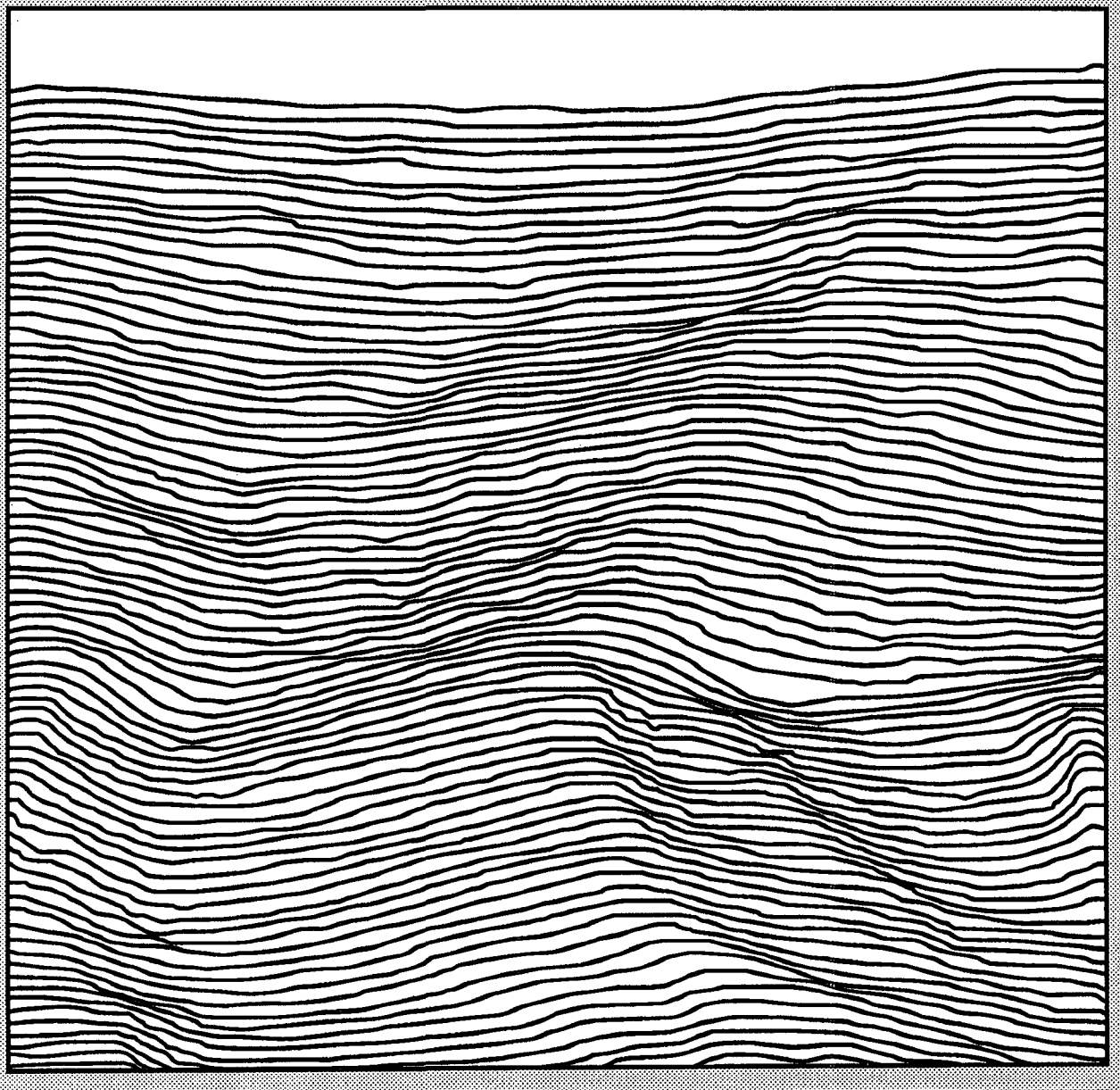
Technical Publication SJ 90-7

Floodplain Study of the Hicks Ditch Basin in Lake County, Florida



St. Johns River Water Management District

Technical Publication SJ 90-7

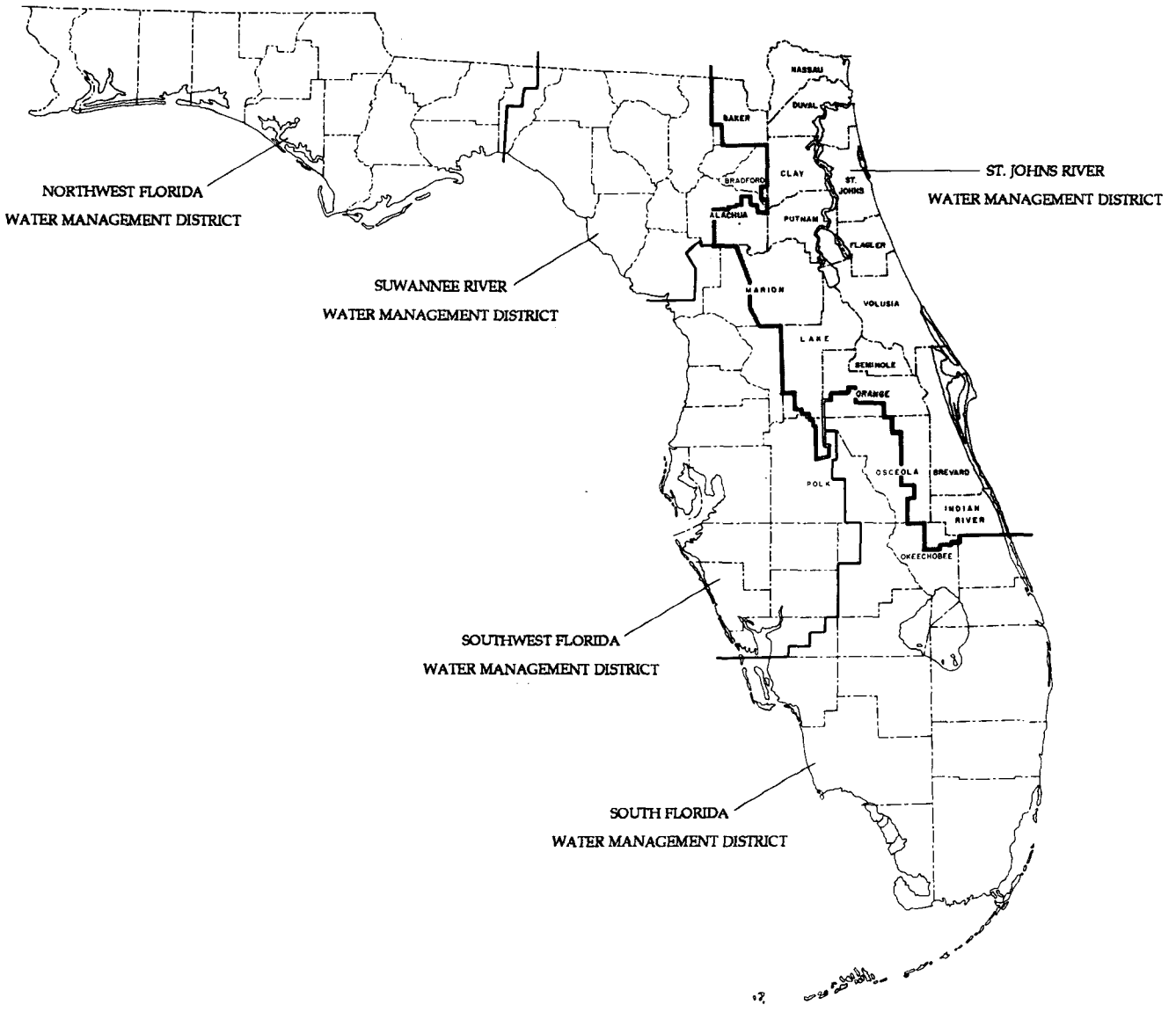
FLOODPLAIN STUDY OF THE HICKS DITCH BASIN IN LAKE COUNTY, FLORIDA

by

William M. Adkins
Donthamsetti V. Rao, P. E.
and
David A. Clapp

St. Johns River Water Management District
Palatka, Florida

1990



THE ST. JOHNS RIVER WATER MANAGEMENT DISTRICT

The St. Johns River Water Management District (SJRWMD) was created by the Florida Legislature in 1972 to be one of five water management districts in Florida. It includes all or parts of nineteen counties in northeast Florida. The mission of SJRWMD is to manage water resources to insure their continued availability while maximizing environmental and economic benefits. It accomplishes its mission through regulation; applied research; assistance to federal, state, and local governments; operation and maintenance of water control works; and land acquisition and management. Technical reports are published to disseminate information collected by SJRWMD in pursuit of its mission.

EXECUTIVE SUMMARY

This floodplain study is the first step toward the development of a water management plan for the Hicks Ditch basin. The Hicks Ditch basin, an 18.2 sq mi watershed located east of Lake Eustis and south of the Ocala National Forest in Lake County, experiences periodic flooding, resulting in damages to agricultural levee systems and standing water on farm lands. The lack of an efficient flood conveyance system within the basin has caused a conflict among the landowners concerning the right to use Hicks Ditch to drain their lands.

The flooding in the central region of the Hicks Ditch basin (which includes the farm land) is due primarily to runoff from adjacent areas and inadequate conveyance capacity in Hicks Ditch.

Three alternative measures are possible to reduce the threat of flood damage to the muck farms:

- Increase the conveyance capacity of Hicks Ditch to accommodate the drainage needs of the central basin
- Increase the storage capacity in the muck farms so that pumped discharge rates can be reduced, allowing rapid removal of drainage from the surrounding areas
- Build a higher and more stable levee

The appropriate alternative(s) should be chosen only after a detailed water management study of the basin that includes environmental and socio-economic consideration.

Most areas lying in the 100-yr floodplain in the Hicks Ditch basin are undeveloped. Developed areas include some residential areas around lakes, the muck farm operation in the southeast portion of Eustis Meadows, and two golf courses. About 63 buildings around Trout Lake and two buildings in Dona Vista would be affected by a 100-yr flood event.

Flooding in Trout Lake can be reduced by increasing the conveyance capacity of the channel between Trout Lake and Lake Eustis. This could be done by removing the old railroad trestle bridge downstream of Trout Lake and expanding the corrugated metal pipe culvert immediately upstream.

The threat of flooding in the northern and southern regions of Hicks Ditch basin is minor, but inadequate maintenance of the drainage system can cause culverts to become blocked and channels overgrown. Inspections of the drainage system during this study revealed that a culvert between Lake Joanna and SR44 was blocked. The threat of flooding can be reduced by proper maintenance of the drainage system.

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INTRODUCTION

This floodplain study, performed in cooperation with the Lake County Water Authority, is the first step toward developing a water management plan for the Hicks Ditch basin. The study investigated flooding problems by identifying the existing drainage system and its boundaries and examining the existing channel network's ability to convey water. A hydrologic model was developed to simulate the drainage response of the basin to rainfall events. The model was then used to predict the results of hypothetical 10-yr, 25-yr, and 100-yr storm events. Flood profiles were developed for major streams in the Hicks Ditch basin for the 10-yr, 25-yr, and 100-yr flood events.

The Hicks Ditch basin is an 18.2 sq mi watershed located in the Oklawaha River basin (Fig. 1). Situated east of Lake Eustis and south of the Ocala National Forest in Lake County, the watershed encompasses portions of Eustis, Umatilla, Dona Vista, and the surrounding rural and agricultural areas and drains into Lake Eustis (Fig. 2).

During periods of high water conditions (e.g., in the late 1950s, early 1960s, 1979, and 1982), this area has experienced a variety of surface water problems. In 1982, heavy rains caused major floods in the basin, particularly in Hicks Ditch, and high stages resulted in damage to private agricultural levee systems.

The area of Hicks Ditch basin is projected to experience rapid population growth and development in the near future. This growth will exacerbate existing water management problems if an adequate surface water management plan is not developed and implemented.

During major storm events, regulated discharges from agricultural lands and other stormwater management practices can alleviate flooding problems in the area to some extent. However, no such plans currently exist.

