=105.77 cfs 34.235 af
n=0.040 L=2,356.0' S=0.0398 '/' Capacity=202.98 cfs Outflow=105.56 cfs 34.225 af

Reach 2R: Res Rd Culvert Avg. Flow Depth=4.00' Max Vel=18.66 fps Inflow=502.44 cfs 96.303 af
48.0" Round Pipe n=0.011 L=62.0' S=0.0147 '/' Capacity=205.67 cfs Outflow=219.17 cfs 96.300 af

Reach 3R: Reservoir Brook Avg. Flow Depth=3.48' Max Vel=9.23 fps Inflow=219.17 cfs 96.300 af
n=0.040 L=1,983.0' S=0.0300 '/' Capacity=156.15 cfs Outflow=205.67 cfs 96.293 af

Reach 4R: Rt 104 Easterly Culvert Avg. Flow Depth=2.86' Max Vel=44.03 fps Inflow=584.86 cfs 146.586 af
72.0" Round Pipe n=0.011 L=124.0' S=0.0645 '/' Capacity=1,271.30 cfs Outflow=584.79 cfs 146.586 af

Reach 5R: Reservoir Brook Avg. Flow Depth=5.94' Max Vel=11.51 fps Inflow=584.79 cfs 146.586 af
n=0.040 L=2,167.0' S=0.0332 '/' Capacity=201.12 cfs Outflow=578.74 cfs 146.577 af

Reach 6R: Easterly Culvert into Pond Avg. Flow Depth=3.00' Max Vel=2.49 fps Inflow=647.47 cfs 156.519 af
54.0" Round Pipe w/ 18.0" inside fill n=0.025 L=61.0' S=0.0016 '/' Capacity=24.84 cfs Outflow=26.57 cfs 79.449 af

Reach 7R: Rt 104 Westerly Culvert Avg. Flow Depth=3.00' Max Vel=19.64 fps Inflow=249.93 cfs 30.551 af
36.0" Round Pipe n=0.013 L=120.0' S=0.0333 '/' Capacity=121.77 cfs Outflow=127.49 cfs 30.551 af

Reach 8R: Central Culvert into Pond Avg. Flow Depth=1.33' Max Vel=5.72 fps Inflow=221.44 cfs 43.327 af
16.0" Round Pipe n=0.013 L=60.0' S=0.0083 '/' Capacity=7.00 cfs Outflow=7.56 cfs 22.809 af

Reach 9R: Westerly culvert into Pond Avg. Flow Depth=1.50' Max Vel=18.27 fps Inflow=97.70 cfs 12.352 af
18.0" Round Pipe n=0.013 L=55.0' S=0.0727 '/' Capacity=28.33 cfs Outflow=29.96 cfs 12.352 af

Reach 10R: (new Reach) Avg. Flow Depth=3.37' Max Vel=6.32 fps Inflow=243.81 cfs 38.743 af
n=0.040 L=116.0' S=0.0172 '/' Capacity=96.39 cfs Outflow=243.71 cfs 38.743 af

Pond 1P: Meredith Reservoir Peak Elev=781.48' Storage=12.246 af Inflow=281.01 cfs 34.478 af
30.0" Round Culvert x 3.00 n=0.013 L=30.0' S=0.0200 '/' Outflow=105.77 cfs 34.235 af

Pond 2P: Wilcom Pond Peak Elev=718.44' Storage=1.626 af Inflow=103.78 cfs 12.272 af
Primary=7.90 cfs 3.604 af Secondary=105.06 cfs 10.252 af Outflow=112.96 cfs 13.856 af

Pond 3P: Monkey Pond Peak Elev=547.43' Storage=7.766 af Inflow=314.57 cfs 157.465 af
Outflow=256.85 cfs 150.594 af

Link 2L: Lake Waukewan Inflow=256.85 cfs 150.594 af
Primary=256.85 cfs 150.594 af

Total Runoff Area = 790.260 ac Runoff Volume = 253.739 af Average Runoff Depth = 3.85"
85.96% Pervious = 679.318 ac 14.04% Impervious = 110.942 ac

Summary for Subcatchment 1S: Subcat 1

Runoff = 281.01 cfs @ 12.39 hrs, Volume= 34.478 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
14.820	55	Woods, Good, HSG B
74.760	70	Woods, Good, HSG C
16.140	73	Woods, Fair, HSG C
5.100	61	>75% Grass cover, Good, HSG B
2.070	74	>75% Grass cover, Good, HSG C
1.290	79	50-75% Grass cover, Fair, HSG C
3.310	92	Urban commercial, 85% imp, HSG B
1.700	94	Urban commercial, 85% imp, HSG C
0.580	94	Urban commercial, 85% imp, HSG C
3.280	98	Water Surface, 0% imp, HSG A
123.050	70	Weighted Average
118.298		96.14% Pervious Area
4.751		3.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.2	2,832	0.1200	1.68		**Lag/CN Method,**

Summary for Subcatchment 2S: Subcat 2

Runoff = 422.59 cfs @ 12.57 hrs, Volume= 62.077 af, Depth= 3.67"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
118.170	70	Woods, Good, HSG C
37.880	73	Woods, Fair, HSG C
23.520	77	Woods, Good, HSG D
7.540	74	>75% Grass cover, Good, HSG C
0.900	79	50-75% Grass cover, Fair, HSG C
11.110	94	Urban commercial, 85% imp, HSG C
2.920	95	Urban commercial, 85% imp, HSG D
0.970	98	Water Surface, 0% imp, HSG A
203.010	73	Weighted Average
191.085		94.13% Pervious Area
11.925		5.87% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
41.3	4,382	0.0950	1.77		**Lag/CN Method,**

Summary for Subcatchment 3S: Subcat 3

Runoff = 103.78 cfs @ 12.36 hrs, Volume= 12.272 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
30.940	70	Woods, Good, HSG C
2.520	74	>75% Grass cover, Good, HSG C
5.570	94	Urban commercial, 85% imp, HSG C
39.030	74	Weighted Average
34.295		87.87% Pervious Area
4.734		12.13% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
26.3	2,511	0.0910	1.59		**Lag/CN Method,**

Summary for Subcatchment 4S: Subcat 4

Runoff = 137.17 cfs @ 12.37 hrs, Volume= 16.695 af, Depth= 4.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
20.230	70	Woods, Good, HSG C
7.890	73	Woods, Fair, HSG C
7.080	77	Woods, Good, HSG D
7.400	94	Urban commercial, 85% imp, HSG C
2.340	94	Urban commercial, 85% imp, HSG C
2.820	95	Urban commercial, 85% imp, HSG D
47.760	78	Weighted Average
37.084		77.65% Pervious Area
10.676		22.35% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
27.9	3,272	0.0980	1.96		**Lag/CN Method,**

Summary for Subcatchment 5S: Subcat 5

Runoff = 379.49 cfs @ 12.47 hrs, Volume= 50.293 af, Depth= 4.30"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
25.990	70	Woods, Good, HSG C
49.750	73	Woods, Fair, HSG C
8.780	77	Woods, Good, HSG D
7.760	74	>75% Grass cover, Good, HSG C
0.550	79	50-75% Grass cover, Fair, HSG C
4.560	80	>75% Grass cover, Good, HSG D
19.720	94	Urban commercial, 85% imp, HSG C
20.960	94	Urban commercial, 85% imp, HSG C
2.230	95	Urban commercial, 85% imp, HSG D
140.300	79	Weighted Average
103.826		74.00% Pervious Area
36.473		26.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
33.5	3,798	0.0810	1.89		**Lag/CN Method,**

Summary for Subcatchment 6S: Subcat 6

Runoff = 243.81 cfs @ 12.69 hrs, Volume= 38.743 af, Depth= 3.57"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
10.260	55	Woods, Good, HSG B
50.460	70	Woods, Good, HSG C
49.240	73	Woods, Fair, HSG C
5.250	74	>75% Grass cover, Good, HSG C
3.290	79	50-75% Grass cover, Fair, HSG C
1.970	92	Urban commercial, 85% imp, HSG B
2.560	94	Urban commercial, 85% imp, HSG C
7.330	94	Urban commercial, 85% imp, HSG C
130.360	72	Weighted Average
120.279		92.27% Pervious Area
10.081		7.73% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
47.8	4,593	0.0810	1.60		**Lag/CN Method,**

Summary for Subcatchment 7S: Subcat 7

Runoff = 97.70 cfs @ 12.41 hrs, Volume= 12.352 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
0.170	55	Woods, Good, HSG B
1.060	70	Woods, Good, HSG C
12.680	73	Woods, Fair, HSG C
5.510	77	Woods, Good, HSG D
0.100	74	>75% Grass cover, Good, HSG C
5.730	94	Urban commercial, 85% imp, HSG C
6.790	95	Urban commercial, 85% imp, HSG D
32.040	82	Weighted Average
21.398		66.79% Pervious Area
10.642		33.21% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
29.8	3,154	0.0630	1.77		**Lag/CN Method,**

Summary for Subcatchment 8S: Subcat 8

Runoff = 99.67 cfs @ 12.42 hrs, Volume= 12.776 af, Depth= 4.63"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
0.270	70	Woods, Good, HSG C
19.120	73	Woods, Fair, HSG C
0.160	77	Woods, Good, HSG D
1.540	94	Urban commercial, 85% imp, HSG C
10.730	94	Urban commercial, 85% imp, HSG C
1.320	95	Urban commercial, 85% imp, HSG D
33.140	82	Weighted Average
21.588		65.14% Pervious Area
11.551		34.86% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.8	2,745	0.0470	1.48		**Lag/CN Method,**

Summary for Subcatchment 9S: Subcat 9

Runoff = 81.41 cfs @ 12.38 hrs, Volume= 9.941 af, Depth= 4.09"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
1.580	55	Woods, Good, HSG B
16.600	73	Woods, Fair, HSG C
1.810	77	Woods, Good, HSG D
1.620	61	>75% Grass cover, Good, HSG B
0.730	92	Urban commercial, 85% imp, HSG B
6.340	94	Urban commercial, 85% imp, HSG C
0.500	95	Urban commercial, 85% imp, HSG D
29.180	77	Weighted Average
22.745		77.95% Pervious Area
6.435		22.05% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
28.0	2,576	0.0700	1.53		**Lag/CN Method,**

Summary for Subcatchment 10S: Subcat 10

Runoff = 47.42 cfs @ 12.17 hrs, Volume= 4.112 af, Depth= 3.98"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Type III 24-hr 100yr Rainfall=6.69"

Area (ac)	CN	Description
3.540	55	Woods, Good, HSG B
3.730	73	Woods, Fair, HSG C
0.110	61	>75% Grass cover, Good, HSG B
1.660	92	Urban commercial, 85% imp, HSG B
2.660	94	Urban commercial, 85% imp, HSG C
0.690	98	Water Surface, 0% imp, HSG A
12.390	76	Weighted Average
8.718		70.36% Pervious Area
3.672		29.64% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
12.1	961	0.0830	1.33		**Lag/CN Method,**

Summary for Reach 1R: Reservoir Brook

[79] Warning: Submerged Pond 1P Primary device # 1 INLET by 0.02'

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth > 3.34" for 100yr event
Inflow = 105.77 cfs @ 12.93 hrs, Volume= 34.235 af
Outflow = 105.56 cfs @ 13.07 hrs, Volume= 34.225 af, Atten= 0%, Lag= 8.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 8.71 fps, Min. Travel Time= 4.5 min
Avg. Velocity = 2.71 fps, Avg. Travel Time= 14.5 min

Peak Storage= 28,559 cf @ 12.99 hrs
Average Depth at Peak Storage= 2.02'
Bank-Full Depth= 3.00' Flow Area= 19.5 sf, Capacity= 202.98 cfs

5.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 0.5 '/' Top Width= 8.00'
Length= 2,356.0' Slope= 0.0398 '/'
Inlet Invert= 776.00', Outlet Invert= 682.31'

Summary for Reach 2R: Res Rd Culvert

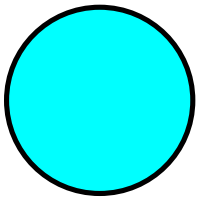
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 244% of Manning's capacity
[76] Warning: Detained 16.506 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 1R OUTLET depth by 3.21' @ 12.22 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 3.54" for 100yr event
Inflow = 502.44 cfs @ 12.62 hrs, Volume= 96.303 af
Outflow = 219.17 cfs @ 12.21 hrs, Volume= 96.300 af, Atten= 56%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Max. Velocity= 18.66 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.09 fps, Avg. Travel Time= 0.1 min

Peak Storage= 779 cf @ 12.22 hrs
Average Depth at Peak Storage= 4.00'
Bank-Full Depth= 4.00' Flow Area= 12.6 sf, Capacity= 205.67 cfs

48.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 62.0' Slope= 0.0147 '/'
Inlet Invert= 682.31', Outlet Invert= 681.40'



Summary for Reach 3R: Reservoir Brook

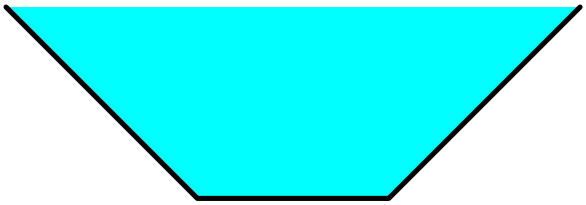
[91] Warning: Storage range exceeded by 0.48'
[55] Hint: Peak inflow is 140% of Manning's capacity
[63] Warning: Exceeded Reach 2R INLET depth by 0.77' @ 15.94 hrs

Inflow Area = 326.060 ac, 5.11% Impervious, Inflow Depth > 3.54" for 100yr event
Inflow = 219.17 cfs @ 12.21 hrs, Volume= 96.300 af
Outflow = 205.67 cfs @ 13.81 hrs, Volume= 96.293 af, Atten= 6%, Lag= 96.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 9.23 fps, Min. Travel Time= 3.6 min
Avg. Velocity = 3.42 fps, Avg. Travel Time= 9.7 min

Peak Storage= 44,171 cf @ 13.75 hrs
Average Depth at Peak Storage= 3.48'
Bank-Full Depth= 3.00' Flow Area= 18.0 sf, Capacity= 156.15 cfs

3.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 9.00'
Length= 1,983.0' Slope= 0.0300 '/'
Inlet Invert= 681.40', Outlet Invert= 622.00'



Summary for Reach 4R: Rt 104 Easterly Culvert

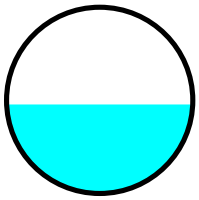
[52] Hint: Inlet/Outlet conditions not evaluated
[62] Hint: Exceeded Reach 3R OUTLET depth by 0.22' @ 8.43 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 3.77" for 100yr event
Inflow = 584.86 cfs @ 12.47 hrs, Volume= 146.586 af
Outflow = 584.79 cfs @ 12.47 hrs, Volume= 146.586 af, Atten= 0%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 44.03 fps, Min. Travel Time= 0.0 min
Avg. Velocity = 13.11 fps, Avg. Travel Time= 0.2 min

Peak Storage= 1,647 cf @ 12.47 hrs
Average Depth at Peak Storage= 2.86'
Bank-Full Depth= 6.00' Flow Area= 28.3 sf, Capacity= 1,271.30 cfs

72.0" Round Pipe
n= 0.011 Concrete pipe, straight & clean
Length= 124.0' Slope= 0.0645 '/'
Inlet Invert= 622.00', Outlet Invert= 614.00'



Summary for Reach 5R: Reservoir Brook

[91] Warning: Storage range exceeded by 2.94'
[55] Hint: Peak inflow is 291% of Manning's capacity
[62] Hint: Exceeded Reach 4R OUTLET depth by 3.10' @ 12.53 hrs

Inflow Area = 466.360 ac, 11.40% Impervious, Inflow Depth > 3.77" for 100yr event
Inflow = 584.79 cfs @ 12.47 hrs, Volume= 146.586 af
Outflow = 578.74 cfs @ 12.56 hrs, Volume= 146.577 af, Atten= 1%, Lag= 5.7 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 11.51 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 3.70 fps, Avg. Travel Time= 9.8 min

Peak Storage= 108,974 cf @ 12.51 hrs
Average Depth at Peak Storage= 5.94'
Bank-Full Depth= 3.00' Flow Area= 21.0 sf, Capacity= 201.12 cfs

4.00' x 3.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 1.0 '/' Top Width= 10.00'
Length= 2,167.0' Slope= 0.0332 '/'
Inlet Invert= 614.00', Outlet Invert= 542.00'

Summary for Reach 6R: Easterly Culvert into Pond

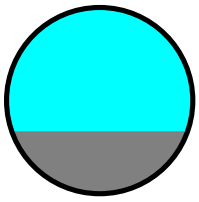
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 2607% of Manning's capacity
[76] Warning: Detained 122.639 af (Pond w/culvert advised)
[62] Hint: Exceeded Reach 5R OUTLET depth by 4.46' @ 47.99 hrs

Inflow Area = 495.540 ac, 12.02% Impervious, Inflow Depth > 3.79" for 100yr event
Inflow = 647.47 cfs @ 12.54 hrs, Volume= 156.519 af
Outflow = 26.57 cfs @ 10.30 hrs, Volume= 79.449 af, Atten= 96%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 2.49 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.13 fps, Avg. Travel Time= 0.5 min

Peak Storage= 687 cf @ 10.31 hrs
Average Depth at Peak Storage= 4.50' above invert (3.00' above fill)
Bank-Full Depth= 4.50' above invert (3.00' above fill) Flow Area= 11.3 sf, Capacity= 24.84 cfs

54.0" Round Pipe w/ 18.0" inside fill
n= 0.025 Corrugated metal
Length= 61.0' Slope= 0.0016 '/' (101 Elevation Intervals)
Inlet Invert= 542.00', Outlet Invert= 541.90'



Summary for Reach 7R: Rt 104 Westerly Culvert

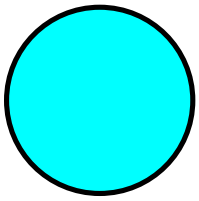
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 205% of Manning's capacity
[76] Warning: Detained 4.260 af (Pond w/culvert advised)

Inflow Area = 86.790 ac, 17.76% Impervious, Inflow Depth = 4.22" for 100yr event
Inflow = 249.93 cfs @ 12.37 hrs, Volume= 30.551 af
Outflow = 127.49 cfs @ 12.11 hrs, Volume= 30.551 af, Atten= 49%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 19.64 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 7.20 fps, Avg. Travel Time= 0.3 min

Peak Storage= 848 cf @ 12.12 hrs
Average Depth at Peak Storage= 3.00'
Bank-Full Depth= 3.00' Flow Area= 7.1 sf, Capacity= 121.77 cfs

36.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 120.0' Slope= 0.0333 '/'
Inlet Invert= 640.00', Outlet Invert= 636.00'



Summary for Reach 8R: Central Culvert into Pond

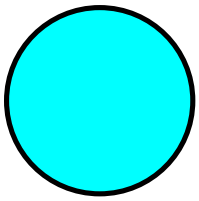
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 3161% of Manning's capacity
[76] Warning: Detained 34.117 af (Pond w/culvert advised)

Inflow Area = 119.930 ac, 22.48% Impervious, Inflow Depth = 4.34" for 100yr event
Inflow = 221.44 cfs @ 12.42 hrs, Volume= 43.327 af
Outflow = 7.56 cfs @ 9.83 hrs, Volume= 22.809 af, Atten= 97%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 5.72 fps, Min. Travel Time= 0.2 min
Avg. Velocity = 4.88 fps, Avg. Travel Time= 0.2 min

Peak Storage= 84 cf @ 9.84 hrs
Average Depth at Peak Storage= 1.33'
Bank-Full Depth= 1.33' Flow Area= 1.4 sf, Capacity= 7.00 cfs

16.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 60.0' Slope= 0.0083 '/'
Inlet Invert= 542.50', Outlet Invert= 542.00'



Summary for Reach 9R: Westerly culvert into Pond

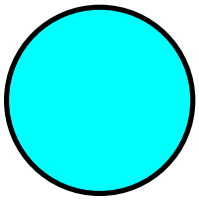
[52] Hint: Inlet/Outlet conditions not evaluated
[55] Hint: Peak inflow is 345% of Manning's capacity
[76] Warning: Detained 3.116 af (Pond w/culvert advised)

Inflow Area = 32.040 ac, 33.21% Impervious, Inflow Depth = 4.63" for 100yr event
Inflow = 97.70 cfs @ 12.41 hrs, Volume= 12.352 af
Outflow = 29.96 cfs @ 11.99 hrs, Volume= 12.352 af, Atten= 69%, Lag= 0.0 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 18.27 fps, Min. Travel Time= 0.1 min
Avg. Velocity = 10.57 fps, Avg. Travel Time= 0.1 min

Peak Storage= 97 cf @ 12.00 hrs
Average Depth at Peak Storage= 1.50'
Bank-Full Depth= 1.50' Flow Area= 1.8 sf, Capacity= 28.33 cfs

18.0" Round Pipe
n= 0.013 Corrugated PE, smooth interior
Length= 55.0' Slope= 0.0727 '/'
Inlet Invert= 544.00', Outlet Invert= 540.00'



Summary for Reach 10R: (new Reach)

[91] Warning: Storage range exceeded by 1.37'
[55] Hint: Peak inflow is 253% of Manning's capacity

Inflow Area = 130.360 ac, 7.73% Impervious, Inflow Depth = 3.57" for 100yr event
Inflow = 243.81 cfs @ 12.69 hrs, Volume= 38.743 af
Outflow = 243.71 cfs @ 12.69 hrs, Volume= 38.743 af, Atten= 0%, Lag= 0.1 min

Routing by Stor-Ind+Trans method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Max. Velocity= 6.32 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 2.97 fps, Avg. Travel Time= 0.7 min

Peak Storage= 4,471 cf @ 12.69 hrs
Average Depth at Peak Storage= 3.37'
Bank-Full Depth= 2.00' Flow Area= 18.0 sf, Capacity= 96.39 cfs

3.00' x 2.00' deep channel, n= 0.040 Mountain streams
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 116.0' Slope= 0.0172 '/'
Inlet Invert= 546.00', Outlet Invert= 544.00'

‡

Summary for Pond 1P: Meredith Reservoir

Inflow Area = 123.050 ac, 3.86% Impervious, Inflow Depth = 3.36" for 100yr event
Inflow = 281.01 cfs @ 12.39 hrs, Volume= 34.478 af
Outflow = 105.77 cfs @ 12.93 hrs, Volume= 34.235 af, Atten= 62%, Lag= 32.7 min
Primary = 105.77 cfs @ 12.93 hrs, Volume= 34.235 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs
Peak Elev= 781.48' @ 12.93 hrs Surf.Area= 3.661 ac Storage= 12.246 af