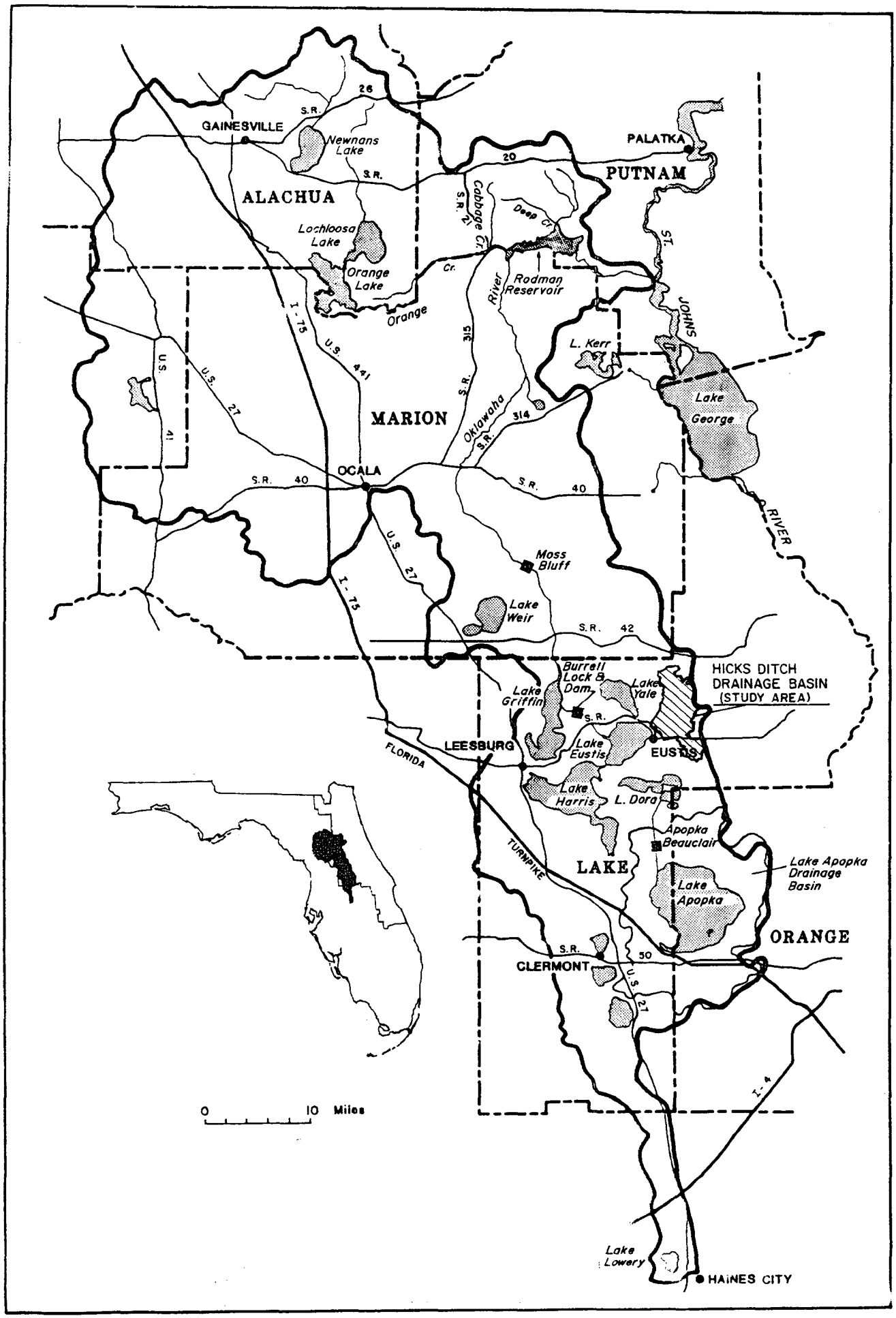

Figure 1. Location of the Hicks Ditch drainage basin

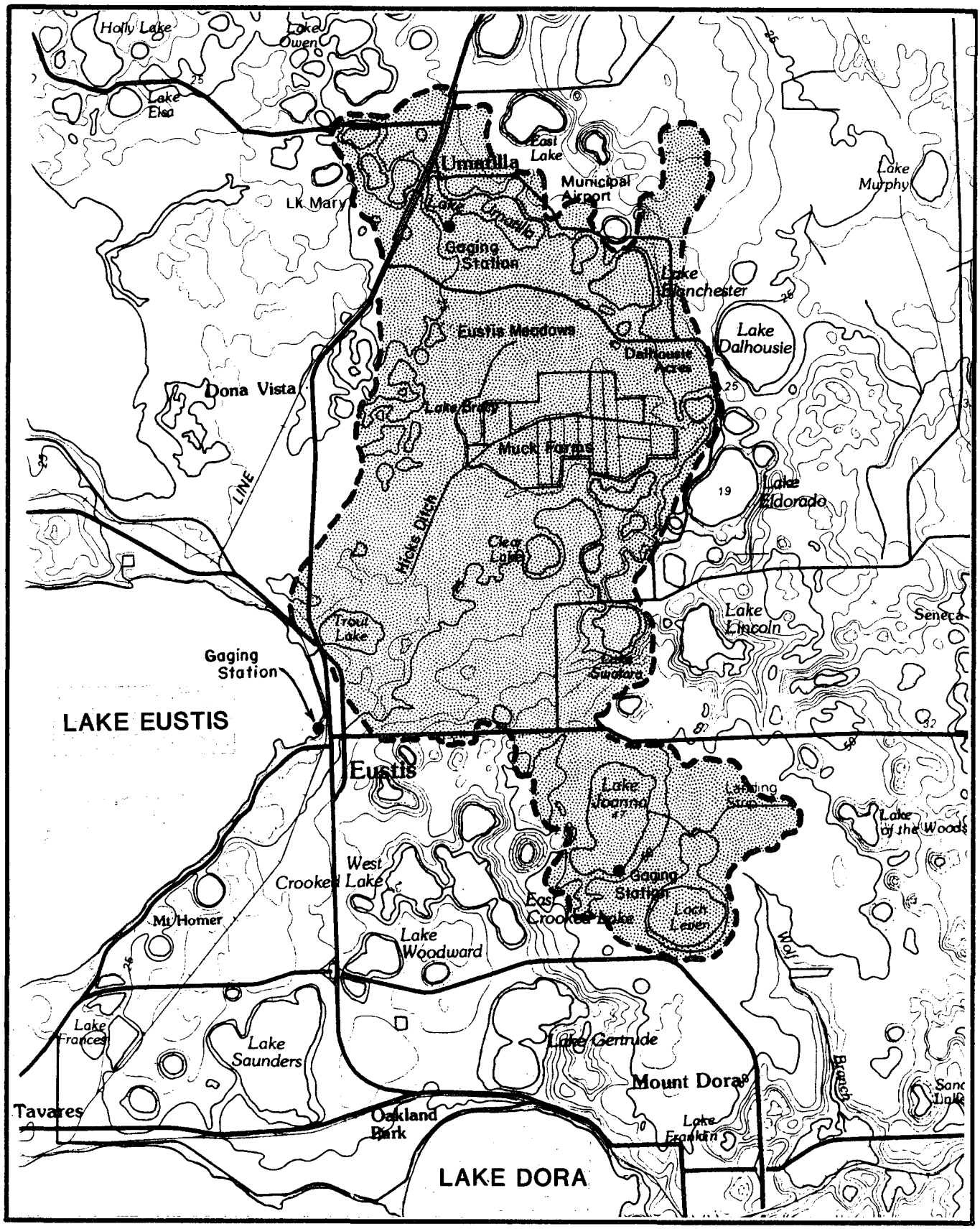

Figure 2. Vicinity map for the Hicks Ditch drainage basin

THE HICKS DITCH BASIN

The hydraulic and hydrologic characteristics of the basin were determined through a detailed inventory of soils, land use, and hydraulic control structures; a delineation of basin and subbasin boundaries; and a survey of channel cross-sections and structural elevations and dimensions. Other topographic features of the basin were incorporated into the study by examining photogrammetric maps.

LAND USE

The Hicks Ditch basin covers an area of 18.2 square miles. Although the basin is relatively small, it encompasses several types of land use. Over 25 percent of the area is wetland or pine flatwood and over 10 percent is open water (Fig. 3). Wetlands are areas such as marsh, swamp, and wet prairie. These areas store water during storm events. Pine flatwoods are areas with poor drainage subject to frequent inundation. Eustis Meadows is a wet prairie with stands of pine flatwoods (Fig. 2). Marsh and swamp areas occur around most of the lakes.

Agricultural land in the basin consists of pasture, a muck farming operation in the southeastern portion of Eustis Meadows, and a few citrus groves. Most citrus groves in the basin were destroyed by severe freezes in 1983 and 1984. Only a few of the destroyed groves are replanted. The residential areas in the basin include Umatilla, the eastern portion of Dona Vista, and the northern portion of Eustis (Fig. 2).

Lakes comprise the open water areas in the basin. There are two types of lakes in the basin: those that are an integral part of the drainage system and those that are usually landlocked; i.e., they contribute outflow from the basin only during severe flood events. Typical lakes of the first type are Loch Leven, Lake Joanna, Lake Swatara, Lake Umatilla, and Trout Lake (Fig. 2). Landlocked lakes include Lake Mary, Lake Bracy, and Clear Lake.

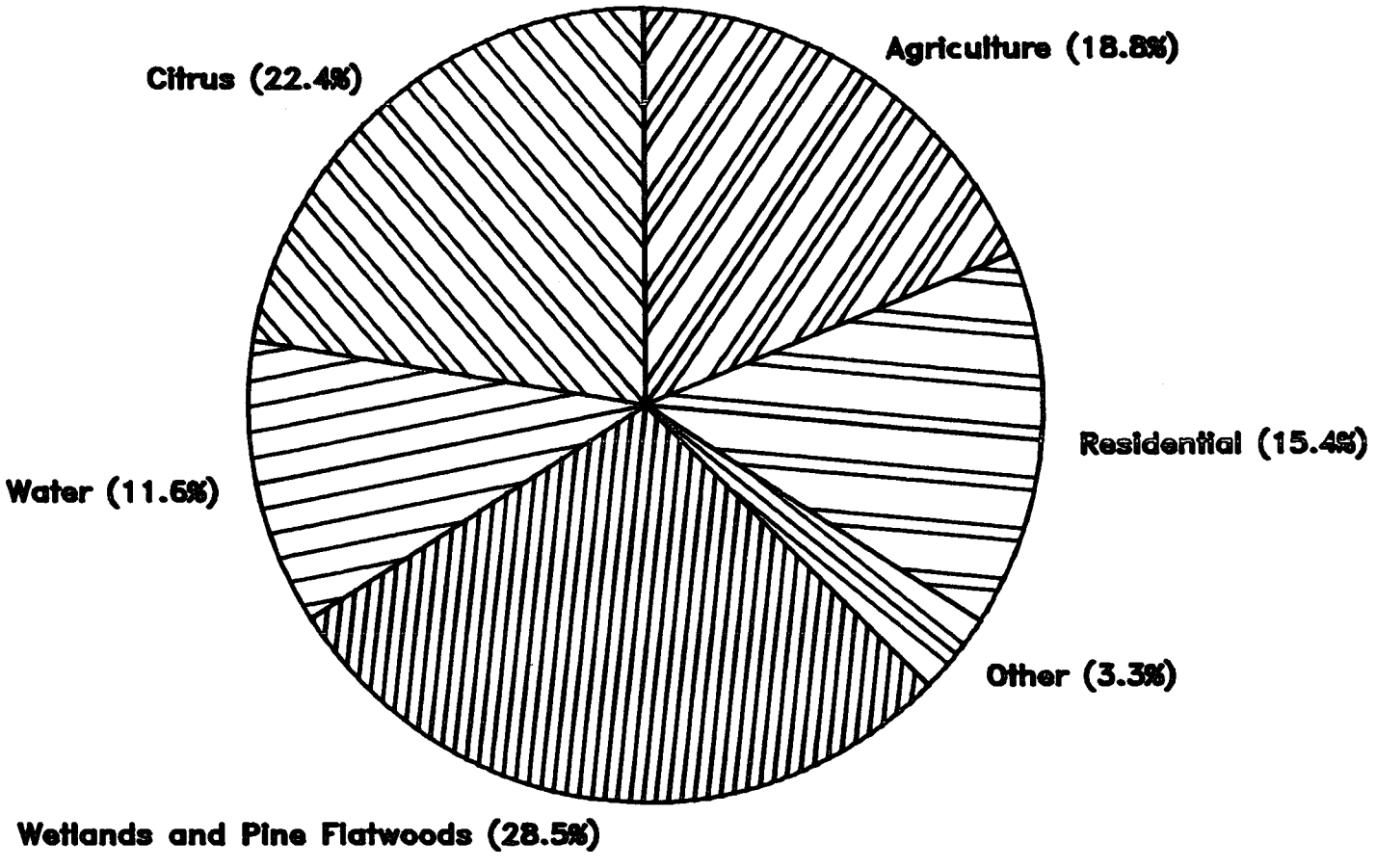

Figure 3. General land use in the Hicks Ditch drainage basin

DRAINAGE PATTERNS

For this study, the Hicks Ditch basin has been divided into five regions: the southern region, the northern region, the muck farm area, the Hicks Ditch area, and the Trout Lake area. Each of these areas is further divided into several subbasins as shown in Figure 4. The subbasins in each area are designated by the respective first letters of the divisions, i.e., S for southern region, N for northern region, F for farm, H for Hicks Ditch, and T for Trout Lake. Generally, the drainage flows from lower to higher numbered subbasins (e.g., see Fig. 4). This convention helps to identify the general direction of flow in various regions. The northern and southern subbasins drain toward the central portion of the basin. The drainage from these areas and the muck farm discharge flow southwest through the Hicks Ditch area. The flow enters Trout Lake, which also receives runoff directly from the Trout Lake area. Finally, the waters collected by Trout Lake discharge into Lake Eustis. The following sections give a detailed description of drainage in each of the five regions.

The Southern Region

The southern region comprises 30.2 percent (or 5.5 sq mi) of the Hicks Ditch basin (Fig. 5). Subbasins S1 and S2 are characterized by sandy surface soils which allow percolation to an impervious clay layer, which blocks the downward percolation and forms a perched water table. Seepage can occur into Lake Joanna, Lake Swatara, and also out of the basin to the southwest.

In S1, flow from Loch Leven begins at an elevation of 162.00 ft NGVD through a pine flatwood that has small braided channels that weave through the underbrush. This flow continues through a well-defined canal at the center of a depression east of SR44B. This canal extends south to the pine flatwoods. This depression also receives runoff from S2. The boundary of S1 is not well defined. When Loch Leven's water surface elevation rises above 164.00 ft NGVD, a canal diverts water from Loch Leven into the Wolf Creek basin.

Subbasin S2 has well-defined canals which collect runoff from the local airport and the surrounding area. Runoff directed to the west by these canals discharges into the depression east of SR44B. The depression, although normally separate from Loch Leven, interconnects with Loch Leven and acts as one ponding area during high water stages.

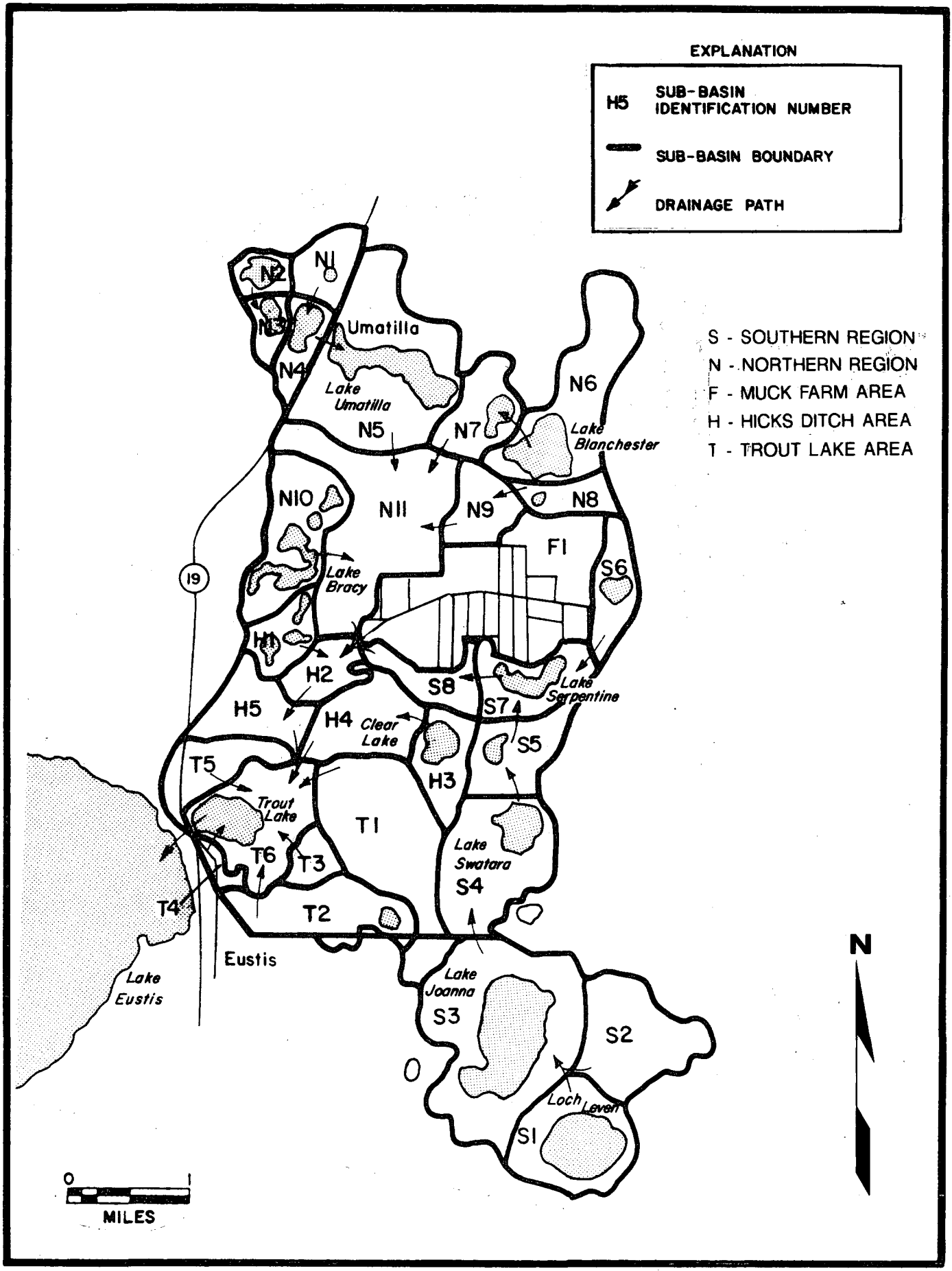

Figure 4. Subbasin delineation in the Hicks Ditch drainage basin

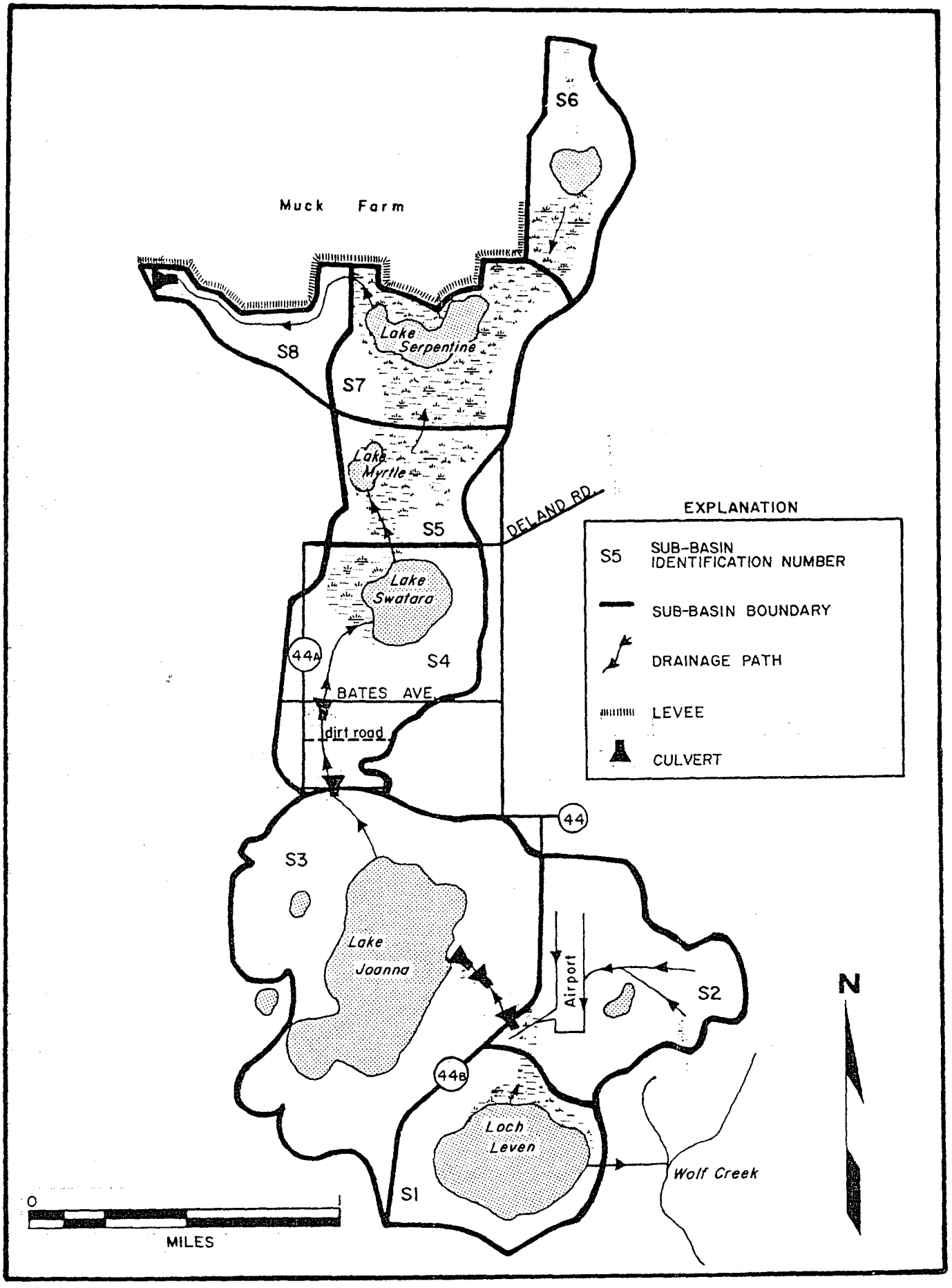

Figure 5. Drainage patterns in the southern region of the Hicks Ditch basin

Discharge from S1 and S2 exits under SR44B and continues along a well-defined ditch and through two culverts before entering Lake Joanna. This lake also receives the runoff from S3. A well-defined ditch leading from Lake Joanna conveys the outflow north under SR44 into subbasin S4. However, there is no outflow from Lake Joanna unless the water surface elevation rises above 155.00 ft NGVD.

Once the flow enters S4, it briefly follows a well-defined channel, which increasingly becomes steeper. This channel is then halted by disjointed depressions. Also, an abandoned dirt road grade adds to the blockage of flow. Water levels must rise above 147.60 ft NGVD to flow past this obstruction. From here to Lake Swatara the channel remains well defined and steep as it passes through heavily vegetated areas and past Bates Avenue. At the base of this steep slope, drainage from the area west of SR44 is collected and also seepage is evident from the perched water table mentioned above. Before reaching Lake Swatara, flow is ponded behind two culverts, that have flashboard risers at 82.30 ft NGVD and 79.20 ft NGVD, respectively.

The outlet of Lake Swatara consists of three culverts under DeLand Road. A dense patch of cypress knees forms a natural obstruction at the entrance to these culverts. Although the cypress knees allow some passage of flow at lower water surface elevations, the lake's water surface elevation must rise above 72.00 ft NGVD before measurable flow can pass over the knees and through the culverts.

Flow into S5 from under DeLand Road follows a wide, densely vegetated path into Lake Myrtle. Subbasin S5 is primarily a swamp, although a portion of the subbasin contains citrus groves. Subbasin S6 to the east of the muck farm also contains low-lying lands adjacent to citrus groves. Both S5 and S6 contribute flow to S7. The connection between S5 and S7 is a wide, marshy path but the connection between S6 and S7 is not well defined. It appears that S6 may contribute some runoff to the muck farm.

Subbasin S7 is mostly a swamp with Lake Serpentine as the prominent feature. This subbasin abuts the southern levee of the muck farm. The ditch along that levee ponds water along the outer perimeter of the muck farm.

Subbasin S8 is a long, narrow subbasin consisting mostly of pasture and adjoining the southern levee of the muck farm. The main conveyor of flow through the basin is the ditch along the muck farm levee, although it acts more as a long narrow pond interconnected with Lake Serpentine. This ditch leads to an 18-in flap-gated culvert that opens into the head of Hicks Ditch. The

purpose of this flap-gate is to keep the backflow of Hicks Ditch from entering subbasins S7 and S8.

The Northern Region

The northern region comprises 34.3 percent of the Hicks Ditch basin (or 6.2 sq mi), with its drainage beginning in N1, which is a residential area of Umatilla (Fig. 6). Runoff in this subbasin is collected in ponds and flows south to Lake Enola in N4.

Runoff from N2 flows south into Lake Mary (N3), which is landlocked. Therefore, N2 and N3 are considered noncontributing subbasins of the Hicks Ditch basin.

An underdrain at SR19 with an invert elevation of 68.10 ft NGVD connects Lakes Enola and Umatilla. Located north of Lake Umatilla in N5 are residential areas and citrus groves. With the exception of Guerrant Park, the area from the south of the lake to SR450 is swamp and interconnected wetlands. Discharge from Lake Umatilla flows through the eastern portion of the swamp before exiting the subbasin through a culvert under SR450.

Subbasin N6 consists mostly of citrus groves. Runoff from this subbasin flows into Lake Blanchester, which is connected to Lake Whitcomb by a 12-in culvert at an elevation of 65.80 ft NGVD. Lake Whitcomb is connected to Eustis Meadows through a swamp southwest of the lake and through a 42-in culvert with an invert elevation of 65.20 NGVD at SR450. This culvert was silted up to an elevation of 66.20 ft NGVD at the time of this study. The siltation in this culvert results in reduction of the conveyance capacity of the culvert. However, this reduction does not appear to cause any upstream flooding problems. During high water stages, the wetland southwest of Lake Whitcomb interconnects with the wetland south of Lake Umatilla in N5.

Subbasin N8 collects runoff along the north side of SR450 and discharges into N9. The flow from N9 enters Eustis Meadows by the outside borrow canal of the northern levee of the muck farms and as overland flow.

Subbasin N10, extending from south of SR450 to Dona Vista, contains three lakes of which Lake Bracy is the largest. These lakes are connected to Eustis Meadows at high stages (about 68.50 ft NGVD).

Subbasin N11 (Eustis Meadows) receives discharge from subbasins N5, N7, N9, and N10. This area is a wet prairie with

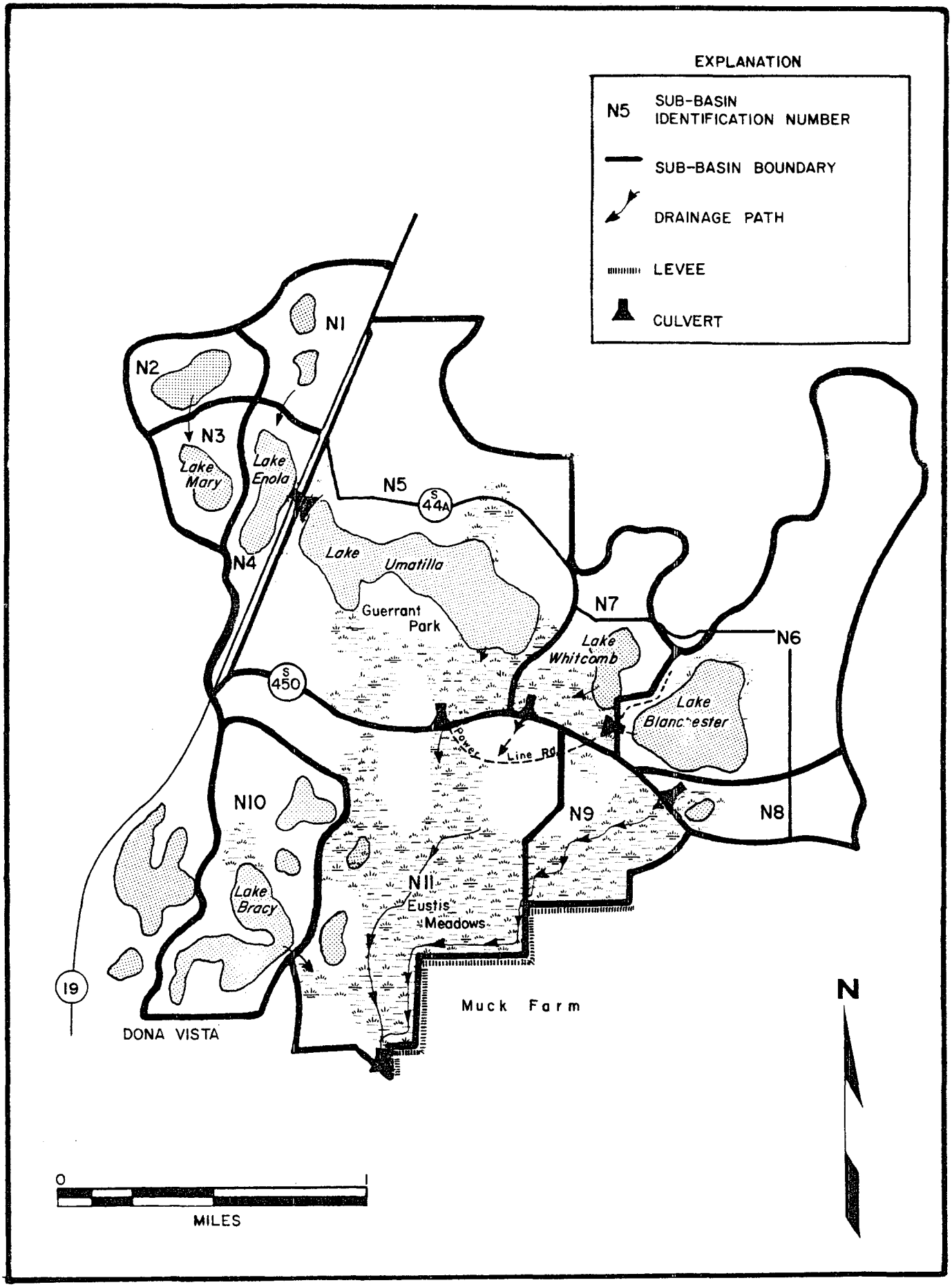

Figure 6. Drainage patterns in the northern region of the Hicks Ditch basin

scattered pine flatwoods. Flow through this subbasin is conveyed through a ditch located in the center of the subbasin. The ditch and the levee borrow canal meet at the western point of the muck farm and then continue until the channel connects to Hicks Ditch through a 42-in culvert.

The Muck Farm Area

The muck farm area contains 8.4 percent (or 1.5 sq mi) of the Hicks Ditch basin (Fig. 7). The farms are separated from Eustis Meadows wet prairie and Lake Serpentine marsh by earthen levees. The fields are drained with pump facilities and irrigation ditches which lead to a trunk canal oriented westerly, approximately along the center of the farms. Due to the adverse slope of the farm area a pump midway along the trunk canal is used to convey most of the drainage toward the west. Drainage reaches the western portion of the farms and is pump-discharged into Hicks Ditch.

The Hicks Ditch Area

This area comprises 10.5 percent (or 1.9 sq mi) of the Hicks Ditch basin (Fig. 8). Subbasin H1 is a residential area in east Dona Vista and contains three small lakes which can discharge through a ditch to Hicks Ditch when their stages are approximately 71.50 ft NGVD. However, the lake levels do not reach this high elevation, and thus the three lakes are usually landlocked.

Subbasin H2 encompasses a local golf course, and contributes its runoff to Hicks Ditch through swales. During high water periods, backwater from Hicks Ditch prevents the swales from adequately draining the golf course.

Subbasin H3 contains mostly citrus groves and also includes an expanding residential area around Clear Lake. Subbasin H4 is characterized by marsh, swamps, scattered wet prairie, and some pasture. The swamp in this subbasin acts as storage for runoff, but the flow into Hicks Ditch is still significant.

Subbasin H5 is located west of Hicks Ditch and extends south from the golf course and H1 to Getford Road. Although this subbasin is connected to Hicks Ditch it also has an underdrain on Getford Road into T5. Neither exit conveys much flow due to the significant storage available in the swamps and clay pits of the subbasin.