Plug-Flow detention time= 115.8 min calculated for 34.227 af (99% of inflow)
Center-of-Mass det. time= 111.8 min (965.4 - 853.6)

Volume	Invert	Avail.Storage	Storage Description
#1	778.00'	14.178 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
778.00	3.387	0.000	0.000
782.00	3.702	14.178	14.178

Device	Routing	Invert	Outlet Devices
#1	Primary	778.00'	**30.0" Round Culvert X 3.00** L= 30.0' CMP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 778.00' / 777.40' S= 0.0200 '/' Cc= 0.900 n= 0.013 Corrugated PE, smooth interior, Flow Area= 4.91 sf

Primary OutFlow Max=105.77 cfs @ 12.93 hrs HW=781.48' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 105.77 cfs @ 7.18 fps)

Summary for Pond 2P: Wilcom Pond

[93] Warning: Storage range exceeded by 2.44'
[88] Warning: Qout>Qin may require smaller dt or Finer Routing

Inflow Area = 39.030 ac, 12.13% Impervious, Inflow Depth = 3.77" for 100yr event
Inflow = 103.78 cfs @ 12.36 hrs, Volume= 12.272 af
Outflow = 112.96 cfs @ 12.36 hrs, Volume= 13.856 af, Atten= 0%, Lag= 0.0 min
Primary = 7.90 cfs @ 12.36 hrs, Volume= 3.604 af
Secondary = 105.06 cfs @ 12.36 hrs, Volume= 10.252 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 718.44' @ 12.36 hrs Surf.Area= 0.350 ac Storage= 1.626 af

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 29.1 min (871.8 - 842.8)

Volume	Invert	Avail.Storage	Storage Description
#1	710.00'	1.626 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
710.00	0.192	0.000	0.000
716.00	0.350	1.626	1.626

Device	Routing	Invert	Outlet Devices
#1	Primary	715.75'	**1.0" x 1.0" Horiz. Orifice/Grate X 12.00 columns** X 12 rows C= 0.600 in 24.0" x 24.0" Grate (25% open area) Limited to weir flow at low heads
#2	Secondary	715.95'	**10.0' long x 5.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.34 2.50 2.70 2.68 2.68 2.66 2.65 2.65 2.65 2.65 2.67 2.66 2.68 2.70 2.74 2.79 2.88

Primary OutFlow Max=7.90 cfs @ 12.36 hrs HW=718.44' (Free Discharge)
1=Orifice/Grate (Orifice Controls 7.90 cfs @ 7.90 fps)

Secondary OutFlow Max=105.02 cfs @ 12.36 hrs HW=718.44' (Free Discharge)
2=Broad-Crested Rectangular Weir (Weir Controls 105.02 cfs @ 4.21 fps)

Summary for Pond 3P: Monkey Pond

[93] Warning: Storage range exceeded by 2.43'
[58] Hint: Peaked 2.43' above defined flood level
[63] Warning: Exceeded Reach 6R INLET depth by 0.93' @ 12.65 hrs
[63] Warning: Exceeded Reach 8R INLET depth by 3.59' @ 12.65 hrs
[63] Warning: Exceeded Reach 9R INLET depth by 1.93' @ 12.65 hrs
[62] Hint: Exceeded Reach 10R OUTLET depth by 0.05' @ 12.61 hrs

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 2.39" for 100yr event
Inflow = 314.57 cfs @ 12.65 hrs, Volume= 157.465 af
Outflow = 256.85 cfs @ 12.65 hrs, Volume= 150.594 af, Atten= 18%, Lag= 0.0 min
Primary = 256.85 cfs @ 12.65 hrs, Volume= 150.594 af

Routing by Stor-Ind method, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs / 2
Peak Elev= 547.43' @ 12.65 hrs Surf.Area= 2.000 ac Storage= 7.766 af
Flood Elev= 545.00' Surf.Area= 2.000 ac Storage= 7.766 af

Plug-Flow detention time= 105.2 min calculated for 150.562 af (96% of inflow)
Center-of-Mass det. time= 42.0 min (1,457.4 - 1,415.5)

Volume	Invert	Avail.Storage	Storage Description
#1	540.00'	7.766 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
540.00	0.867	0.000	0.000
542.00	1.517	2.384	2.384
544.00	1.910	3.427	5.811
545.00	2.000	1.955	7.766

Device	Routing	Invert	Outlet Devices
#1	Primary	541.00'	**48.0" Round RCP_Round 48"** L= 40.0' RCP, groove end projecting, Ke= 0.200 Inlet / Outlet Invert= 541.00' / 540.20' S= 0.0200 '/' Cc= 0.900 n= 0.011 Concrete pipe, straight & clean, Flow Area= 12.57 sf
#2	Primary	541.00'	**48.0" Round Steel Culvert** L= 47.0' CMP, projecting, no headwall, Ke= 0.900 Inlet / Outlet Invert= 541.00' / 540.00' S= 0.0213 '/' Cc= 0.900 n= 0.012 Steel, smooth, Flow Area= 12.57 sf

Primary OutFlow Max=256.85 cfs @ 12.65 hrs HW=547.43' (Free Discharge)
└─**1=RCP_Round 48"** (Barrel Controls 156.36 cfs @ 12.44 fps)
└─**2=Steel Culvert** (Inlet Controls 100.49 cfs @ 8.00 fps)

Summary for Link 2L: Lake Waukewan

Inflow Area = 790.260 ac, 14.04% Impervious, Inflow Depth > 2.29" for 100yr event
Inflow = 256.85 cfs @ 12.65 hrs, Volume= 150.594 af
Primary = 256.85 cfs @ 12.65 hrs, Volume= 150.594 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 2.00-48.00 hrs, dt= 0.01 hrs

Appendix D

6 Green Tree Drive
South Burlington, Vermont 05403-6025
(802) 728-7202
Fax (866)783-7101
cbrodie@dubois-king.com

MEMORANDUM
226315

TO: **Nick Sceggell, Project File**
FROM: **Charlotte Brodie, Grace Glynn**
SUBJECT: **Monkey Pond, Meredith, NH; Wetlands Evaluation**
DATE: **December 2, 2020**

1. The Lake Winnipesaukee Association has requested that DuBois & King, Inc. assist with a study of the Reservoir Brook and Monkey Pond subwatershed, in an effort to better understand the processes of excessive stormwater loading from land development into Lake Waukewan and further downstream. A part of this study is a wetlands evaluation of Monkey Pond. DuBois & King, Inc. used the New Hampshire Method for Inventorying and Evaluating Wetlands in New Hampshire (2015) to assess the functions of values of the wetland within the Pond. The results of this evaluation are presented below.

   Monkey Pond is located between the railroad track along the shore of Lake Waukewan and Waukewan Road, in the Town of Meredith, as shown on the Location Map. A small Town parking lot for access to the Lake Waukewan swimming area is located at the eastern extreme, and a residence is located at the western extreme. The pond is located within the Reservoir Brook sub-watershed. The total area is approximately 1.75 acres.

2. Field Naturalists Grace Glynn and Charlotte Brodie visited the site on July 21, 2020 to document the wetland's characteristics for the purposes of a New Hampshire Method Wetland Evaluation. The area was found to include two small, shallow, vegetated ponds as well as aquatic bed, emergent and scrub-shrub wetland. The entire area would be considered jurisdictional wetland under the New Hampshire Wetland Rules. Photos of the wetland are attached.

3. The eastern end of the wetland is primarily scrub-shrub, with speckled alder, willow, elderberry, sweet gale, silky dogwood, highbush blueberry, meadowsweet, and buttonbush. Minor components of forested wetland occur around the edges, with common species including American elm and red maple. Towards the interior, the wetland is primarily herbaceous, with cattails, royal fern, Joe pye-weed, cinnamon fern, rice cutgrass, jewelweed, arrowhead, pickerelweed, burreed, watershield, and yellow pond lily. The wetland gives way to two small areas of open-water pond.

4. Reservoir Brook enters the wetland through a 6' metal "squash pipe" at the eastern end, where it deposits significant quantities of sand and mud from the upstream watershed. The stream continues as a recognizable channel for

approximately 100’ before fanning out into shallow marsh and pond. Water exits Monkey Pond through two four-foot culverts under the railroad.

5. Three 18” culverts drain from the wetland on the south side of Waukewan Road into Monkey Pond, where they scour out plunge pools. The location of the culverts is shown in the attached exhibit.

6. A riparian corridor and wetland on the south side of Waukewan Road at the western end of Monkey Pond empties into the pond through a culvert.

7. According to the NH Natural Heritage Bureau’s Data Check Tool, no rare, threatened or endangered species or significant natural communities are known in the vicinity of Monkey Pond, and none were observed during the course of field work.

8. The wetland as a whole was evaluated in accordance with the “Method for Inventorying and Evaluating Freshwater Wetlands in New Hampshire,” as updated in 2015. The attached Data Forms document the evaluation for each of twelve wetland functions. The scores for each function are provided in Table 1 below. **The scores for each category are on a scale of 1-10, with the exception of Flood Storage, which is based on a calculation, and Noteworthiness, which is ranked out of 70 possible points.** With the exception of these two functions, scores from 8-10 indicate a higher performance for that function, and scores below 5 indicate that the wetland is compromised for that function (NHDES, 2015).

Wetland Function	**Score**
Ecological Integrity	5.0
Wetland Wildlife Habitat	3.6
Fish & Aquatic Habitat	3.1
Scenic Quality	7.7
Educational Potential	3.7
Wetland-Based Recreation	4.4
Floodwater Storage	1.8
Groundwater	2.8
Sediment Trapping	4.1
Nutrient Transformation	5.2
Shoreline Anchoring	7.5
Noteworthiness	10.0

9. **Ecological Integrity** is the overall health and stability of the wetland ecosystem. Monkey Pond received an Ecological Integrity score of 5. Though the wetland itself has not been directly impacted by human activity and includes only a small percentage of non-native invasive plants, development and human activity in the surrounding area—including impervious surfaces and commercial development—diminish the ecological integrity of the site.

   Monkey Pond’s Ecological Integrity score contributed to its lower **Wetland Wildlife Habitat** score (3.6) and **Fish & Aquatic Habitat** score (3.1). These low scores can be attributed in part to land use in the above watershed, where commercial development appears to be causing high sedimentation

levels in the wetland and its stream channel. Photos of sediment deposition in the wetland are attached. These lower scoring wetland functions can indicate potential focus areas for restoration and mitigation. For example, reducing sedimentation and erosion upstream and managing invasive species will help maintain open water habitat in the wetland and its stream channel, increasing habitat value for fish and waterfowl. Though culverts are present, access to the wetland by wildlife may be limited by the road and railroad.

The wetland's **Scenic Quality** score was 7.7. This high score is unsurprising considering that the site offers striking contrasts between Lake Waukewan and a diversity of wetland vegetation types. An area of open water in the wetland is visible from the road, and nearby landowners report watching ducks feeding there.

The wetland's **Educational Potential** score was 3.7. This low score is attributed to lack of access to the wetland. Students would need to walk along a busy road to access the wetland itself. The wetland received low **Recreation** score (4.4) for a similar reason: no trails are present and access is limited.

The wetland's **Flood Storage** score of 1.8 indicates Low Flood Value. This is likely because the wetland is small in size. However, despite its small size, the wetland exhibits features indicating a fluctuation in water level of up to three feet. This fluctuation indicates that significant flood storage occurs within the overall wetland, even though the site is relatively small.