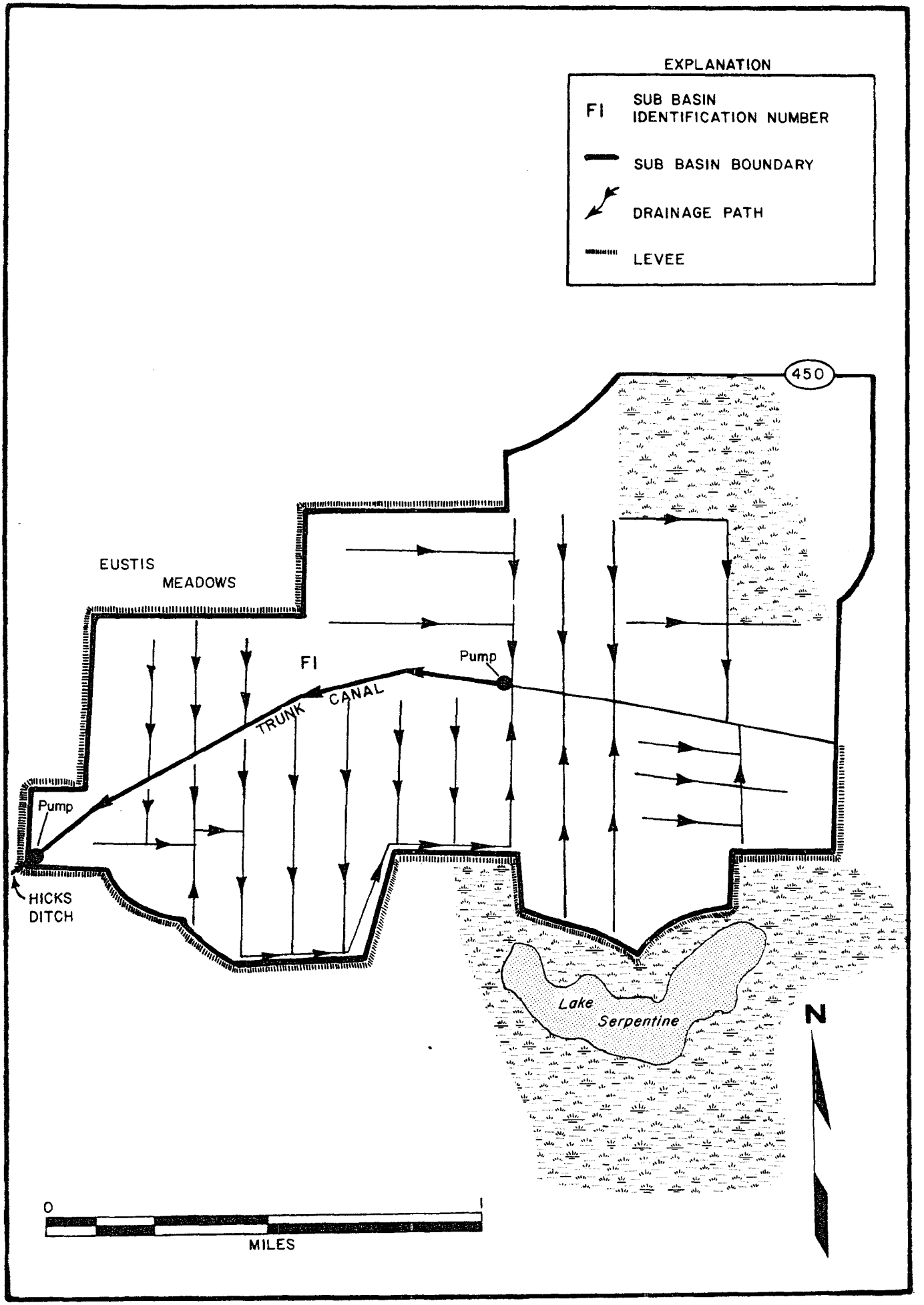

Figure 7. Drainage patterns in the muck farms area

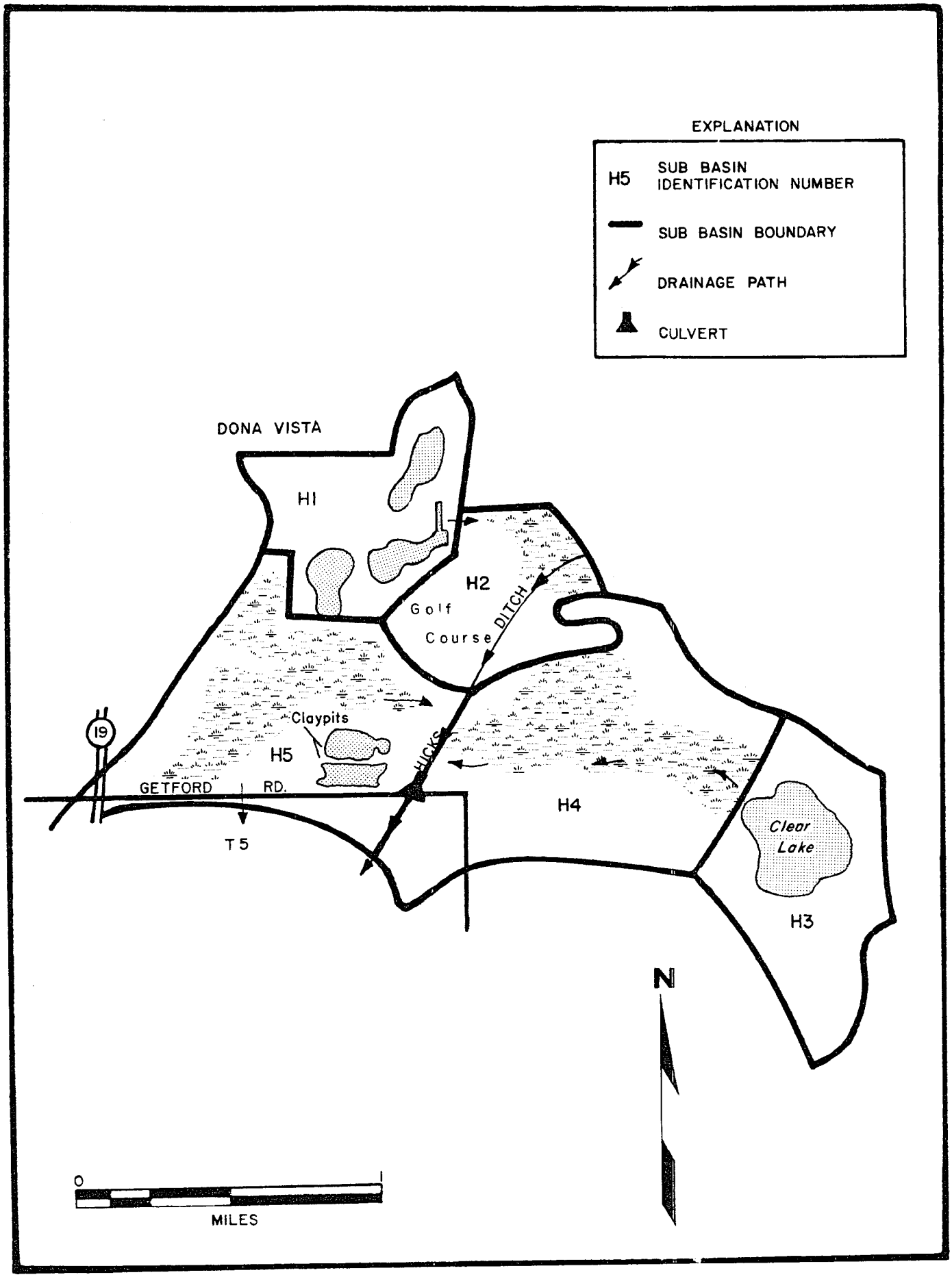

Figure 8. Drainage patterns in the Hicks Ditch area

The Trout Lake Area

The Trout Lake area comprises 16 percent of the basin (or 2.9 sq mi) and contains six subbasins (Fig. 9). The drainage of subbasins T1 and T2 is conveyed by several channels with intermittent local ponding.

Subbasin T3 contains a wastewater treatment facility. Subbasin T4 consists of the urban area of Eustis and contributes its runoff directly to Trout Lake. Runoff contributions from T3 and T4, however, are not significant.

Subbasin T5 is a heavily vegetated undeveloped area which drains into Trout Lake. Subbasin T6 includes Trout Lake and the surrounding swamp, receiving discharge from Hicks Ditch as well as from the area around Trout Lake. Trout Lake discharges to Lake Eustis.

HYDROLOGIC DATA

Data Collection Network

Rainfall stations in or near the study area include Lisbon (1959-current) located at Burrell Lock and Dam and Eustis (1891-1958) (Fig. 1).

No streamflow gaging stations exist in the Hicks Ditch basin.

The USGS maintains only one lake stage recorder within the basin, which is on Lake Umatilla (USGS Station Number 02237865, Fig. 2). Water surface elevations have been recorded about once weekly since March 1970. In addition, daily data are available for Lake Eustis (USGS Station Number 02237900) since July 1942. SJRWMD, in cooperation with the Lake County Water Authority, established a temporary stage recorder during this study to record water surface elevation data for Lake Joanna.

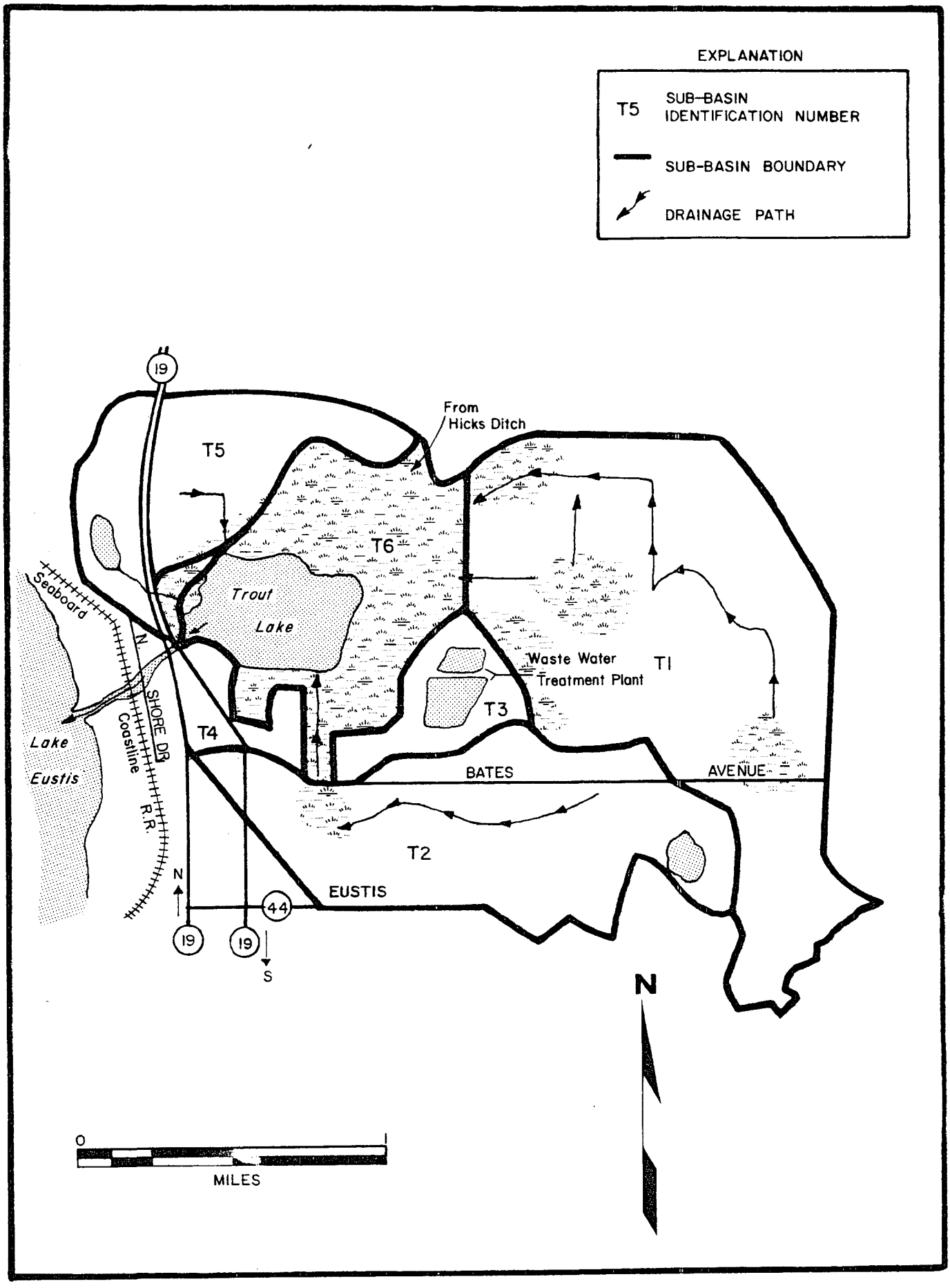

Figure 9. Drainage patterns in the Trout Lake area

Rainfall and Temperature Data

Average monthly temperatures at Lisbon, the long-term weather station near the basin, range from about 57.5 °F to 81.8° F (Table 1). Based on the combined Lisbon and Eustis rainfall data, the normal annual rainfall (1951-1980 mean) is calculated as about 47.0 in. for the basin, most of which occurs during the June through September rainy season. A maximum 24-hr rainfall of 9.18 in. was recorded at Eustis in 1950 (Table 2). For a 24-hr storm, the 10-yr, 25-yr, and 100-yr point rainfall values for the study area were estimated to be 7.0 in, 8.5 in, and 11.2 in, respectively (Hershfield 1961, Rao 1988).

Surface Water Elevations and Discharge

River and Stream Discharge. No long-term monitoring stations exist in the Hicks Ditch basin. During the study period SJRWMD made instantaneous discharge measurements throughout the basin for a storm lasting from March 26 to March 31, 1987. Rainfall data were collected for the days of the storm and discharges and water surface elevations were measured at selected locations on March 31, 1987 (Tables 3 and 4). However, high water marks were observed at the time of discharge measurements, indicating that the measurements were made after the peak occurred.

Water Surface Elevations of Lakes. Lake Umatilla has weekly water surface elevation records from March 1970 to the current year. The intermediate daily values were obtained by an interpolation of recorded data. Monthly mean elevations calculated from this data are summarized in Table 5. Lake Eustis, which is the receiving water body for Hicks Ditch, has daily records from July 1942 to the present time. Lake Eustis water levels are controlled by Burrell Lock and Dam.

Extreme Value Data. Tables 6 and 7 present the highest and lowest mean water surface elevations for different durations for Lake Umatilla. The maximum daily elevation of 68.66 ft NGVD was recorded on March 13, 1970. The minimum daily elevation, 64.20 ft NGVD was recorded on December 18, 1981.

Frequency Analysis. The 10-yr, 25-yr, and 100-yr peak water surface elevations for Lake Eustis were estimated as 64.3 ft NGVD, 64.6 ft NGVD, and 65.0 ft NGVD, respectively (Rao 1982). A frequency analysis on annual peak stage data for Lake Umatilla (see 1-day values, Table 6) did not yield satisfactory results. For 11 years during the 18-year period of record the annual peak stages ranged from 68.18 ft NGVD to 68.65 ft NGVD. This minimal

variation of data and the small sample size (18 years) caused problems in estimating long-term events by statistical methods.

Table 1. Normal temperature and rainfall at Lisbon

Month	Temperature, °F Lisbon	Rainfall, inches Lisbon/Eustis
January	57.5	2.70
February	59.7	3.47
March	65.2	3.68
April	70.5	2.38
May	76.0	4.05
June	80.2	5.12
July	81.8	6.25
August	81.8	6.34
September	79.8	5.55
October	73.6	3.15
November	65.9	1.89
December	60.0	2.45
Annual	70.9	47.01

Table 2. 24-hr to 10 day maximum rainfall data for Lisbon and Eustis

Highest Total Rainfall (inches) for the Following Durations							Starting Day of Rainfall					
YEAR	24 HR	48 HR	72 HR	96 HR	5 DAY	10 DAY						
1931	3.66	3.78	4.62	4.74	4.78	6.16	125	125	123	123	123	87
1932	2.23	4.16	4.99	5.21	5.27	6.02	122	310	310	309	309	304
1933	9.13	11.99	13.01	13.31	13.37	13.37	248	248	248	247	246	241
1934	8.23	10.28	11.64	12.75	13.27	13.94	166	165	164	164	164	159
1935	1.72	3.06	3.33	3.39	4.78	5.35	179	247	246	245	247	244
1936	4.20	4.40	5.44	5.70	5.77	6.51	283	282	283	282	282	276
1937	5.82	5.98	6.96	7.41	7.57	9.34	211	210	211	208	207	204
1938	3.17	3.97	4.23	4.29	4.29	7.28	173	172	171	171	170	171
1939	3.87	5.37	6.36	6.72	6.79	7.31	166	165	165	165	165	161
1940	2.45	4.48	4.78	6.43	7.17	7.98	359	187	186	187	187	183
1941	2.73	3.57	3.87	3.99	4.52	5.75	182	293	293	292	91	181
1942	2.60	3.25	4.38	4.90	4.91	4.91	272	175	270	269	269	264
1943	5.08	5.86	5.87	5.87	6.59	7.78	228	227	226	225	227	225
1944	8.80	8.94	8.96	8.99	9.00	9.03	293	293	292	291	290	285
1945	6.95	7.17	7.23	9.88	11.13	11.26	175	174	174	172	171	167
1946	2.84	3.57	4.50	4.57	4.94	5.86	153	153	209	208	207	202
1947	3.78	4.11	4.11	4.11	4.98	6.83	240	240	240	239	75	102
1948	2.79	3.75	3.80	4.51	4.52	6.25	24	205	205	21	20	197
1949	5.71	6.66	6.81	7.47	7.57	9.22	239	239	238	239	238	232
1950	9.18	10.66	11.04	11.73	11.78	12.99	291	290	289	246	245	240
1951	4.58	6.30	6.33	6.33	6.48	8.00	260	260	259	258	271	175
1952	4.32	5.33	5.43	5.43	5.43	5.43	281	85	85	84	83	78
1953	2.40	5.42	5.96	5.96	5.96	6.31	33	81	80	79	78	73
1954	4.46	4.46	4.46	4.46	4.49	5.20	281	280	279	278	277	272
1955	3.27	4.04	4.16	4.23	4.52	5.86	314	313	312	247	247	247
1956	8.54	8.81	8.84	9.04	9.27	10.10	290	289	288	287	286	288
1957	3.81	4.61	4.72	4.74	5.11	5.71	218	120	119	119	120	209
1958	4.34	5.10	5.10	5.23	5.25	6.69	292	304	303	302	57	57
1959	2.60	4.13	4.85	5.52	6.74	8.29	102	168	74	74	74	70
1960	5.69	6.70	8.80	9.76	9.76	9.85	77	77	75	75	74	69
1961	2.31	2.32	2.52	2.54	2.55	4.05	77	77	187	186	185	180
1962	3.13	3.30	3.50	3.62	4.17	5.93	209	209	208	207	231	207
1963	2.90	2.97	2.97	3.48	3.65	4.10	148	148	147	187	187	182
1964	3.45	4.29	4.83	5.21	5.33	6.35	254	254	253	253	253	246
1965	3.38	3.43	3.62	4.48	4.58	6.24	194	194	192	194	194	189
1966	3.35	4.72	5.08	5.33	5.50	6.06	263	206	205	204	203	205
1967	3.77	4.39	4.46	4.67	4.74	4.84	240	240	239	240	239	234
1968	3.62	5.02	5.36	5.46	5.46	5.57	134	241	241	240	239	234
1969	3.25	4.02	4.62	4.78	5.73	5.98	274	343	274	273	274	270
1970	4.20	4.82	4.82	4.87	4.90	5.02	34	33	32	31	30	25
1971	3.65	4.05	4.22	4.29	4.29	4.40	39	38	37	36	35	30
1972	5.16	5.81	5.91	5.95	5.95	6.24	91	90	89	88	87	82
1973	4.34	4.34	4.34	4.34	4.34	4.82	129	128	127	126	125	125
1974	4.54	5.65	7.11	7.67	7.67	9.84	176	175	176	175	174	176
1975	2.77	2.77	3.24	3.30	3.70	4.92	101	100	276	275	101	220
1976	3.86	4.08	4.20	4.23	4.23	7.83	136	136	135	135	134	136
1977	2.31	2.31	2.42	2.45	2.47	3.81	3	2	348	347	346	183
1978	2.13	2.98	2.98	2.98	2.98	4.85	40	139	138	137	136	40
1979	3.36	3.91	4.47	5.02	5.83	7.73	128	269	269	269	128	126
1980	4.09	4.96	5.54	5.54	5.69	6.36	96	95	94	93	92	90
1981	4.02	4.02	4.36	4.64	4.67	5.37	193	192	191	190	189	189
1982	4.87	5.17	5.84	5.85	5.85	7.85	169	169	99	99	98	169
1983	2.64	2.65	3.09	3.10	3.11	4.93	114	113	75	74	346	67
1984	3.40	4.68	5.17	5.41	5.90	6.33	94	143	143	143	143	140
1985	2.12	2.22	3.25	3.47	3.54	3.91	195	194	164	164	163	219
1986	4.29	5.41	5.60	5.75	5.80	6.59	11	10	9	8	7	2
1987	2.98	3.93	4.79	5.93	6.57	6.68	135	89	88	87	86	85

Table 3. Rainfall observed at Lisbon during March 1987 storm

Date	Rainfall (in)
March 26	0.21
March 27	1.27
March 28	0.96
March 29	0.71
March 30	1.50
March 31	2.00

Table 4. Observed water surface elevations and discharges on March 31, 1987

Location	Water Surface Elevation (ft NGVD)	Discharge (cubic foot per second)
Trout Lake	64.0	97.4
Hicks Ditch (at Getford Road)	66.0	43.7
Hicks Ditch (at pump)	66.5	*
SR450	67.9	3.9
Lake Umatilla	68.5	*
Lake Swatara	73.6	11.9
Lake Joanna	155.8	0.8
Loch Leven	164.0	9.3

* No measurement taken

Table 5. Monthly mean water surface elevations for Lake Umatilla

	Monthly mean elevation (ft NGVD)											
YEAR	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP
1971	68.01	67.85	67.71	67.75	67.90	67.82	67.82	67.56	67.52	67.65	67.94	67.92
1972	67.97	68.02	68.10	67.94	68.04	68.05	68.08	67.77	67.65	67.62	67.57	67.68
1973	67.54	67.49	67.87	68.05	68.12	67.96	68.01	67.77	67.67	67.74	67.83	68.25
1974	68.13	67.85	67.76	67.80	67.54	67.37	67.21	66.90	66.81	67.49	67.69	67.74
1975	67.34	66.95	66.81	66.82	66.91	66.71	66.78	66.60	66.04	65.85	66.00	66.71
1976	66.95	66.80	66.67	66.64	66.45	66.33	66.13	66.15	67.18	67.57	67.51	67.43
1977	67.17	66.91	67.05	67.33	67.50	67.53	67.11	66.59	66.41	66.50	66.70	66.79
1978	66.52	66.29	66.24	66.47	66.90	67.63	67.37	67.31	67.37	67.51	67.89	67.78
1979	67.47	67.24	67.13	67.71	67.74	68.03	67.72	67.97	67.87	67.82	67.89	68.37
1980	68.36	68.02	67.92	67.84	67.87	67.78	67.92	67.73	67.67	67.63	67.62	67.69
1981	67.34	67.18	67.12	66.79	66.73	66.61	66.36	65.78	65.55	65.25	65.33	65.18
1982	64.70	64.52	64.26	64.55	64.51	64.70	65.07	64.97	65.28	65.78	65.78	66.27
1983	67.13	67.13	67.00	66.91	67.64	67.98	68.13	67.83	67.70	67.90	67.98	68.12
1984	67.94	67.82	68.06	68.14	68.05	67.95	68.19	67.86	67.79	68.18	68.16	67.91
1985	67.76	67.49	67.44	67.31	67.13	66.93	66.67	66.21	66.04	66.42	66.83	67.51
1986	67.89	67.79	67.67	68.04	68.04	67.93	67.69	67.35	67.42	67.34	67.15	67.52
1987	67.24	67.11	67.05	67.20	67.60	67.98	68.21	67.85	67.57	67.46	67.26	67.18
1988	67.03	67.07	66.99	66.86	67.58	67.52	67.40	67.03	67.06	67.05	67.30	67.91
MEAN	67.36	67.20	67.16	67.23	67.35	67.38	67.33	67.07	67.03	67.15	67.25	67.44
MAX	68.36	68.02	68.10	68.14	68.12	68.05	68.21	67.97	67.87	68.18	68.16	68.37
MIN	64.70	64.52	64.26	64.55	64.51	64.70	65.07	64.97	65.28	65.25	65.33	65.18

Table 6. Mean high water surface elevations for various durations for Lake Umatilla

	Highest mean elevation (ft NGVD) for the following number of consecutive days in the year ending May 31								
YEAR	1	7	14	30	60	120	183	274	1 YEAR
1971	68.39	68.38	68.36	68.32	68.24	68.11	68.01	67.94	67.88
1972	68.34	68.31	68.26	68.15	68.09	68.04	68.06	68.01	67.92
1973	68.18	68.17	68.17	68.15	68.08	68.04	67.96	67.83	67.78
1974	68.32	68.29	68.27	68.26	68.20	68.02	67.94	67.84	67.67
1975	67.80	67.79	67.79	67.78	67.72	67.58	67.35	67.18	67.05
1976	67.09	67.08	67.05	66.96	66.88	66.79	66.70	66.54	66.39
1977	67.62	67.61	67.59	67.58	67.55	67.47	67.30	67.34	67.24
1978	67.71	67.71	67.70	67.65	67.51	67.31	66.98	66.83	66.76
1979	68.36	68.19	68.14	68.04	67.92	67.88	67.71	67.64	67.63
1980	68.65	68.64	68.62	68.54	68.37	68.18	68.07	68.00	67.95
1981	67.86	67.82	67.77	67.72	67.66	67.65	67.52	67.31	67.04
1982	65.70	65.68	65.65	65.55	65.40	65.33	65.09	64.87	64.88
1983	68.25	68.20	68.16	68.13	68.08	67.90	67.58	67.33	66.90
1984	68.36	68.33	68.31	68.21	68.12	68.09	68.04	68.03	67.97
1985	68.28	68.27	68.26	68.24	68.18	68.02	67.88	67.69	67.42
1986	68.19	68.19	68.16	68.12	68.06	67.93	67.89	67.76	67.43
1987	68.53	68.50	68.44	68.29	68.10	67.91	67.64	67.53	67.47
1988	67.76	67.74	67.70	67.59	67.57	67.38	67.26	67.22	67.24

Table 7. Mean low water surface elevations for various durations for Lake Umatilla

Lowest mean elevations (ft NGVD) for the following number of consecutive days in the year ending Sep 30									
YEAR	1	7	14	30	60	120	183	274	1 YEAR
1971	67.44	67.47	67.50	67.52	67.54	67.63	67.71	67.73	67.79
1972	67.34	67.37	67.40	67.47	67.59	67.63	67.73	67.82	67.87
1973	67.40	67.41	67.42	67.45	67.51	67.73	67.83	67.83	67.86
1974	66.64	66.65	66.67	66.73	66.83	67.06	67.22	67.39	67.52
1975	65.66	65.69	65.73	65.78	65.87	66.10	66.31	66.49	66.62
1976	65.89	65.90	65.91	65.96	66.09	66.25	66.39	66.59	66.82
1977	66.36	66.39	66.39	66.40	66.42	66.54	66.68	66.94	66.96
1978	66.19	66.22	66.23	66.24	66.27	66.37	66.68	66.90	67.11
1979	67.06	67.06	67.06	67.13	67.19	67.37	67.55	67.65	67.75
1980	67.52	67.54	67.57	67.59	67.62	67.65	67.71	67.75	67.84
1981	64.96	65.02	65.08	65.18	65.26	65.32	65.57	65.95	66.27
1982	64.20	64.20	64.20	64.26	64.37	64.45	64.54	64.73	65.03
1983	66.82	66.83	66.85	66.88	66.95	67.04	67.30	67.49	67.62
1984	67.70	67.73	67.75	67.79	67.82	67.94	67.99	67.98	68.00
1985	65.80	65.85	65.90	66.01	66.10	66.31	66.51	66.76	66.98
1986	67.06	67.08	67.10	67.12	67.23	67.31	67.41	67.60	67.65
1987	66.98	67.00	67.03	67.05	67.08	67.14	67.37	67.53	67.47
1988	66.75	66.77	66.80	66.84	66.92	66.98	67.17	67.16	67.23

FLOODPLAIN INVESTIGATION

Estimates of flood discharges for 10-yr, 25-yr, and 100-yr return periods were obtained by rainfall-runoff modeling (hydrologic analysis) using hypothetical storm events. The U.S. Army Corps of Engineers' (USACOE) HEC-1 computer program was used for this purpose. HEC-1 also computes flood elevations for lakes and other storage areas by storage routing methods. Water surface elevations for streams were computed using the USACOE HEC-2 step-backwater computer program (hydraulic analysis) based on peak discharges generated by HEC-1.

HYDROLOGIC ANALYSIS

The HEC-1 Model

The HEC-1 computer model of USACOE (Hydrologic Engineering Center 1981) was used for generating peak discharges based on hypothetical storm events and for determining flood elevations of lakes and other storage areas. This model is designed to simulate the surface runoff response of a watershed to precipitation by representing the basin as an interconnected system of components. The model has five major components: land surface runoff, river routing, storage routing, diversion, and pump discharge. Three of these components--land surface runoff (subbasin runoff), storage routing, and diversion--were used to simulate flow in the Hicks Ditch watershed (Fig. 10).

The Soil Conservation Service (SCS) methods (SCS 1972) were used for modeling the surface runoff component.

Model Input Data

Input parameters for the HEC-1 model include: SCS runoff curve number (CN), watershed lag, basin area, stage-storage-discharge relationships for use in storage routing, and the initial stage elevations in lakes and storage areas.

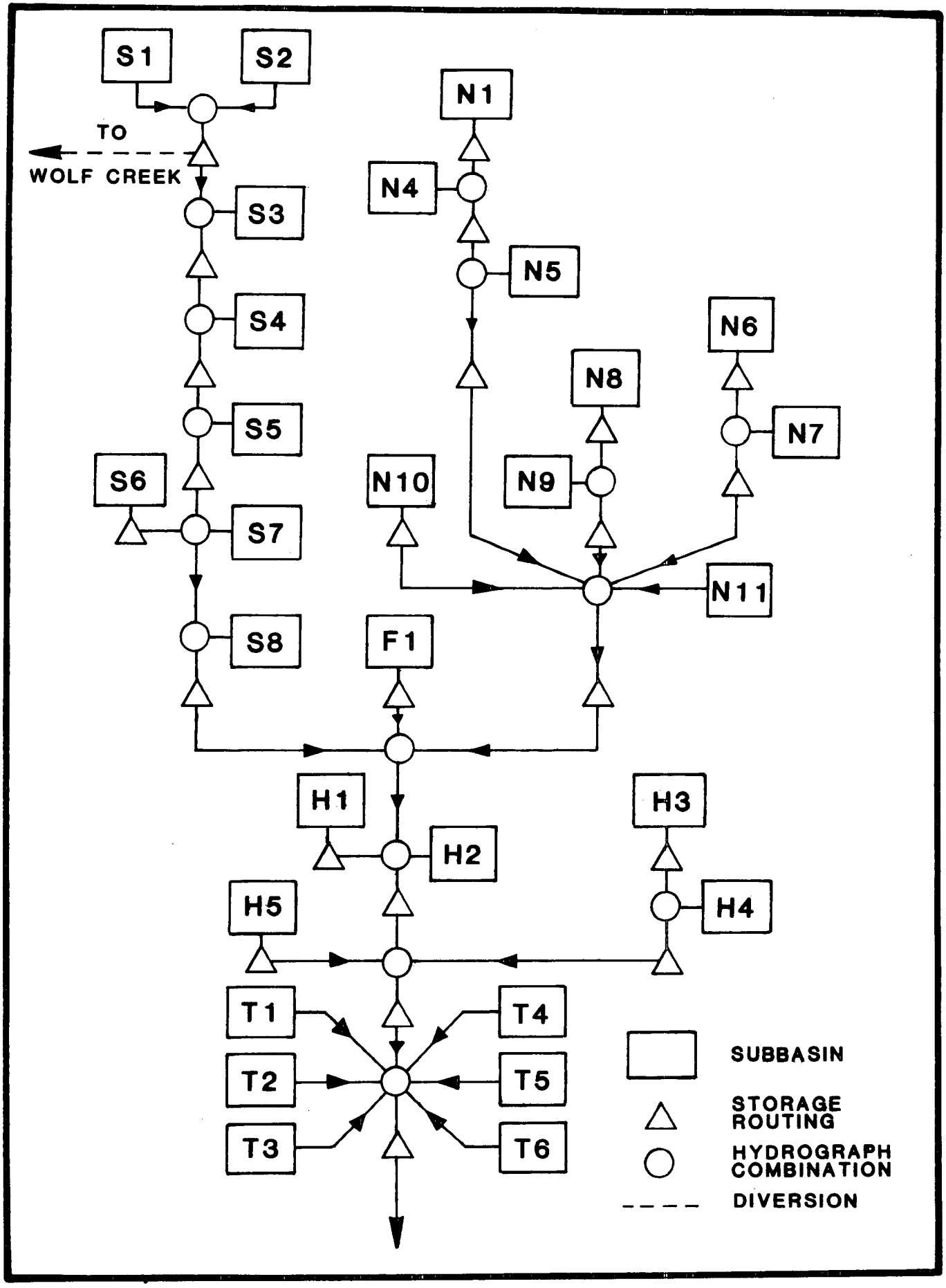

Figure 10. Schematic of the drainage in the Hicks Ditch basin

For estimating runoff from storm rainfall, SCS uses the Runoff Curve Number (CN) method (see Chapters 4-10, SCS 1972). The CN value of a given soil is determined from its hydrologic soil group and land use. Soil data for the study area were extracted from the SCS Soil Surveys (SCS 1975a). Land use was determined from 1984 aerial photographs and from land-use maps prepared by the Center for Wetlands at the University of Florida (1973). The CN values for various "land use/hydrologic soil group" combinations are summarized in Table 8. An average antecedent moisture condition (AMC II), which represents a 5-day antecedent rainfall of 0.5-1.1 in. during the dry season and 1.4-2.1 in. during the wet season, was assumed for the basin. A weighted CN is calculated for each subbasin based on soils and land use.