The wetland received a **Groundwater** score of 2.8. This was Monkey Pond's lowest-scoring function, likely due to a low percentage of highly permeable soil types and absence of public wellhead protection area. However, it should be noted that Lake Waukewan is the public drinking water supply for the town of Meredith, and conservation of wetlands along the lake edge should be prioritized accordingly.

The wetland received a **Sediment Trapping** score of 4.1. This low score is attributed to the wetland's outlets into Lake Waukewan, which cause sediment to enter the lake. However, because of the wetland's linear shape and small culverts, it should be noted that it is likely functioning as a sediment trap to some degree. This is especially true in the wetland's densely vegetated areas.

Though the wetland only received a score of 5.2 for **Nutrient Transformation,** this lower score is likely due to the wetland's small size and subsequently low flood storage score.

A score of 7.5 for **Shoreline Anchoring** indicates that Monkey Pond contributes to the stabilization of Lake Waukewan's shoreline. A diversity of wetland vegetation types is present with moderate vegetation cover and a moderate diversity of substrate, preventing erosion into the lake. Because the wetland is semi-permanently or permanently flooded and contains abundant organic soils, it also helps to prevent excess nutrients and pollutants from entering Lake Waukewan.

The wetland received a score of 10 for **Noteworthiness** due to its location within an area of Highest Ranked Habitat as identified on the NH Wildlife Action Plan. Wildlife that utilize Lake Waukewan as habitat can also find food and cover at Monkey Pond.

10. Conclusions

General:
Although degraded by sedimentation, Monkey Pond supports a good diversity of native wetland vegetation and performs a variety of wetland functions at fair levels.

Regarding Monkey Pond's contribution to the water quality of Lake Waukewan:
Areas of dense wetland vegetation, including cattails and alders, sequester nutrients, preventing pollutants from entering Lake Waukewan and helping to maintain water quality in the Lake.

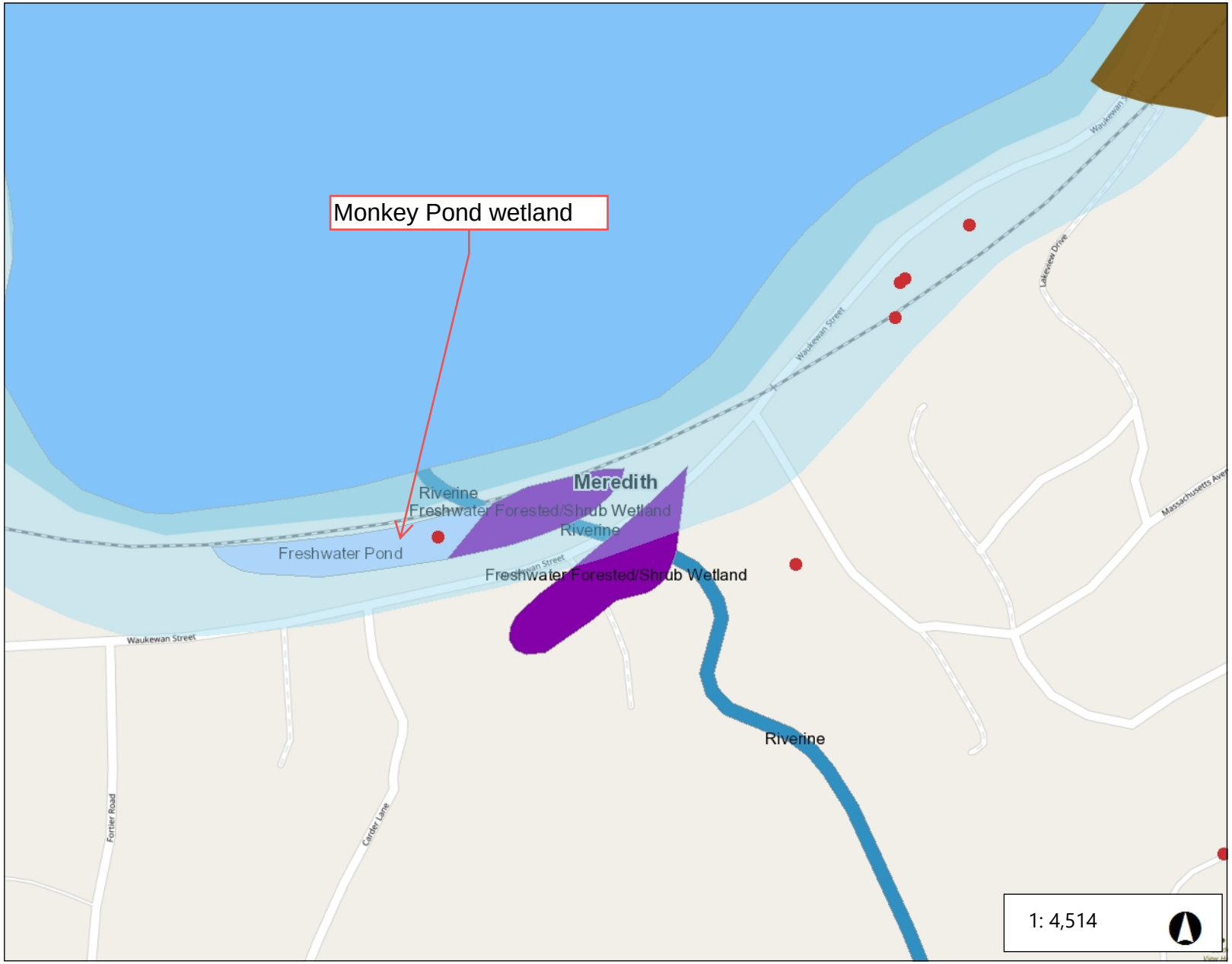
Regarding the question of dredging:
As mentioned above, areas of dense vegetation help to sequester nutrients in the substrate. Therefore, disturbance of natural vegetation in the wetland should be avoided. Dredging and other activities that disturb organic wetland soils and root systems are not recommended, and are unlikely to be permittable through the NHDES Wetlands Bureau.

Regarding candidacy for wetland enhancement:
Although degraded by sedimentation from the upstream watershed, the wetland is still supporting a good diversity of native wetland species, and is performing a variety of functions, including the provision of some wildlife and waterfowl habitat. Since dredging is not recommended, since there is little to no room to increase protective buffer at the wetland itself, and since the vegetative community is well adapted to the environment and stable, the wetland itself is not a good candidate for wetland enhancement.

Recommendations for management:
Monkey Pond's ecological integrity, its ability to function as wildlife, fish and aquatic habitat, and its flood storage potential have been compromised by sedimentation from upstream sources. It is recommended that restoration and conservation efforts be focused upstream, where land use practices have significant effects on the ecological integrity of Monkey Pond and Lake Waukewan. For example, improved stormwater management at or below development sites and restoration of riparian buffers would help to reduce erosion and sedimentation and provide shade and cover for aquatic organisms.

Use of the NH Method Evaluation:
The NH Method Evaluation of Monkey Pond's functions and values can be considered a baseline against which to measure changes resulting from future development or restoration in the watershed above.

Monkey Pond Wetland, Lake Waukewan



Legend

- NHDES Wetland and Shorelan
- Shoreland Jurisdiction - Lakes
- NH City/Town Boundaries
- Flood Plain Wetlands Adjacent
- Prime Wetlands
- Designated Rivers
  - Subject to SWQPA
  - Not Subject to SWQPA
- NWI Plus
  - Estuarine and Marine Deepwater
  - Estuarine and Marine Wetland
  - Freshwater Emergent Wetland
  - Freshwater Forested/Shrub Wetlan
  - Freshwater Pond
  - Lake
  - Other
  - Riverine
- NWI
  - Estuarine and Marine Deepwater
  - Estuarine and Marine Wetland
  - Freshwater Emergent Wetland
  - Freshwater Forested/Shrub Wetlan
  - Freshwater Pond
  - Lake
  - Other
  - Riverine
- Drainage Class
  - Excessively drained
  - Somewhat excessively drained
  - Well drained

Map Notes

0.2 0 0.08 0.2 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere

This map is a user generated static output from the web-based NHDES Wetlands Permit Scanning Tool and is for reference only. Data layers that appear on this map may or may not be accurate, current, or otherwise reliable. No map should be printed with scale 1 to less than 7,500.

THIS MAP IS NOT TO BE USED FOR NAVIGATION

GRAPHIC SCALE
0 100 200
1 inch = 200 ft.

DuBois & King inc.
engineering planning management development

MONKEY POND
MEREDITH, NEW HAMPSHIRE

WETLAND EXHIBIT

DRAWN BY: JWP	DATE: JUL. 2020
CHECKED BY:	PROJ. NO.: 226315L1
PROJ. ENG.: CWB	DRAW. NO.:

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: Charlotte Brodie, Grace Glynn

1 – ECOLOGICAL INTEGRITY

Evaluation Questions	Observations & Notes	Answers	Score
1. Are there land uses in the wetland's watershed that could degrade water quality in the wetland?	Commercial development upstream may be causing high sedimentation levels in wetland	a. Less than 5% of the watershed has land uses that could degrade water quality. b. 5-10% of the watershed has land uses that could degrade water quality. c. > 10% of the watershed has land uses that could degrade water quality.	10 5 1
2. Is there evidence of fill in the wetland?	None observed	a. Less than 1 % b. From 1-3 % c. More than 3 %	10 5 1
3. What percentage of the wetland has been altered by agricultural activities?	None	a. Less than 5 % b. From 5 to 25 % c. More than 25 %	10 5 1
4. What percentage of the wetland has been adversely impacted by logging activity within the last 10 years?	None	a. Less than 1% b. From 1 to 10 % c. More than 10 %	10 5 1
5. How much human activity is taking place in the wetland (e.g. ATV use, trails, cars, dumping of brush and garbage, etc.)?	None	a. Low: Few trails in use, little or no traffic, and little or no litter. b. Moderate: Some used trails, roads, litter c. High: Many trails, roads, and/or litter	10 5 1
6. What percentage of the wetland is occupied by invasive plant species?	Purple loosestrife and Japanese knotweed present along wetland/ upland edge	a. None b. 1-5% of the wetland has invasive species c. > 5% of the wetland has invasive species	10 5 1
7. Are there roads, driveways and/or railroads crossing or adjacent to the wetland or come within 500 ft. of the wetland?	The wetland is bordered by a railroad on one side and Waukewan Street on the other	a. No roads, driveways or railroads. within 500 ft. of, or in the wetland b. Roads, driveways, railroads are within 500 ft of the wetland c. Roads, driveways, railroads cross, or are adjacent to, the wetland	10 5 1
8. How much human activity is taking place in the upland within 500 feet of the wetland edge?	Residential and recreational use along road and railroad	a. Less than 5% or no activity b. Human activity evident in up to 25% of the 500 ft zone c. Human activity evident in more than 25% of the 500 ft zone	10 5 1
9. What is the percent of impervious surface within 500 feet of the wetland edge?	Small parking lot, rail-road, and paved road adjacent to wetland	a. Less than 3% impervious area within 500 ft of the wetland edge b. 3-10% impervious area within 500 ft of the wetland edge c. Greater than 10% impervious area within 500 ft of the wetland edge	10 5 1
10. Is there a human-made structure that regulates the flow of water through the wetland?	There are three 18" culverts beneath Waukewan St, 2 4' culverts beneath the railroad, and one 6' culvert carrying Reservoir Brook beneath Waukewan Street	a. No human made structures present **upstream of, or in** the wetland. b. One or more human made structures present **upstream of, or** in the wetland but hydrologic modification is slight c. One or more human made structures present **upstream of, or** in the wetland that severely block or alter surface water hydrology	10 5 1