The basin lag (L) for a given subbasin can be calculated based on travel time or time of concentration (T_c) by the relation $L = 0.6\ T_c$. However, for most of the subbasins in this study the SCS equation given below was used to calculate L.

$$L = \frac{\ell^{0.8}\ (S+1)^{0.7}}{1{,}900 Y^{0.5}}$$

where

L = lag in hours,

ℓ = hydraulic length of watershed in feet,

$$S = \frac{1{,}000}{CN'} - 10, \text{ and}$$

(where CN′ is the retardance factor and is equivalent to the runoff curve number)

Y = average watershed land slope in percent.

The HEC-1 program uses a peak rate factor of 484 for runoff calculations by the SCS methods. The peak rate factor, however, varies from 300 for flat swampy areas to 600 for steep terrain. For the Hicks Ditch basin it can be less than 484. However, the peak rate factor of 484 was retained for this study.

It is necessary to revise lag values (L) upwards for the following conditions: a) ponding behind small or inadequate drainage systems, including storm drain inlets and road culverts; b) reduction of land slope through grading; and c) the presence of pond and swamp areas in the basin. In general, all of the above

Table 8. Runoff curve numbers for selected land use and soil group combinations

Land use	Curve number for hydrologic soil group A	B	C	D
FULLY DEVELOPED URBAN AREA				
Residential				
1 acre	51	68	79	84
1/2 acre	54	70	80	85
1/3 acre	57	72	81	86
1/4 acre	61	75	83	87
1/8 acre	77	85	90	92
Lawns, Open Spaces, Parks, Golf Courses, Cemeteries, etc.	39	61	74	80
Streets and Roads	98	98	98	98
CULTIVATED AGRICULTURAL LAND				
Row Crops straight row (ground cover poor, 5% to 20% of the surface is covered with residue)	72	81	88	91
NON-CULTIVATED AGRICULTURAL LAND				
Pasture or Range No mechanical treatment (ground cover fair, i.e. 25% to 50% is covered with vegetation)	49	69	79	84
Forestland--grass or orchards--evergreen or deciduous (ground cover, poor, cover density less than 25%)	55	73	82	86
(ground cover good, cover density = 25% to 50%)	32	58	72	79
PINE FLATWOODS AND WETLANDS				
Pine Flatwoods	61	79	86	93
Wet Prairie	65	82	89	95
Cypress Swamps	70	85	91	97
Marsh	78	90	94	98
Water	98	98	98	98

conditions were encountered to some degree throughout the basin. L values calculated by the SCS equation were adjusted according to SCS guidelines (1975b).

Initial elevations for lakes and other storage areas were estimated based on long-term stage records, USGS quadrangle maps, and photogrammetric maps. Table 9 summarizes subbasin areas together with basin-weighted CN, lag (L) values, and initial abstraction (I_a). Table 10 presents the initial elevations assumed for the study.

HYDRAULIC ANALYSIS

The HEC-2 Model

This study used the USACOE HEC-2 computer model (Hydrologic Engineering Center 1982) for estimating water surface elevations of streams. The program is intended for calculating water surface profiles for steady, gradually varied flow in natural or man-made channels. The effects of various obstructions such as bridges, culverts, weirs, and other structures in the floodplain may be considered in computations. The program is also designed for application in floodplain management studies to assess the effects of channel improvements, levees, and structural modifications on water surface profiles.

Model Input Data

Input parameters used in the HEC-2 model include Manning's roughness coefficients for the channel and overbank, channel profiles, structure (bridge and culvert) profiles, areas for orifice flow and weir flow, and other loss coefficients.

Surveyed channel cross-sections and details of culverts and bridges were furnished by the Lake County Water Authority. Locations of cross-sections were selected according to the guidelines provided in the HEC-2 user's manual (Hydrologic Engineering Center 1982).

Elevations on photogrammetric maps were used for obtaining cross-sectional data of the floodplain. The aerial photography was done in April 1984. The aerial maps have a scale of 1 in = 200 ft and show contour lines at 1-ft intervals.

Table 9. Subbasin runoff parameters

Subbasin	Area (acres)	CN	L (hr)	I_a (in)
N1	180	70.6	0.78	1.0
N2	102	79.4	0.26	0.7
N3	91	79.4	0.37	0.7
N4	122	78.2	0.73	0.7
N5	1,050	77.1	5.49	0.8
N6	640	61.8	3.00	1.4
N7	253	78.3	2.49	0.6
N8	152	63.4	1.28	1.3
N9	195	90.2	4.26	0.4
N10	398	80.2	1.33	1.4
N11	801	87.0	28.82	0.3
S1	435	81.0	2.12	0.6
S2	454	75.9	14.27	1.5
S3	1,082	70.3	4.44	1.0
S4	538	67.2	1.59	1.1
S5	384	75.3	4.45	0.7
S6	237	65.6	2.09	1.1
S7	390	85.4	4.07	0.3
S8	160	82.3	1.15	0.6
F1	972	86.3	1.31	0.5
H1	170	78.9	1.13	0.7
H2	159	71.2	2.51	1.0
H3	212	73.1	1.09	0.9
H4	346	77.4	7.22	1.0
H5	333	83.5	6.67	0.6
T1	744	71.6	13.45	1.3
T2	385	69.8	1.83	1.4
T3	111	62.5	0.62	5.0
T4	52	67.8	0.22	1.1
T5	252	86.7	5.77	0.5
T6	401	92.9	6.67	0.2

CN = SCS curve numbers
L = lag values
I_a = initial abstraction

Table 10. Initial lake and pond elevations assumed in the study

Storage Name	Initial Elevation (ft NGVD)
Loch Leven	163.0
Lake Joanna	155.0
Lake Swatara	72.5
Lake Myrtle	67.0
Lake Serpentine	63.5
Lake Enola	68.0
Lake Umatilla	67.4
Lake Blanchester	67.1
Lake Whitcomb	67.0
Lake Bracy	67.6
Eustis Meadows	63.5
Muck Farm Ditch	62.0
Clear Lake	76.0
East Swamp	63.0
West Swamp	63.0
Trout Lake	62.2
Three Minor Lakes South of Lake Bracy	67.5

The channel roughness coefficients were assessed based on field inspections and color photographs taken at various sites and calibrated based on observed stage and discharge data. Roughness coefficients for channels varied from 0.015 (where the channel is concrete lined) to 0.24 (where the channel is full of vegetation). Overbank roughness has a range of 0.24 to 0.80.

Stage-Storage-Discharge Relationships. Stage-discharge relationships for various control structures in the basin were determined directly from the HEC-2 output. However, several iterations were made through runoff calculations to reflect appropriate backwater effects at each stage. Stage-storage relationships for those portions of the basin where the surveyed cross-sections adequately described the available stage-area relationships were obtained from the HEC-2 output. For lakes and other areas of ponding, the stage-area relationships were determined by digital planimetry and the use of a compensating polar planimeter.

FLOOD DISCHARGES

Flood discharges for existing conditions were derived by HEC-1 for various storm events for the entire Hicks Ditch watercourse and its tributaries. It was assumed that the culverts and bridges were well-maintained and free of silt and debris. However, additional results were evaluated for some anticipated conditions. These include blockage of culverts downstream of Lake Joanna and Loch Leven, siltation of Hicks Ditch, and the implementation of Florida Department of Environmental Regulation (DER) rules for agricultural discharge regulation, i.e., on-site retention of 10-yr storm runoff.

Simulation of Storm Events

Flood discharges for 10-yr, 25-yr, and 100-yr return periods were obtained by simulating storm events of the same recurrence intervals. The precipitation depths for 24-hour storm events with 10-yr, 25-yr, and 100-yr recurrence intervals of were obtained from the National Weather Bureau (Hershfield 1961) and SJRWMD (Rao 1988). Using the conservative 10-yr value from the first source and the 25-yr and 100-yr values from the second, the respective depths are 7.0 in, 8.5 in, and 11.2 in. The SCS Type II rainfall

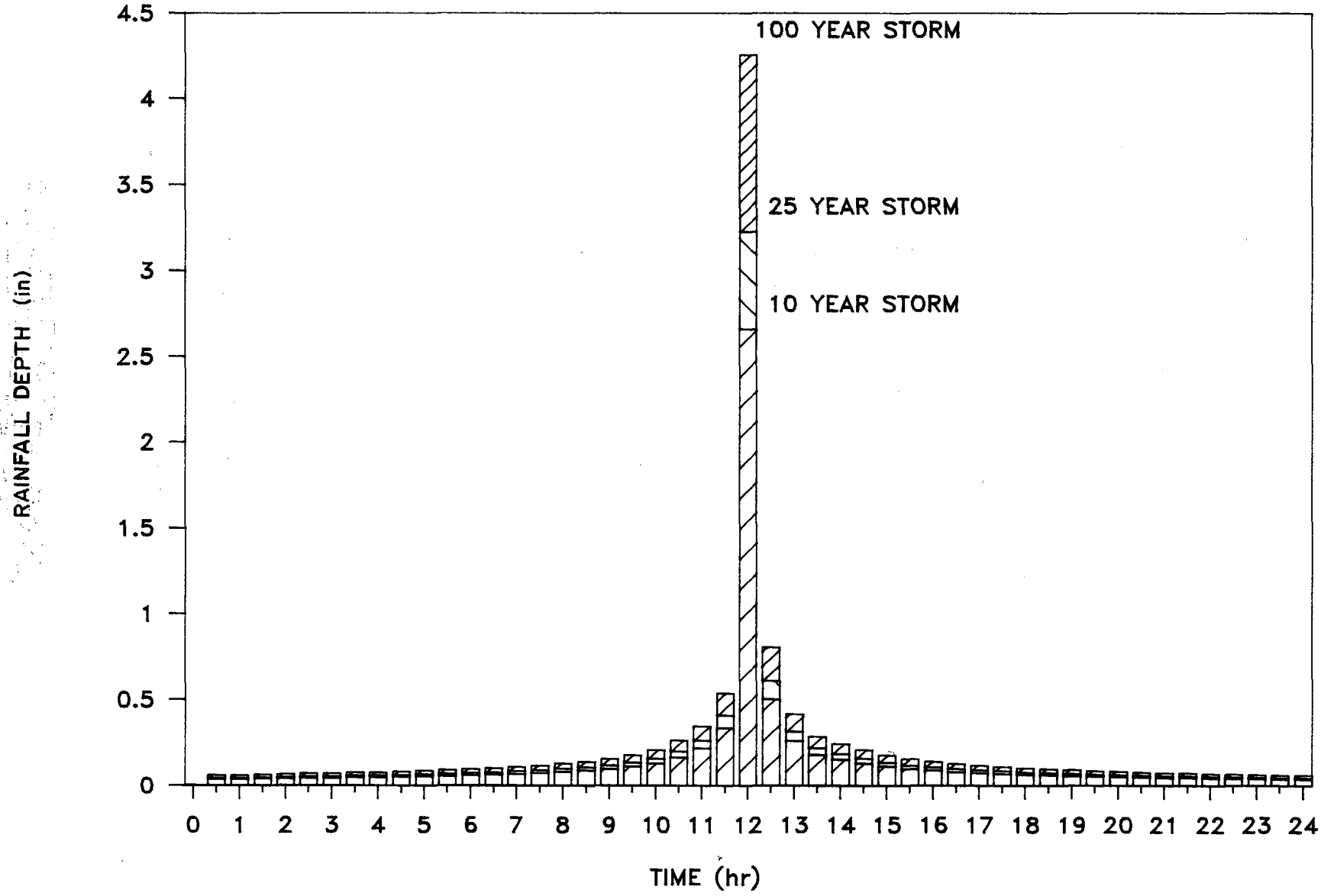

Figure 11. Rainfall intensity of 24-hour hypothetical storm events

distribution was assumed to determine the hypothetical storm distribution during the 24-hour storm period. Note that although the storm lasts for 24 hours, most of the rainfall occurs over the middle six hour duration (Fig. 11).

Under existing conditions, it is assumed that all culverts and bridges are well maintained and free of silt and debris. Some anticipated conditions, however, are expected to arise as a result of erosion and siltation in the basin. Timely correction of these problems may not be possible using normal maintenance procedures. The Lake County Water Authority made a special request that these conditions be evaluated.

Culvert Siltation. The following two cases are evaluated:

Case A: The culvert on SR44 is completely silted up, blocking discharge from Lake Joanna (Fig. 5). The upstream basins discharge normally into Lake Joanna.

Case B: Culverts on both SR44 and SR44B at the inlet to Lake Joanna are completely silted up. This will block discharge into Lake Joanna from the upstream basins (S1 and S2, Fig. 5) and discharge from Lake Joanna to downstream.

Hicks Ditch Siltation. The bed elevation of Hicks Ditch is higher from its mouth to Getford Road upstream, a distance of about 4,000 ft (Fig. 12), due to siltation. This siltation is likely to progress upstream up to Eustis Meadows and reduce the conveyance capacity of Hicks Ditch. Two cases were evaluated:

Case A: Hicks Ditch is silted up to an elevation of 62.50 ft NGVD from its mouth to Eustis Meadows (Fig. 12, Case A).

Case B: In addition to the siltation of Hicks Ditch in Case A, the culvert at Getford Road is silted up to an elevation of 64.60 ft NGVD (Fig. 12, Case B).

Retention Ponds. In compliance with Chapter 403.087, F.S., and Chapters 17-4 and 17-6, F.A.C., the muck farms in the Hicks Ditch basin (Fig. 7) are required to retain runoff due to a 10-yr storm event within the property boundaries. This measure, when fully implemented, will give some relief to flooding downstream. However, this measure will be implemented in stages and three cases were evaluated to reflect the changing conditions in the basin:

Case A: Initially the owner of the western muck farm will build an 83-acre retention pond in the northwestern portion of his farm (Fig. 13). The pump station currently located at the end of the trunk canal will be moved upstream. This station, with a capacity of 35 cubic feet per second (cfs), will pump into the retention pond the storm discharge conveyed by the trunk canal from both eastern and western muck farms. Since the retention pond is designed to contain the 10-yr storm discharge from only the western farm, overflow occurs from the pond when additional discharge is received from the east muck farm, or the return frequency exceeds 10 years, or both. This overflow discharge will be received by Hicks Ditch.

Case B: In the second phase, the eastern farm owner also will build a retention pond. At that time, each retention pond will hold the 10-yr storm discharge from the respective farms. However, overflow from the ponds can occur during a greater than 10-yr event.

Case C: Case B is simulated with an additional condition that Hicks Ditch has silted up to 62.50 ft NGVD, as described under Hicks Ditch siltation, Case A.

Appendices A through E present the peak 10-, 25-, and 100-yr discharges for existing conditions and for four other conditions accounting for siltation of Hicks Ditch or retention ponds built in the muck farms. These data are extracted from the HEC-2 model output.

FLOOD ELEVATIONS

Computation of Peak Elevations and Flood Profiles

Peak elevations for all lakes and storage areas were obtained by HEC-1 modeling. For Hicks Ditch and other channels, flood profiles were computed by the HEC-2 program using peak discharges generated by the HEC-1 program. Table 11 summarizes

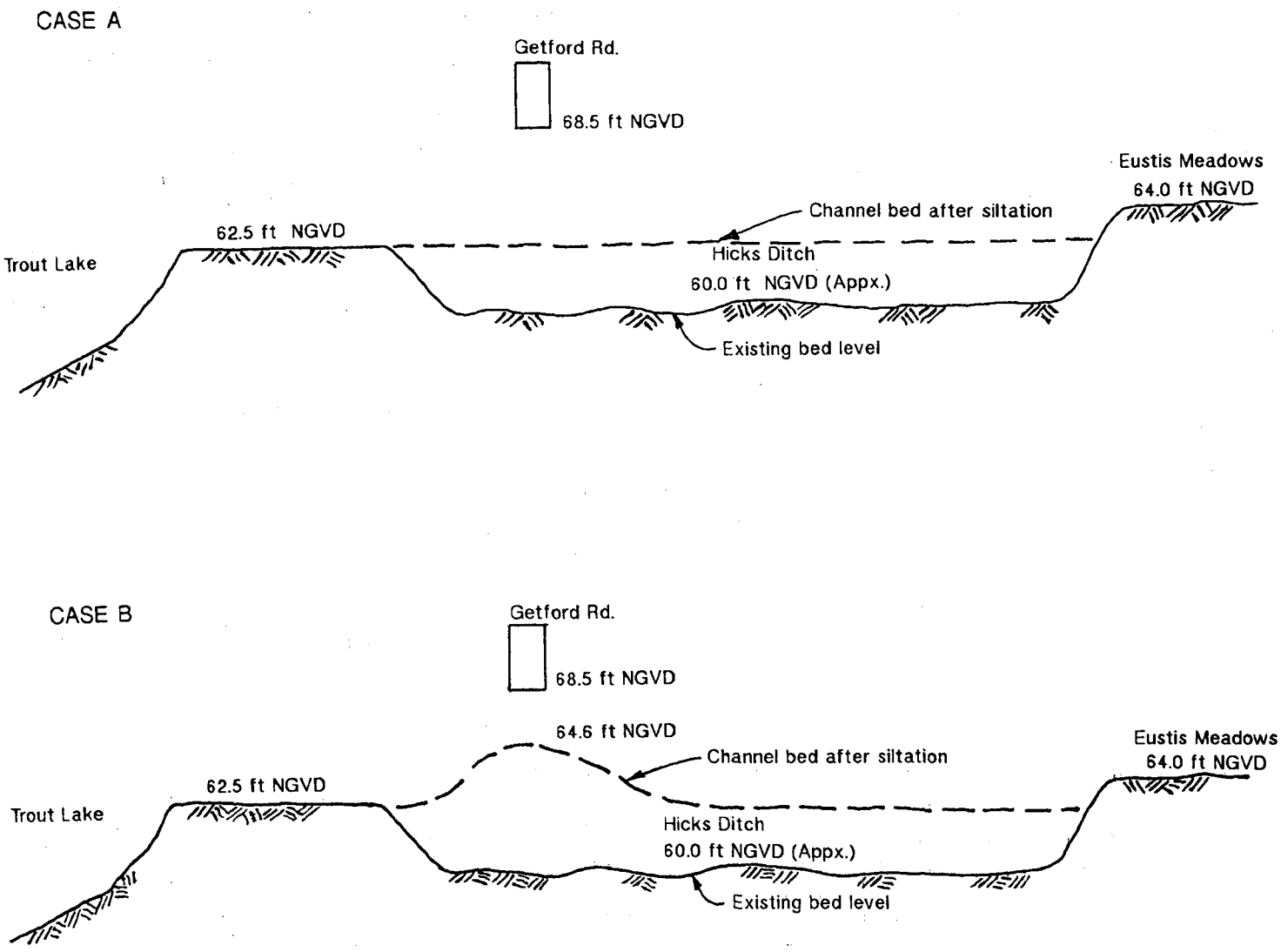

Figure 12. Assumed Hicks Ditch siltation for modeling

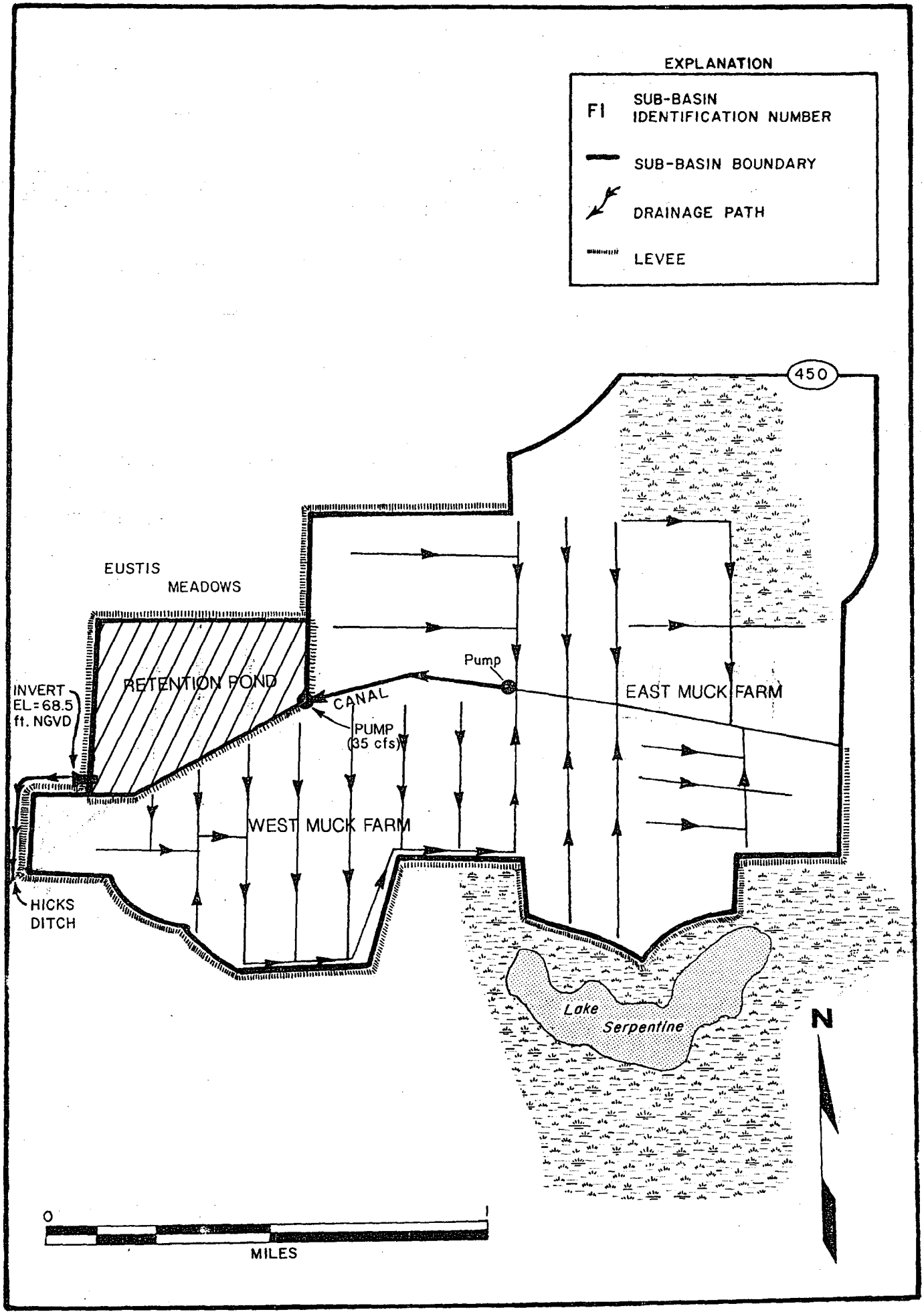

Figure 13. Anticipated changes in west muck farm area to contain runoff due to a 10-yr 24-hr storm

the 10-yr, 25-yr, and 100-yr elevations for selected locations in the basin for existing conditions. Appendix F presents flood profiles.

Results for Other Anticipated Conditions

Siltation of culverts downstream of Loch Leven and Lake Joanna. Results were evaluated for 24-hr and 96-hr 100-yr storm events (Table 12). Lake Joanna will rise an additional 0.6 ft during a 100-yr 24-hr storm event if the culvert downstream is completely blocked by siltation and inflow occurs as usual from Loch Leven. Loch Leven will rise an additional 0.8 ft during a similar event if the culvert downstream of the lake is blocked. However, as mentioned earlier, floodwaters are diverted to Wolf Creek basin (Fig. 5) from Loch Leven if the water level exceeds 164.00 ft NGVD. Diversion also occurs to Wolf Creek from the airport subbasin (S2, Fig. 5) if the water level exceeds 166.00 ft NGVD, i.e., during a 96-hr 100-yr storm event (Table 12).

Downstream areas will not be significantly affected by blockage of the culverts.

Siltation of Hicks Ditch. Flood elevations in Hicks Ditch and Lake Serpentine will increase by about 0.4 ft as a result of siltation in Hicks Ditch (Case A, Fig. 12) (Table 13). If the culvert on Getford Road is also blocked partially, the elevations will rise by another 0.1 ft (Case B, Fig. 12) (Table 14). Elevations will rise marginally in muck farms and the East Swamp. A decline of 0.1 ft is likely in Trout Lake during a 25-yr event.

Retention of 10-yr storm runoff by the muck farms. Flood elevations will decline by about 0.4 ft to 0.7 ft in Hicks Ditch if the muck farms retain 10-yr storm runoff onsite (Cases A and B, "Retention Ponds") (Tables 15 and 16). If Hicks Ditch is silted up, however, (Case C, "Retention Ponds") the decrease in 100-yr and 25-yr stages will be only marginal, while 10-yr stages will decrease by about 0.2 ft to 0.4 ft (Table 17). Some nearby areas will be marginally affected. Stages in Trout Lake will decline by about 0.1 ft.

Table 11. Flood elevations in the Hicks Ditch basin (Existing conditions), ft NGVD

Location	Flood Elevation (ft NGVD) 10-yr	25-yr	100-yr
South Branch (Fig.5)			
Loch Leven	164.3	164.6	165.2
Lake Joanna	156.5	156.8	157.4
Lake Swatara	74.0	74.6	75.6
Lake Myrtle	69.3	69.6	70.1
Lake Serpentine	67.1	67.5	68.1
North Branch (Fig.6)			
Lake Enola	69.4	69.8	70.3
Lake Umatilla	68.4	68.7	69.1
Lake Blanchester	68.2	68.6	69.4
Lake Whitcomb	68.0	68.3	68.8
Lake Bracy	68.9	69.2	69.9
Eustis Meadows	67.8	68.0	68.7
West of Muck Farm	67.3	67.8	68.6
Hicks Ditch (Fig. 8)			
at Muck Farm	67.1	67.5	68.2
at Golf Course	67.0	67.3	68.1
at Getford Road	66.5	66.8	67.4
Trout Lake (Fig. 9)	64.5	65.0	65.7
Other Areas of Interest			
West Muck Farm (Fig. 7)	65.1	65.3	65.6
Three Lakes in Dona Vista (Subbasin H1, Fig. 8)	69.3	69.8	70.6
Clear Lake (Fig. 8)	78.2	78.5	78.9
East Swamp (Fig. 8)	68.0	68.4	69.3
West Swamp (Fig. 8)	67.4	67.7	68.2

Comparison with Other Studies

A comparison between SJRWMD and Federal Emergency Management Agency (FEMA) flood elevations is presented in Table 18. The FEMA flood elevations are the result of flood insurance studies of Eustis (FEMA 1987) and Lake County unincorporated areas (FEMA 1981). The differences in results may be attributed to the differences in statistical methods used in the two studies to analyze both rainfall and Lake Eustis gaged stages and other modeling procedures. However, the channel cross-sectional data, culvert surveys, and the aerial photogrammetric maps used by SJRWMD are deemed to have contributed to greater modeling accuracy.

Structural Hazards

The levee around the muck farms is found to be of inadequate height to contain or convey floodwaters. Flood stages in Eustis Meadows resulting from events greater than a 10-yr return period are higher than the top of the levee. Flood stages to the south of the muck farm area from the 10-yr event are higher than the top of the levee. These conditions will result in passage of an uncontrolled flow of water into the farm area and may cause a washout of the levee.

FLOOD HAZARD AREAS

Based on the results of this study, flood prone areas (i.e., areas affected by the 100-yr flood) within the Hicks Ditch basin are identified in Table 19 and Figures 14-18. These are predominantly undeveloped areas with the exceptions of the muck farm operation (Fig. 16) southeast of Eustis Meadows and some residential areas around lakes.

The largest residential area threatened by floodwaters is on Trout Lake (Subbasin T6, Fig. 18). About 63 buildings are within the 100-yr floodplain and 58 of these are on the finger canals in the northwest corner of the lake. Another developed area within the floodplain is a small golf course north of Trout Lake. In the Hicks Ditch area (Fig. 17), floodwaters extend over portions of the golf course. In Dona Vista (Subbasin H1, Fig. 17), the flooding in three small lakes may affect two buildings. Lake Joanna (Fig. 14) has many docks and boathouses that could be damaged by floodwater.