AVERAGE SCORE FOR ECOLOGICAL INTEGRITY
(Add scores for each question and divide by 10) 5

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: Charlotte Brodie, Grace Glynn

2 – WETLAND-DEPENDENT WILDLIFE HABITAT

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the wetland acreage (including upland islands)?	1.75 acres	a. More than 100 acres b. From 20 - 100 acres c. Less than 20 acres	10 5 1
2. What is the score for Ecological Integrity?	5	Average score for **Ecological Integrity**	5
3. Has water quality in the wetland been degraded by land use in the watershed?	Likely degraded by commercial development upstream (to the south of the site)	Record Answer from **Ecological Integrity**, Question 1	1
4. What is the area of shallow permanent open water less than 6.6 feet deep, including streams and shallow ponds that are part of the wetland complex?	<.5 acres	a. More than 3 acres b. From 0.5 to 3 acres c. Less than 0.5 acre	10 5 1
5. Is there deepwater habitat (lakes or ponds > 6.6ft deep) and/or 4th order or higher rivers associated with the wetland?	No	a. Deepwater stream ≥1 mile long and/or lake or pond ≥10 acres present b. Deepwater stream < 1 mile long and/or lake or pond < 10 acres present c. No deepwater stream, lake or pond present	10 5 1
6. What is the diversity of vegetation classes in the wetland? *Refer to Appendix F for more information about wetland vegetation classes.*	3 classes: PUB, PSS, PEM	a. Three or more wetland classes (including upland islands) present b. Two wetland classes (including upland islands) present c. One wetland class present	10 5 1
7. Are other wetlands in close proximity to the study wetland?	Yes, Wetland B is of similar size and directly south of Waukewan St.	a. Other connected or unconnected wetlands within a 0.25 mile distance b. Wetland connected to other wetlands within a 0.5 to 1 mile distance by perennial stream or lake, **OR** other unconnected wetlands are present within a 0.25 to 0.5 mile distance c. Wetland not hydrologically connected to other wetlands within 1 mile and more than 0.5 miles from other unconnected wetlands.	10 5 1

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: Charlotte Brodie, Grace Glynn

2 – WETLAND-DEPENDENT WILDLIFE HABITAT (continued)

Evaluation Questions	Observations & Notes	Answers	Score
8. Are there wildlife travel corridors allowing access to other wetlands?	Movement likely blocked by railroad and road	a. Free access along well vegetated stream corridor, woodland, or lakeshore b. Access partially blocked by roads, urban areas, or other obstructions c. Access blocked by roads, urban areas, or other obstructions	10 5 1
9. What percentage of the wetland edge is bordered by undisturbed woodland or idle land (e.g. shrub land or abandoned fields) at least 500 feet in width?	Estimated 10% undisturbed border (on western boundary)	a. More than 95% of the wetland b. More than 75-95% of the wetland c. Less than 75% of the wetland	10 5 1
10. What percentage of the wetland is occupied by invasive plant species?		Record Answer from **Ecological Integrity**, Question 6	5

AVERAGE SCORE FOR WILDLIFE HABITAT
(Add scores for each question and divide by 10) 3.6

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

3 – FISH AND AQUATIC LIFE HABITAT

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the dominant land use in the watershed above wetland?	Mostly wooded with scattered commercial development	a. Woodland, wetland, or abandoned farmland b. Active farmland or rural residential c. Urban and heavily developed suburban areas, commercial and industrial areas.	10 **5** 1
2. Has water quality in the wetland been degraded by land use in the watershed?		Record Answer from **Ecological Integrity**, Question 1	1
3. What is the area of <u>shallow</u> permanent open water less than 6.6 ft deep, including streams and ponds within the wetland?		Record Answer from **Wetland-Dependent Wildlife Habitat**, Question 4	1
4. What is the acreage of <u>deepwater</u> habitats deeper than 6.6 feet (pond or lake) associated with the wetland?	Two small open-water ponds present	a. More than 100 acres b. From 10 to 100 acres c. Less than 10 acres d. deepwater pond or lake not present	10 5 1 **0**
5. What is the width (bank to bank) of the stream within the wetland?	Est. 5 ft width	a. More than 50 feet b. From 25 to 50 feet c. Less than 25 feet d. No stream present	10 5 **1** 0
6. Does the stream channel appear to have been recently altered?		a. Stream is in a natural channel, either a meandering low gradient stream, **OR** a steeper gradient stream with pools and riffles b. Portions of stream appear recently modified, **OR** stream formerly channelized but has regained some natural channel features c. Stream appears to have been recently been channelized, **OR** stream is confined in a non-vegetated chute or pipe d. No stream present	**10** 5 1 0
7. Within the wetland, what is the diversity of substrate types in the area(s) <u>occupied by open water</u> (flowing or standing) for the non-growing season?	gravel, muck, large rocks	a. 4 or more substrate types b. 2 or 3 substrate types c. 1 substrate type	10 **5** 1
8. How abundant are coarse woody material and large rocks associated with the open water portion of the wetland?	Some woody material and large rocks present in stream channel	a. Moderately Abundant to Abundant: More than 10% of the open water portion of the wetland area contains cover objects such as logs, stumps, branches and rocks b. Scarce: Less than 10% of the ~~water~~ open water portion of the wetland wetland area contains cover objects c. No visible woody materials or rocks	10 **5** 1

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

Evaluation Questions	Observations & Notes	Answers	Score
9. What is the abundance of floating & submerged vegetation?	Date of Observation: 7/21 Wetland was an est. 2 feet below high water line during time of site visit. Brasenia schreberi present in small portion of open water	a. Abundant: More than 70% of water area contains cover objects such as pond lilies, pondweed, and bladderwort b. Moderately abundant: From 30 to 70% of water area contains floating and submerged vegetation c. Scarce: Less than 30% of the water area contains floating and submerged vegetation	10 5 1
10. Are there artificial barriers to the passage of aquatic life? **(e.g. dams, elevated culverts, bridge with a width less than the natural stream channel, road crossings, etc. along the stream reach associated with the wetland).**	Culverts were elevated during time of site visit, but appear to be sumberged by typical water levels	a. No artificial barrier(s) present. b. An artificial barrier is present and equipped with a fish ladder or other provisions for fish passage, or artificial barrier is only present during extreme low water c. Dam, elevated culverts or other artificial barrier(s) is present without provisions for fish passage d. Stream not present	10 5 1 0
11. Are fish or aquatic species present that are rare, threatened, endangered or "Species of Greatest Conservation Need"?	None identified by Natural Heritage Bureau, and none observed in the field	a. Documented occurrence of a rare or endangered fish or aquatic life species within or immediately adjacent to the subject wetland b. Documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland and suitable habitat exists for this species within the wetland c. No documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland, but suitable habitat exists and wetland is within range of one or more rare species d. No documented occurrence of a rare or endangered fish or aquatic life species within .5 miles of wetland, and suitable habitat is not known to exist	10 5 1 0

AVERAGE SCORE FOR FISH & AQUATIC LIFE HABITAT
(Add scores for each question and divide by 11) 3.1

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

4 – SCENIC QUALITY

Primary viewing Site: Waukewan St/beach parking lot

Evaluation Questions	Observations & Notes	Answers	Score
1. How many wetland vegetation classes are visible from the primary viewing location(s)? *Refer to Appendix F for more information about wetland vegetation classes.*		a. Three or more classes b. Two classes c. One class	**10** 5 1
2. Is there public access at the viewing site?	Wetland visible from rail-road, road, and parking lot for popular swimming area	a. Viewing site is on a property with public access, and trails to the site, or site is along a road. b. Wetland is on property with public access but no trails to the site. c. Wetland is on a property that does not have public access.	**10** 5 1
3. What is the visible extent across the wetland?		a. Large expanse visible and low growing plants, or mixed vegetation classes you can see through b. View is somewhat restricted by trees and shrubs c. Forested or scrub-shrub wetland with little or no expanse visible.	10 **5** 1
4. What is the approximate extent of open water (including streams) visible from the primary viewing location/s?	Open water visible from road	a. More than 3 acres b. From 1 to 3 acres c. Less than 1 acre	10 5 **1**
5. Does the wetland provide visual contrast with the surrounding landscape?	Lake Waukewan provides striking contrast	a. High level of visual contrast with surrounding natural landscape. b. Some visual contrast with surrounding natural landscape c. Little visual contrast with surrounding landscape, or surrounding landscape is developed	**10** 5 1
6. What is the general appearance of the wetland and surrounding land use(s) visible from primary viewing location(s)?	No visual detractors	a. Wetland is undisturbed and natural. No visual detractors, such as buildings, litter, abandoned cars, or powerlines b. Limited disturbance in and/or around wetland. Minor visual detractors c. Severe visual detractors present	**10** 5 1

AVERAGE SCORE FOR SCENIC QUALITY
(Add scores for each question and divide by 6) 7.7

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

5 – EDUCATIONAL POTENTIAL

Primary Educational Site(s): Parking lot at beach on Waukewan Street

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the Ecological Integrity of the wetland?		Average Score from **1- Ecological Integrity**	5
2. Does the wetland have high value wildlife habitat?		Average Score from **2 – Wetland-Dependent Wildlife Habitat**	4
3. Does the wetland have high value fish and aquatic life habitat?		Average Score from **3 – Fish & Aquatic Life Habitat**	3.2
4. Is all or part of the wetland on public or private property that has public or private access (i.e. with written permission)?		a. Wetland is on a property with public or private access and trails to the site. b. Wetland is on a property with public or private access but no trails to the site. c. Wetland is on a property that does not currently have public or private access.	10 **5** 1
5. How close is the educational site to off-road parking suitable for 5-10 vehicles or large enough for a school bus?	Adjacent parking lot	a. Adequate parking is available less than a 5 minute walk from the educational site. b. Adequate parking is a 5-15 minute walk from educational site, or parking is limited to less than 5 cars. c. Adequate parking is more than 15 mins walk from the educational site, or no adequate parking is available.	**10** 5 1
6. How many wetland vegetation classes are accessible or potentially accessible for study at the educational site? *Refer to Appendix F for more information about wetland vegetation classes.*	PSS & PEM	a. Three or more wetland vegetation classes b. Two wetland vegetation classes c. One wetland vegetation class	10 **5** 1
7. Is there access to open water (include streams) associated with the wetland at educational site?	Access not feasible	a. Direct access to water available b. Water access is a short distance (5 mins or less) from the educational site c. No access or access not feasible d. No open water	10 5 **1** 0
8. What is the aesthetic and visual quality of the educational site?		Average Score from **4 – Scenic Quality**	7.7
9. Is the educational site accessible to the disabled?	Only if limited to parking lot	a. Yes b. No	10 **0**

AVERAGE SCORE FOR EDUCATIONAL POTENTIAL
(Add scores for each question and divide by 9) 3.7

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

6 – WETLAND-BASED RECREATION (CANOEING, KAYAKING, AND WILDLIFE OBSERVATION)

Evaluation Questions	Observations & Notes	Answers	Score
1. Are there opportunities for wildlife observation?	Limited-- visibility of open water is poor from road/parking lot	Average score for **2 – Wetland-Dependent Wildlife Habitat**	4
2. Is there access to suitable open water for canoes and kayaks?	No, though a nearby landowner expressed that open water was once more expansive and accessible to paddlers	a. Open water is present, with easy access b. Open water is present, but site is not easily accessed for canoes/kayaks. c. Open water is present but no access is allowed or possible d. No open water suitable for canoe/kayak	10 5 1 0
3. Are there trail-based recreation opportunities?	No	a. Maintained trails are present in and immediately adjacent to the wetland b. Trails are present but not maintained c. No trails are present	10 5 1
4. Are there off-trail recreation opportunities?	Access limited	a. Wetland has open water greater than 0.5 acres in size **AND** an undisturbed 500 ft buffer for greater than 75% of the wetland edge. b. Wetland has open water greater than 0.5 acres in size **OR** an undisturbed 500 ft buffer for greater than 75% of the wetland edge. c. Wetland has neither open water nor an undisturbed buffer greater than 75% d. No access to potential recreation site or access not feasible	10 5 1 0
5. Is there off-road public parking at the potential recreation site for at least two cars?		a. Adequate parking is available less than 5 minutes from the recreation site. b. Adequate parking is a 5-10 minute walk from the recreation site, or parking is limited. c. Adequate parking is more than 10 minutes walk from the recreation site, or no adequate parking is available. d. No access to potential recreational site or access is not feasible	10 5 1 0
6. What is the scenic quality of the potential recreational site?		Average score from **4 – Scenic Quality**	6.1

AVERAGE SCORE FOR WATER-BASED RECREATION
(Add scores for each question and divide by 6) 4.35

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

7 – FLOOD STORAGE

Instead of manually calculating the Wetland Flood Index on this data sheet, you can use the Flood Index Worksheet, an Excel spreadsheet provided on the NH Method website which is set up to do all the calculations for you. An example of the spreadsheet is provided in Table 3.

Note that this function is scored somewhat differently from the other NH Method function. A series of factors are developed that are then use to derive the Flood Storage Index. The numerical scores for the factors do not correspond to the 10, 5, 1, 0 scoring scale used in the other functions.

In the following situations, the Flood Value Index does not need to be calculated for the wetland being studied. Instead a certain flood index range can be assumed:

1. Wetlands with slopes greater than 10% (10' vertical :100' horizontal) as measured along the flow path, where it is obvious that little flood attenuation could occur, **should be assigned a Low Flood Index Value range (0.0 to 0.9).**
2. For large ponds or lakes or wetlands with ponded water surface area greater than 200 acres and streams that are Fourth Order or higher (i.e. 4th, 5th, 6th etc.) **assign a High Flood Index Value range (7.6 to 10.0)**

Evaluation Questions	Observations and Notes	Answers	Factor
1. What is the Wetland Acreage (W)? *Be sure to EXCLUDE the acreage of any upland islands from the total wetland acreage*		1.75 acres	
2. What is the Watershed Acreage (S)?		8,307 acres	
3. What is the Water Storage Depth in the wetland (D)?		a. Use the actual water storage depth if known b. Assign a default value of 1.0 if the wetland is located in a 100 year floodplain c. Assign a default value of 1.0 ft if the actual water storage depth is not known	**D**= 3 ft **D**=1.0 ft **D**=1.0 ft
4. What is the Wetland Storage Volume (V)?		Multiply Water Storage Depth by Wetland acreage: D x W = V	**V**= 5.2 acre feet
5. Wetland Storage Volume Factor (F)		Insert value from Table 1	**F**= 45
6. Watershed Area Factor (A)		Insert value from Table 2	**A**= .5
7. Location of wetland within the watershed (L) *(Choose the highest factor that applies)*		a. Wetland located within 1,000 ft of a 4th order or higher stream OR within 1000 ft of a pond/lake that outlets to a 4th order or higher stream b. Wetland located within 500 ft of a perennial stream (less than 4th order) c. Neither of the above situations apply to the study wetland	1.0 0.8 0.6

SCORE FOR WETLAND FLOOD INDEX = F x A x L x 10 1.8

Use the score to locate the Value Range below and assign Flood Index Value

Wetland Flood Index Values	Flood Value Type
0.0 – 0.9	Low Flood Value
1.0 – 2.5	Low to Moderate Flood Value
2.6 – 5.0	Moderate Flood Value
5.1 – 7.5	Moderate to High Flood Value
7.6 – 10.0	High Flood Value

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

TABLE 1*	
Wetland Storage Volume Factor (F)	
Wetland Storage Volume (V) (acre-feet)	**Value of F**
≥ 200	1.000
150	0.950
100	0.900
75	0.850
50	0.800
37.5	0.750
25	0.700
18.75	0.650
12.5	0.600
9.375	0.550
6.25	0.500
4.69	0.450
3.125	0.400
2.36	0.350
1.6	0.300
1.2	0.250
0.8	0.200
0.6	0.150
0.4	0.100
0.3	0.075
0.2	0.050
0.15	0.037
0.1	0.025
0.05	0.012
0	0.000

TABLE 2*	
Watershed Area Factor (A)	
(P) Wetl. Area/Wshed Area x 100	**Value for A**
≥10%	1.00
9%	0.95
8%	0.90
7%	0.85
6%	0.80
5%	0.75
4%	0.70
3%	0.65
2%	0.60
1%	0.55
< 1%	0.50

(you will need to interpret your value to the closest value in Tables 1 and 2)

SEE BELOW LEFT FOR EXAMPLES OF WETLAND FLOOD INDEX CALCULATION:

Example 1: *(See Wetland I.D. 1 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 0.25 acres
Watershed Area (S) = 25 acres
Water Storage Depth (D) = 0.5 ft (known depth)
Water Storage Volume (V) = 0.5 ft x 0.25 acres = 0.125 acre-feet
Wetland Storage Volume Factor (F) = 0.03 (from Table 1)
Watershed Area Factor (A) = 0.55 (from Table 2, where 0.25 acres/25 acres x 100 = 1%)
Location in Watershed (L) = 0.8
Wetland Flood Index = 0.03 x 0.55 x 0.80 = 0.0132
Flood Value Type = Low Flood Value

Example 2: *(see Wetland I.D. W3 in Table 3 – sample spreadsheet)*

Wetland Area (W) = 33 acres
Watershed Area (S) = 17,937 acres
Water Storage Depth (D) = 1.0 ft (default value)
Water Storage Volume (V) = 1.0 ft x 33 acres = 33 acre-feet
Wetland Storage Volume Factor (F) = 0.73 (from Table 1)
Watershed Area Factor (A) = 0.5 (from Table 2, where 33 acres/17,937 acres x 100 = 0.18%)
Location in Watershed (L)= 1.0
Wetland Flood Index Value Type = 0.73 x 0.5 x 1.0 = 3.65
Flood Value = Moderate Flood Value

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

Table 3: Example of Flood Index Worksheet for Multiple Wetlands

Use the Excel spreadsheet on the NH Method Website
for automated calculation of the Flood Water Storage Index

Flood Index = (F x A x L) x 10
Where:
Maximum Wetland Storage Volume = 200 acre-ft
Maximum Wetland Flood Function Value = 10

"Red" headings indicate data input columns
"Black" headings indicate columns where the figures are automatically calculated

Wetland I.D.	Wetland Acreage (W)	Watershed Acreage (S)	Wetland Area as % of Watershed (P) from Table 2	Watershed Area Factor (A) Table 2	Location in Watershed (L) (1.0/0.8/0.6)	Water Storage Depth feet (D) 1.0 = default	Wetland Storage Volume acre feet (D) acre feet	Wetland Storage Volume Factor (F) Table 1	Flood Index
1	0.25	25	1.00	0.55	0.8	0.5	0.125	0.03	**0.132**
2	0.75	15	5.00	0.75	1	1	0.75	0.19	**1.425**
3	2	50	4.00	0.7	0.8	2.5	5	0.46	**2.576**
4	10	100	10.00	1	1	3	30	0.72	**7.200**
5	10	1000	1.00	1	1	4	40	0.77	**7.700**
6	3	47	6.38	0.81	0.8	2	6	0.48	**3.110**
7	0.1	3	3.33	0.42	0.6	0.5	0.05	0.016	**0.040**
8	0.75	20	3.75	0.68	0.6	0.15	0.1125	0.027	**0.110**
9	1	50	2.00	0.6	1	2.5	2.5	0.35	**2.100**
10	50	400	12.50	1	0.8	3	150	0.95	**7.600**
W1	283	19548	1.45	0.57	1	1	283	1	**5.700**
W3	33	17937	0.18	0.5	1	1	33	0.73	**3.650**
W4	54	17291	0.31	0.5	1	1	54	0.73	**3.650**
W5	202	16619	1.22	0.56	1	1	202	1	**5.600**
W6	175	2664	6.57	0.82	1	1	175	0.95	**7.790**
W7	40	446	8.97	0.94	1	1	40	0.78	**7.332**
W8	24	380	6.32	0.51	1	1	24	0.69	**3.519**
W9	43	679	6.33	0.51	1	1	43	0.77	**3.927**
W10	116	2161	5.37	0.77	1	1	116	0.92	**7.084**
W11	63	880	7.16	0.86	1	1	63	0.83	**7.138**
W12	24	3302	0.73	0.86	1	1	24	0.69	**5.934**
ND1	93.7	5169	1.81	0.57	1	1	93.7	0.88	**5.016**
ND2	50	3741	1.34	0.57	1	1	50	0.8	**4.560**
ND3	37	258	14.34	1	1	1	37	0.75	**7.500**
ND4	101	2700	3.74	0.68	1	1	101	0.9	**6.120**
ND5	110.5	562	19.66	1	1	1	110.5	0.92	**9.200**
ND6	99	1753	5.65	0.77	1	1	99	0.9	**6.930**

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

8 – GROUNDWATER

Note that this function does not require any field work

Evaluation Questions	Observations & Notes	Answers	Score
1. Does the wetland overlie a stratified drift aquifer?	Wetland is within 1/4 mile from a stratified drift aquifer (see attached map)	a. Wetland overlies **a** stratified drift aquifer b. Wetland is within ¼ mile of a stratified drift aquifer c. Wetland is more than ¼ mile from **a** stratified drift aquifer	10 5 1
2. Is the wetland in a potential public water supply area?	Yes-- Lake Waukewan is the public drinking water supply for Meredith	a. Wetland is in an area identified by Favorable Gravel Well Analysis b. Wetland is within ¼ mile of an area identified by Favorable Gravel Well Analysis c. Wetland is more than ¼ mile from an area identified by Favorable Gravel Well Analysis	10 5 1
3. Is the wetland within a public wellhead protection area?	No	a. More than 75% of the wellhead protection area includes the wetland b. 25%-75% of the wellhead protection area includes the wetland c. Less than 25% of the wellhead protection area includes the wetland	10 5 1
4. What is the percent coverage of highly permeable soils within 100 ft of the wetland? *Refer to Table 3 to answer this question*	<25%	a. More than 50% of the soil types within 100 ft of the wetland are on the list in Table 3. b. 25-50% of the soil types within 100 ft of the wetland listed in Table 3 c. Less than 25% of soil types within 100 ft of the wetland are listed in Table 3	10 5 1
5. What is the percent coverage of the highly permeable soil types listed in Table 4 within the wetland? *Refer to Table 4 to answer this question*	<25%	a. More than 50% of the soil types within the wetland are on the list in Table 4 b. 25-50% of the soil types within the wetland listed in Table 4 c. Less than 25% of the soil types within the wetland are listed in Table 4	10 5 1

AVERAGE SCORE FOR GROUND WATER
(Add scores for each question and divide by 5) 2.8

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

Table 3: SAND & GRAVEL SOIL TYPES

***Note**: This list of soils was prepared for the purpose of providing an additional data layer for consideration under the groundwater function – i.e. to include areas that are not mapped as aquifer recharge areas yet contain surface soils with coarse particle sizes which enhance infiltration.*

Number & Slope Classes[1]	Map Unit name & Particle Size Groups[2]	Drainage Class[3]	Record % of 100-ft. wetland buffer
12 B,C,D	Hinckley gravelly LS	ED	
21 B,C,D	Colton, gravelly LS	ED	
22 B,C,D	Colton LS	ED	
24 B,C	Agawam FSL & LS	WD	
25 B,C,D	Ninigret-Windsor complex LS	MWD/WD	
26 B,C,D	Windsor LS	ED	
35 B,C,D	Champlain LS	SED	
36 B,C,D	Adams LFS	SED	
22 A,B,E	Colton S&G	ED	
212 B,C	Hinckley, very gravelly LS	ED	
222 B,C,D	Colton, very stony LS	ED	
236 B,C,D	Adams, very stony FLS	SED	
300	Udipsamments	SED	
313	Deerfield, LS	MWD	
350	Udipsamments	SED	
400	Udorthents, S	ED	
526 B,C	Caesar LS	ED	

1. SLOPE CLASSES

A, B = 0 – 8% (includes 'A' on older maps) C = 8 – 15% D = 15 – 25% E = > 25%

2. PARTICLE SIZE GROUPS

F = fine L = loam S = sand LS = loamy sand SL = sandy loam G = gravel

3. DRAINAGE CLASSES

WD = well drained SED = somewhat excessively drained ED = excessively drained MWD = moderately well drained

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

Table 4: HIGHLY PERMEABLE WETLAND SOIL TYPES THAT POTENTIALLY CONTRIBUTE TO RECHARGE DURING DRY SEASONS.

Map Symbol	Soil Name	Drainage Class			
		Somewhat Poorly Drained	Poorly Drained	Very Poorly Drained	Record % of wetland area
15	Searsport			X	
34	Wareham		X		
115	Scarboro			X	
125	Scarboro, very stony			X	
214	Naumberg		X		
314	Pipestone		X		
315	Mashpee		X		
325	Scarboro variant			X	
326	Scarboro variant, very stony			X	
393	Timakwa			X	
394	Chocorua variant			X	
395	Chocorua			X	
433	Grange		X		
546	Walpole		X		
547	Walpole, stony		X		
614	Kinsman		X		
615	Augres		X		
900	Endoaquents, sandy		X	X	
913	Sudbury variant	X			
914	Duane variant	X			
915	Deerfield variant	X			
916	Croghan variant	X			
918	Madawaska variant	X			
992	Pondicherry			X	
				Total percent	0 %

NH METHOD FOR THE EVALUATION OF FRESHWATER WETLANDS *(revised December, 2015)*

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

9 – SEDIMENT TRAPPING

Evaluation Questions	Observations &Notes	Answers	Score
1. What is the wetland's Flood Storage value?		Average score from 7 – Flood Water Storage.	1.8
2. Does the wetland lack outlet or have a constricted outlet?	Outlets (culverts) have historically been plugged by beavers, according to a landowner, but were un-obstructed at time of visit	a. Wetland has no outlet or has a constricted outlet or is ponded above the outlet b. Wetland has an outlet but flow path through wetland is primarily sheet flow c. Wetland outlet not constricted or flow primarily within stream channel.	10 5 1
3. What is the character of water flow through the wetland? *Channel Length* / *Straight line distance of stream* = *Sinuosity Ratio*	440/343ft=1.3 sinuosity ratio	a. At least one of the following situations apply: • No stream channel OR • Inlet present but no outlet OR • Outlet is im pounded and standing water present in downstream end of wetland OR • Inlet and outlet present and channel sinuosity is ≥ 1.5 b. Inlet and outlet present, and sinuosity of channel is >1.0 and <1.5 c. Channel is straight (sinuosity=1.0) and no impoundments within wetland or at wetland outlet	10 5 1
4. What is the ratio of the wetland's size to the size of its watershed? *Acres of Wetland* / *Area of watershed above wetland outlet* x 100		a. Wetland is more than 10% of its watershed b. Wetland is between 1-10% of its watershed. c. Wetland is less than 1% of its watershed.	10 5 1
5. What is the gradient within the wetland?		a. Wetland has gradient < 0.5% or no outlet b. Wetland gradient is 0.5% to 3% c. Wetland has gradient greater than 3%.	10 5 1
6. What is the areal extent (% coverage) all vegetation types that will most likely trap sediments? (e.g. forested swamps, scrub shrub swamps, and persistent emergent marshes) *Refer to Appendix F for more information about wetland vegetation classes.*	PEM classes cover about 75% of the wetland	a. Persistent emergent plants (stems above surface of water /wetland throughout the year), trees and/or shrubs cover at least 90% of the surface area of the wetland. b. Persistent emergent, trees and/or shrubs, and/or non-persistent emergents (stems fall below the surface of water/wetland during fall and winter) cover 50-90% of the wetland's surface area. c. Persistent emergent, trees and/or shrubs, and/or non-persistent emergents (stems fall below the surface of water/wetland during fall and winter) cover <50% of the wetland's surface area.	10 5 1
7. What is the average water depth in the wetland during growing season?		a. Average water depth is < 1 ft or there is no open water b. Average water depth > 1 ft and < 6.6 ft. c. Average water depth is greater than 6.6 ft	10 5 1

AVERAGE SCORE FOR SEDIMENT TRAPPING:
(Add scores for each question and divide by 7) 4.1

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

10 – NUTRIENT REMOVAL/RETENTION/TRANSFORMATION

Evaluation Questions	Observations &Notes	Answers	Score
1. What is the wetland's Flood Storage value?		Average score from **7 – Flood Storage.**	1.8
2. What is the wetland's ability to trap sediments?		Average score from **9 – Sediment Trapping.**	4.1
3. **What is the extent (percent cover) of persistent emergent vegetation, trees and/or shrubs within the wetland?**		Record answer from **9 – Sediment Trapping**, Question 6	5
4. What hydroperiod occurs over more than 50% of the wetland?		a. Semi-permanently flooded, seasonally flooded/saturated, or saturated b. Seasonally flooded, seasonally flooded/well-drained or temporarily flooded c. Permanently flooded or intermittently exposed	10 5 1
5. What hydric soils cover the greatest percentage of the wetland?	The soils are not mapped as hydric by the NRCS, but were clearly hydric based upon field examination.	a. Wetland is dominated by fine textured soils (refer to Table A, Appendix D) b. Wetland is dominated by organic and/or peat soils (refer to Table B, Appendix 3) c. Wetland is dominated by sands and gravels (refer to Table C, Appendix D)	10 5 1

AVERAGE SCORE FOR NUTRIENT TRANSFORMATION
(Add scores for each question and divide by 5) 5.2

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

11 – SHORELINE ANCHORING

If there is no stream, river, lake or pond within or adjacent to the wetland, leave this Function out of the evaluation.

Evaluation Questions	Observations & Notes	Answers	Score
1. What is the gradation of wetland vegetation types along the shoreline?	PEM, PAB, PSS	a. Three or more wetland vegetation types present (PAB, PEM, PSS or PFO) b. Two wetland vegetation types present c. One wetland vegetation type present	10 5 1
2. What is the vegetation density in the wetland bordering watercourse, lake or pond?		a. High: More than 90% woody or persistent vegetation cover b. Moderate: From 70-90% woody or persistent vegetation cover c. Low: Less than 70% woody or persistent vegetation cover	10 5 1
3. How wide is the wetland bordering the watercourse, lake or pond?		a. More than 20 feet b. From 10-20 feet c. Less than 10 feet	10 5 1
4. How "rough" is the substrate of the wetland at the shoreline of the waterbody?		a. Wetland substrate characterized by many boulders, stones or cobbles and woody material b. Wetland substrate has few boulders, stones or cobbles, or substrate is mostly gravel or coarse sands and little woody material c. Wetland substrate is uniformly smooth and is comprises of clays, silts or very fine sands or organic materials and no woody material	10 5 1

AVERAGE SCORE FOR SHORELINE ANCHORING
(Add scores for each question and divide by 4) 7.5

Wetland Name/Code: Monkey Pond Evaluation Date: July 21, 2020 Evaluator: CB, GG

12 – NOTEWORTHINESS

Describe noteworthy features in the wetland narrative

Note that the scores for this function are totaled and NOT averaged

Evaluation Questions	Observations & Notes	Answers	Score
1. Is the wetland located in or within 500 ft of an area of Highest Ranked Habitat (state or regional level), as identified on the NH Wildlife Action Plan Highest Ranked Habitat Condition map?	Part of wetland located within highest ranked habitat	a. Yes	10
2. Does the wetland have local significance because has consistently high scores for all functions and/or is among the top ten largest wetlands in town?		a. No	0
3. Does the wetland have local, regional or statewide significance because it is it located in a priority area, is documented in a local or regional conservation plan, or it has been recognized as having regional importance in the state?		a. No	0
4. Does the wetland have known biological, geological, or other elements that are rare or unique as documented by the NH Natural Heritage Bureau or as determined by a professional?	No (see attached results from NHB Data Check)	a. No	0
5. Is the wetland known to contain a documented historical or archaeological site?	*Reference the documentation here:* No (see attached EMMIT review map, search conducted 10/8/20)	a. No	0
6. Is the wetland hydrologically connected to a state or federally designated river within ¼ mile of the wetland's outlet?		a. No	0
7. Is the wetland one of just a few left in an urban setting?		a. No	0

TOTAL SCORE FOR NOTEWORTHINESS ___10_____

Add up the scores for all questions which received a YES answer.
The total score is the score for this function (**note that this score is not averaged).**
For example, if you answered YES to four questions, the score would be 40.
If you answered YES to only one question, the score is 10

Stratified Drift Aquifers near Monkey Pond

Legend

High-Yield Stratified-Drift Aq

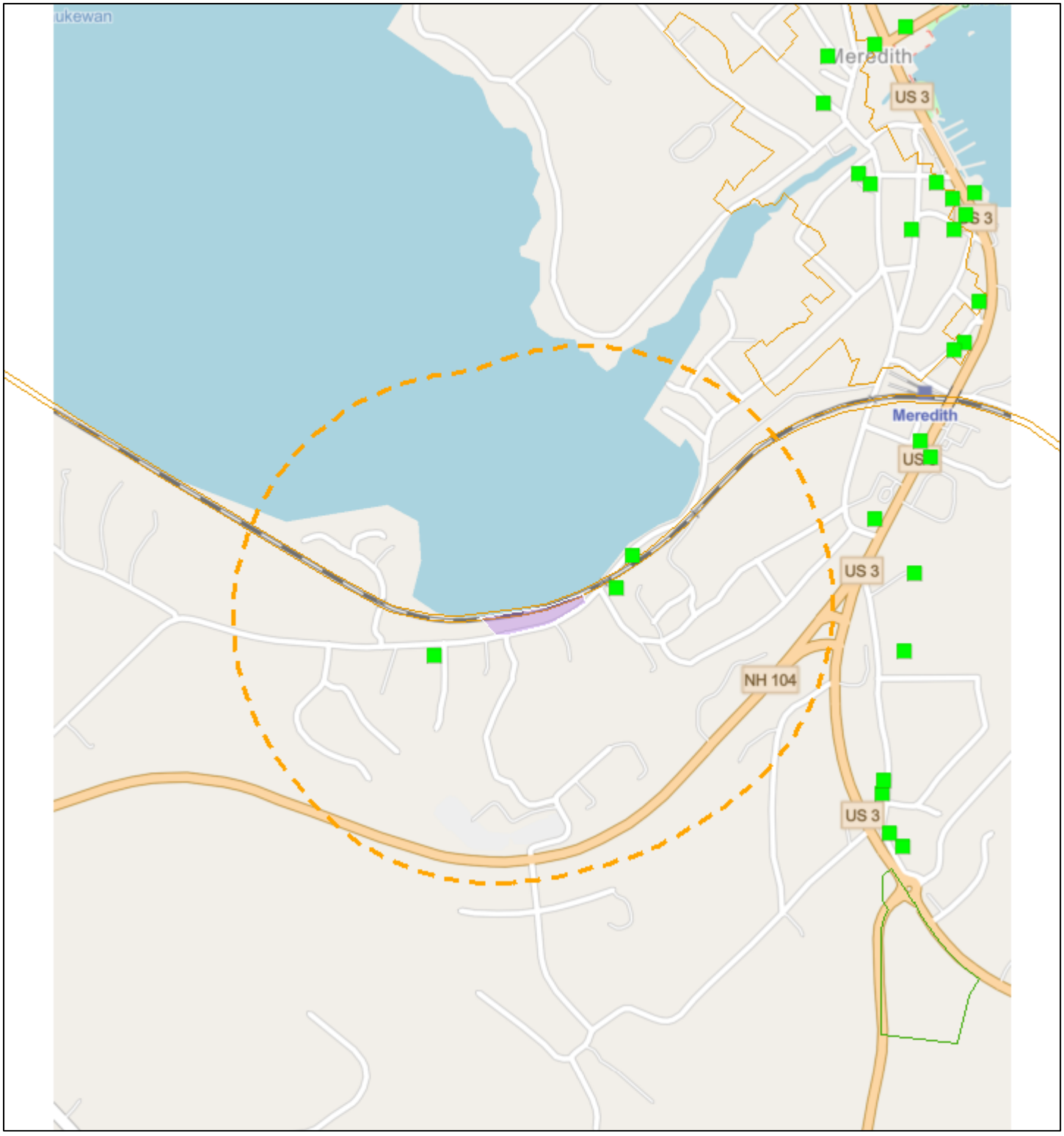
Map Scale

1: 25,977

Map Generated: 10/13/2020

Notes

Monkey Pond



October 8, 2020

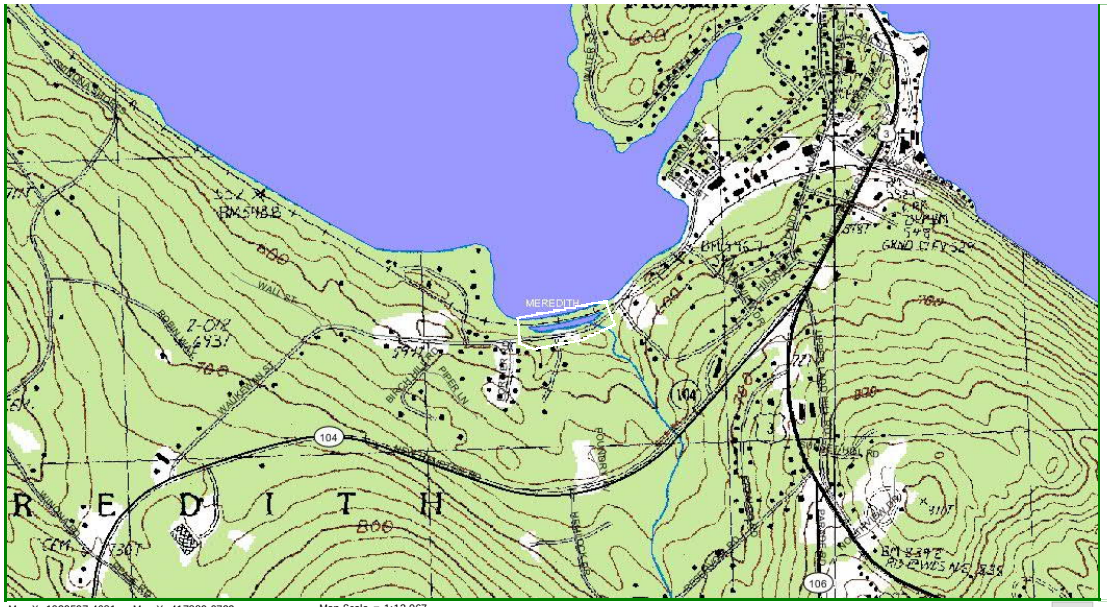
1:18,056

0 0.15 0.3 0.6 mi

0 0.25 0.5 1 km

- Individual Properties < 10 acres
- Individual Properties > 10 acres
- Historic Districts
- Counties
- Towns

EMMIT Review



Map X: 1029597.4681 Map Y: 417889.0722 Map Scale = 1:13,067

Map Project Boundary

Mapped area: 8.7 acres
Reported tract area: 9 acres

DataCheck Results: NO KNOWN RECORDS

There are no known NHB records in the vicinity of the area you drew.

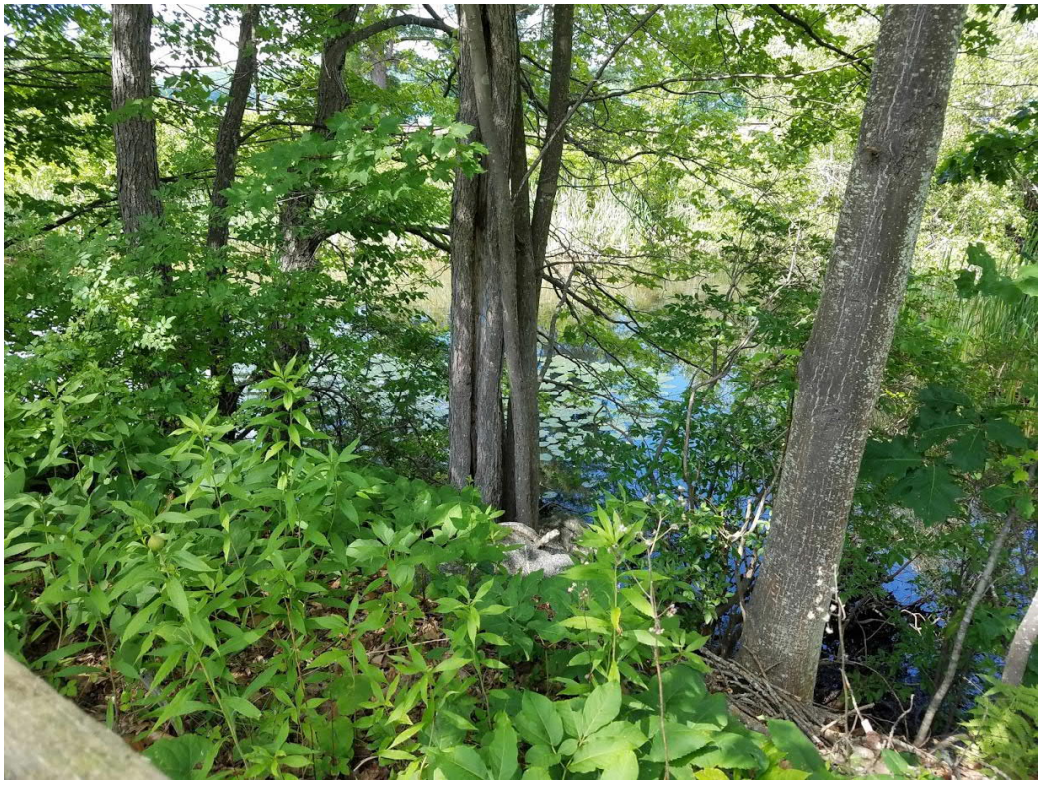
You can request an official report of this result, which will be valid for a period of one year from today.

Continue Remap Cancel

Quit

Monkey Pond, July 2020

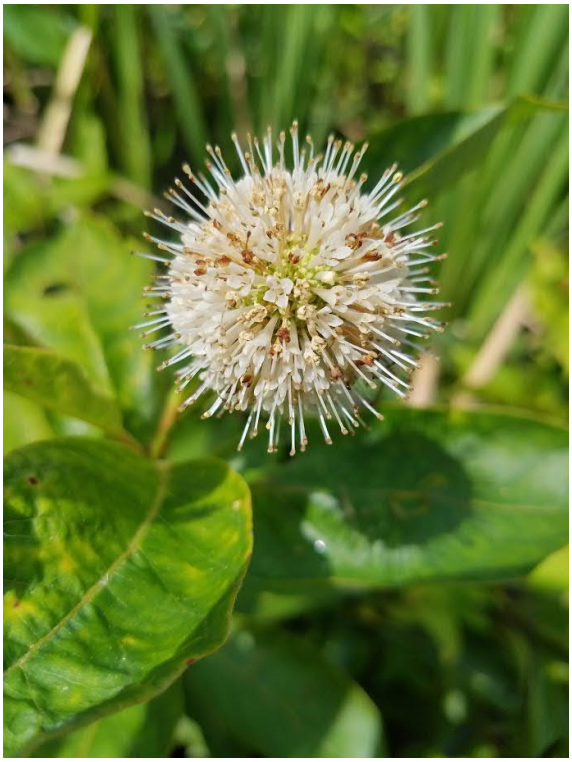
Shallow pond #1 within wetland, east end.



Shallow pond #2 within wetland, west end, from road.

Shallow pond 2 within wetland, west end, from railroad.

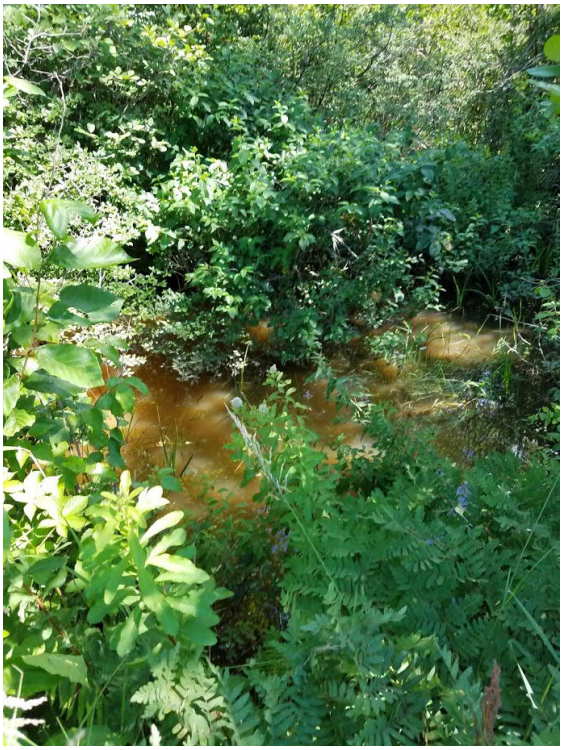
Cattail/pickerelweed marsh in center of wetland.



Buttonbush in marsh in center of wetland.

Culvert (6’ squash pipe) under Waukewan Road, carrying stream from south side of road into wetland.

Stream channel within wetland below 6’ pipe.



Stream channel within wetland further to west.

Riparian corridor and wetland, south side of road, west end.

Culvert from riparian corridor into wetland, west end.

Drop inlet for stormwater from road into wetland.

Stormwater culvert outlet at wetland

Culvert outlet from wetland to south of road.

Culvert outlet from wetland to south of road.

Culvert, 4’ concrete, under railroad.

Culvert, 4’, metal, under railroad.

Stream channel with sediment deposition, south side Waukewan Rd, near road.

Stream channel with sediment deposition, South of Waukewan Rd, further upstream.

Stream channel with erosion and deposition, South of Waukewan Road, further upstream.

Stream channel furthest upstream.