Table 12. 100-yr flood elevations in Lake Joanna and Loch Leven, ft NGVD

Condition	Lake Joanna		Loch Leven	
	24-hr Storm	96-hr Storm	24-hr Storm	96-hr Storm
Existing Conditions	157.40	158.14	165.20	165.90
Case A. Discharge occurs from Loch Leven to Lake Joanna. No outflow from Lake Joanna.	159.03	159.97	165.2	165.90
Case B. No inflow from Loch Leven into Lake Joanna. No outflow from Lake Joanna.	157.88	158.68	166.03	166.51

Table 13. Flood elevations in the Hicks Ditch basin (Siltation of Hicks Ditch: Case A)

Location	Flood Elevation (ft NGVD) 10-yr	25-yr	100-yr
South Branch (Fig.5)			
Loch Leven	164.3	164.6	165.2
Lake Joanna	156.5	156.8	157.4
Lake Swatara	74.0	74.6	75.6
Lake Myrtle	69.3	69.6	70.1
Lake Serpentine*	67.5	67.9	68.5
North Branch (Fig.6)			
Lake Enola	69.4	69.8	70.3
Lake Umatilla	68.4	68.7	69.1
Lake Blanchester	68.2	68.6	69.4
Lake Whitcomb	68.0	68.3	68.8
Lake Bracy*	68.9	69.3	69.9
Eustis Meadows*	67.7	68.1	68.7
West of Muck Farm*	67.6	68.0	68.7
Hicks Ditch (Fig. 8)			
at Muck Farm*	67.5	67.9	68.5
at Golf Course*	67.4	67.8	68.4
at Eustis Bypass*	66.9	67.2	67.6
Trout Lake	64.5	65.0	65.7
Other			
West Muck Farm (Fig. 7)	65.1	65.3	65.6
Three Lakes in Dona Vista (Subbasin H1, Fig. 8)	69.3	69.8	70.6
Clear Lake (Fig. 8)	78.2	78.5	78.9
East Swamp (Fig. 8)	68.0	68.4	69.4
West Swamp (Fig. 8)	67.4	67.7	68.2

*Affected Areas

Table 14. Flood elevations in the Hicks Ditch basin (Siltation of Hicks Ditch: Case B)

Location	Flood Elevation (ft NGVD) 10-yr	25-yr	100-yr
South Branch (Fig.5)			
Loch Leven	164.3	164.6	165.2
Lake Joanna	156.5	156.8	157.4
Lake Swatara	74.0	74.6	75.6
Lake Myrtle	69.3	69.6	70.1
Lake Serpentine*	67.6	67.9	68.6
North Branch (Fig.6)			
Lake Enola	69.4	69.8	70.3
Lake Umatilla	68.4	68.7	69.1
Lake Blanchester	68.2	68.6	69.4
Lake Whitcomb	68.0	68.3	68.8
Lake Bracy*	68.9	69.3	69.9
Eustis Meadows*	67.8	68.1	68.8
West of Muck Farm*	67.6	67.8	68.7
Hicks Ditch (Fig. 8)			
at Muck Farm*	67.6	67.9	68.6
at Golf Course*	67.5	67.8	68.5
at Eustis Bypass*	67.0	67.3	67.8
Trout Lake (Fig. 9)	64.5	64.9	65.7
Other			
West Muck Farm (Fig. 7)	65.1	65.3	65.6
Three Lakes in Dona Vista (Subbasin H1, Fig. 8)	69.3	69.8	70.6
Clear Lake (Fig. 8)	78.2	78.5	78.9
East Swamp (Fig. 8)*	68.0	68.5	69.4
West Swamp (Fig. 8)	67.4	67.7	68.2

*Affected Areas

Table 15. Flood elevations in the Hicks Ditch basin (Retention of 10-yr storm discharge by muck farms: Case A)

Location	Flood Elevation (ft NGVD) 10-yr	25-yr	100-yr
South Branch (Fig.5)			
Loch Leven	164.3	164.6	165.2
Lake Joanna	156.5	156.8	157.4
Lake Swatara	74.0	74.6	75.6
Lake Myrtle	69.3	69.6	70.1
Lake Serpentine*	66.5	67.1	67.8
North Branch (Fig.6)			
Lake Enola	69.4	69.7	70.3
Lake Umatilla	68.4	68.7	69.1
Lake Blanchester	68.2	68.6	69.4
Lake Whitcomb	68.0	68.3	68.8
Lake Bracy	68.9	69.2	69.9
Eustis Meadows	67.8	68.0	68.7
West of Muck Farm*	67.3	67.9	68.7
Hicks Ditch (Fig. 8)			
at Muck Farm*	66.4	66.9	67.7
at Golf Course*	66.3	66.8	67.6
at Eustis Bypass*	66.0	66.4	67.0
Trout Lake (Fig. 9)*	64.5	64.9	65.7
Other Areas of Interest			
West Muck Farm (Fig. 7)	65.1	65.3	65.6
Three Lakes in Dona Vista (Subbasin H1, Fig. 8)	69.3	69.8	70.6
Clear Lake (Fig. 8)	78.2	78.5	78.9
East Swamp (Fig. 8)*	67.9	68.4	69.3
West Swamp (Fig. 8)	67.4	67.7	68.2

*Affected Areas

Table 16. Flood elevations in the Hicks Ditch basin (Retention of 10-yr storm discharge by muck farms: Case B)

Location	Flood Elevation (ft NGVD) 10-yr	25-yr	100-yr
South Branch (Fig.5)			
Loch Leven	164.3	164.6	165.2
Lake Joanna	156.5	156.8	157.4
Lake Swatara	74.0	74.6	75.6
Lake Myrtle	69.3	69.6	70.1
Lake Serpentine*	66.5	67.1	67.8
North Branch (Fig.6)			
Lake Enola	69.4	69.8	70.3
Lake Umatilla	68.4	68.7	69.1
Lake Blanchester	68.2	68.6	69.4
Lake Whitcomb	68.0	68.3	68.8
Lake Bracy	68.9	69.2	69.9
Eustis Meadows	67.8	68.0	68.7
West of Muck Farm*	67.2	67.7	68.6
Hicks Ditch (Fig. 8)			
at Muck Farm*	66.4	66.8	67.7
at Golf Course*	66.3	66.7	67.6
at Eustis Bypass*	66.0	66.4	67.0
Trout Lake (Fig. 9)*	64.5	64.9	65.7
Other			
West Muck Farm (Fig. 7)	65.1	65.3	65.6
Three Lakes in Dona Vista (Subbasin H1, Fig. 8)	69.3	69.8	70.6
Clear Lake (Fig. 8)	78.2	78.5	78.9
East Swamp (Fig. 8)*	67.9	68.4	69.3
West Swamp (Fig. 8)	67.4	67.7	68.2

*Affected Areas

Table 17. Flood elevations in the Hicks Ditch basin (Retention of 10-yr storm discharge by muck farms: Case C)

Location	Flood Elevation (ft NGVD) 10-yr	25-yr	100-yr
South Branch (Fig.5)			
Loch Leven	164.3	164.6	165.2
Lake Joanna	156.5	156.8	157.4
Lake Swatara	74.0	74.6	75.6
Lake Myrtle	69.3	69.6	70.1
Lake Serpentine*	66.7	67.3	68.0
North Branch (Fig.6)			
Lake Enola	69.4	69.7	70.3
Lake Umatilla	68.4	68.7	69.1
Lake Blanchester	68.2	68.6	69.4
Lake Whitcomb	68.0	68.3	68.8
Lake Bracy	68.9	69.2	69.9
Eustis Meadows	67.8	68.0	68.8
West of Muck Farm*	67.3	67.8	68.7
Hicks Ditch (Fig. 8)			
at Muck Farm*	66.7	67.2	68.1
at Golf Course*	66.7	67.2	68.0
at Eustis Bypass*	66.3	66.7	67.3
Trout Lake (Fig. 9)*	64.4	64.9	65.6
Other			
West Muck Farm (Fig. 7)	65.1	65.3	65.6
Three Lakes in Dona Vista (Subbasin H1, Fig. 8)	69.3	69.8	70.6
Clear Lake (Fig. 8)	78.2	78.5	78.9
East Swamp (Fig. 8)*	67.9	68.4	69.3
West Swamp (Fig. 8)	67.4	67.7	68.2

*Affected Areas

Table 18. Comparison of flood elevations between SJRWMD and FEMA

Lake	Flood Elevation, ft NGVD 10-yr SJRWMD	10-yr FEMA	100-yr SJRWMD	100-yr FEMA
Lake Eustis	64.3	64.4	65.0	65.7
Dona Vista Three Small Lakes	69.3	70.7	70.6	71.0
Lake Bracy	68.9	69.7	69.9	70.0
Lake Swatara	74.0	72.5	75.6	72.7
Lake Joanna	156.5	154.6	157.4	155.0

Table 19. Flood prone areas in the Hicks Ditch basin

Area	Flood Prone Area
Southern Region (Fig. 14)	1. The area surrounding Lake Serpentine and Lake Myrtle 2. The area west of Lake Swatara 3. The area northwest of Loch Leven
Northern Region (Fig. 15)	1. Eustis Meadows 2. The area southwest of Lake Whitcomb 3. The area south of Lake Umatilla
Muck Farm Area (Fig. 16)	1. The entire farm area
Hicks Ditch Area (Fig. 17)	1. Northwest Hicks Ditch 2. The swamp east of Hicks Ditch
Trout Lake Area (Fig. 18)	1. The area surrounding Trout Lake

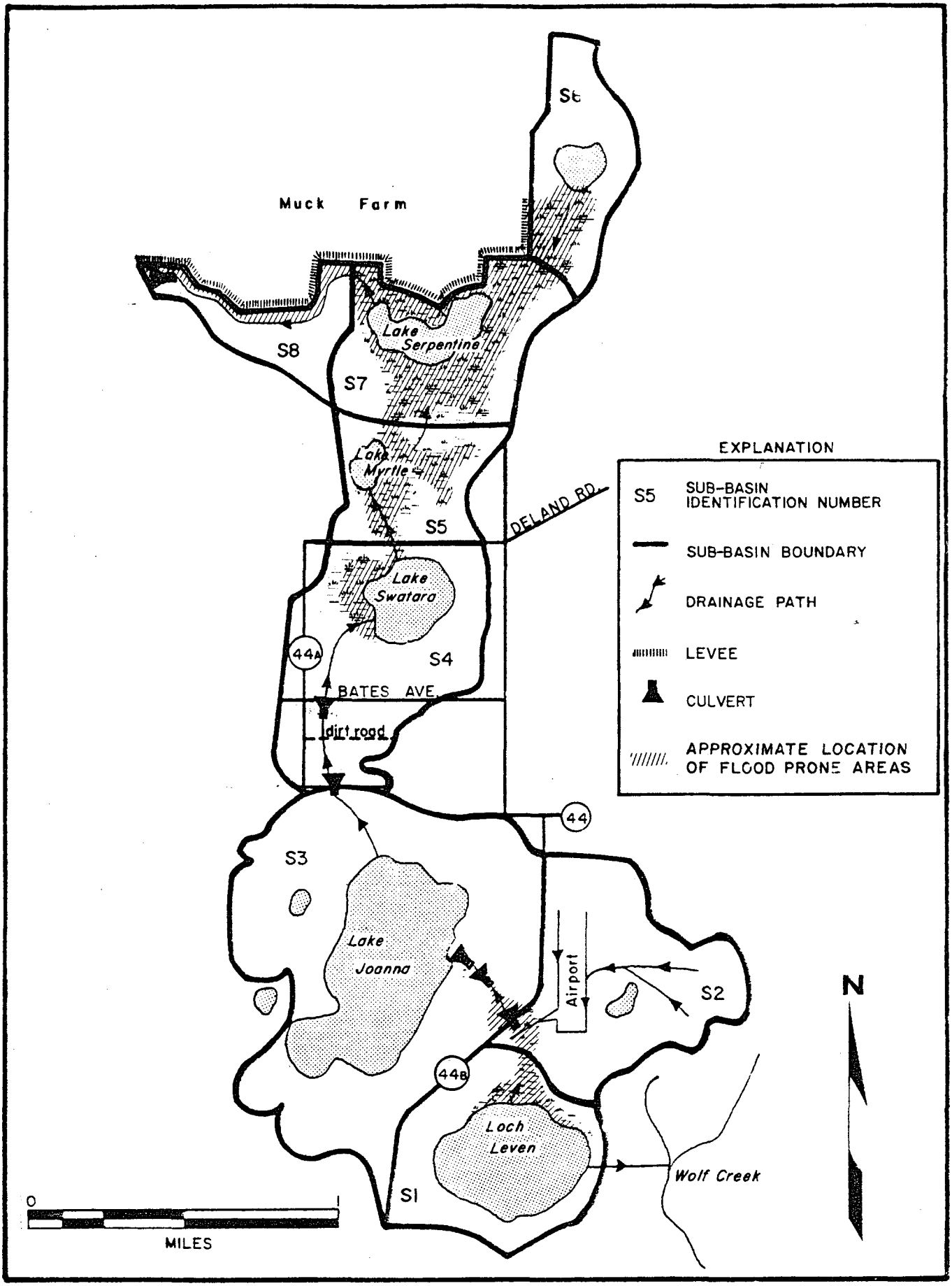

Figure 14. Flood prone areas in the southern region

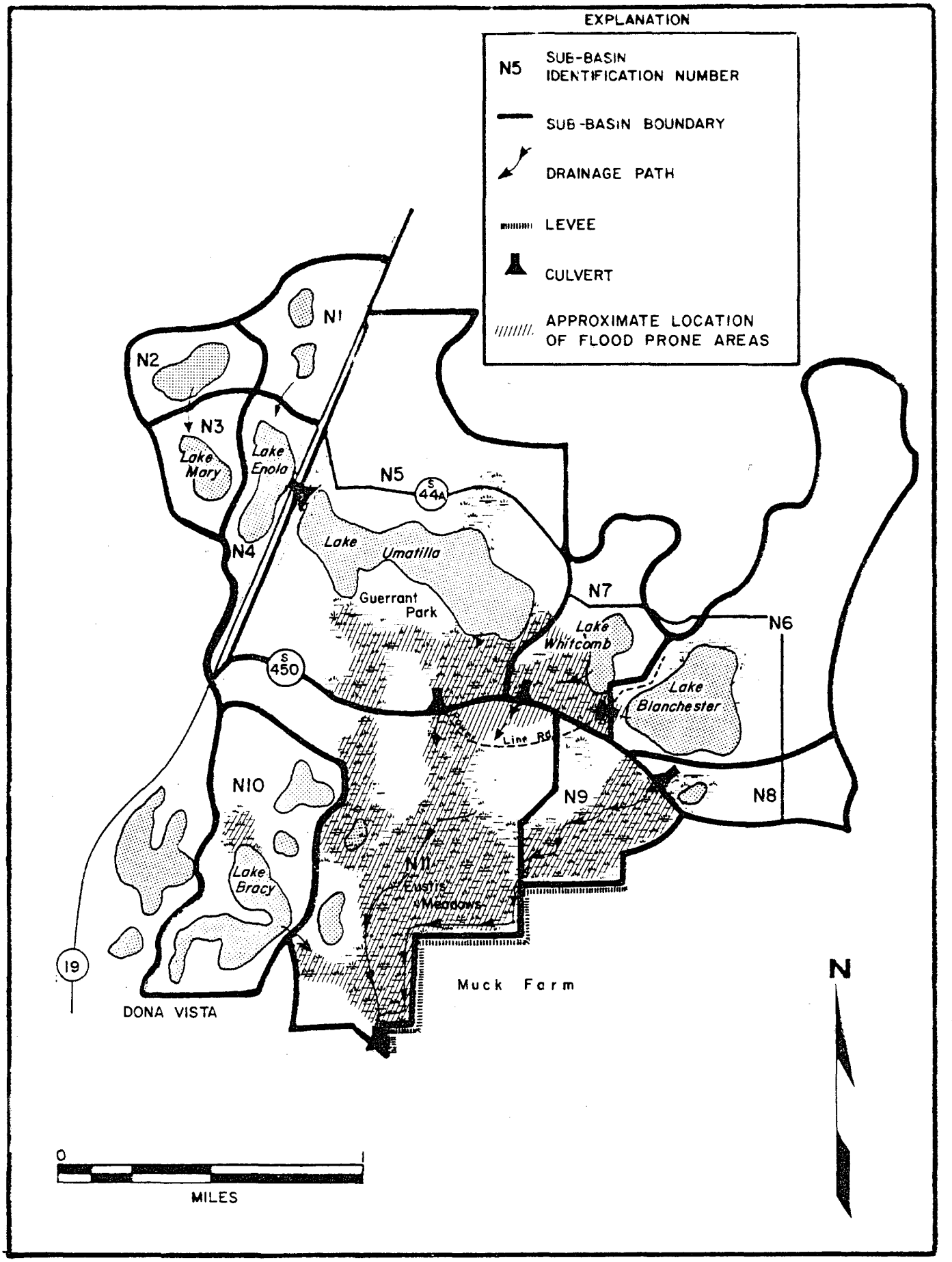

Figure 15. Flood prone areas in the northern region

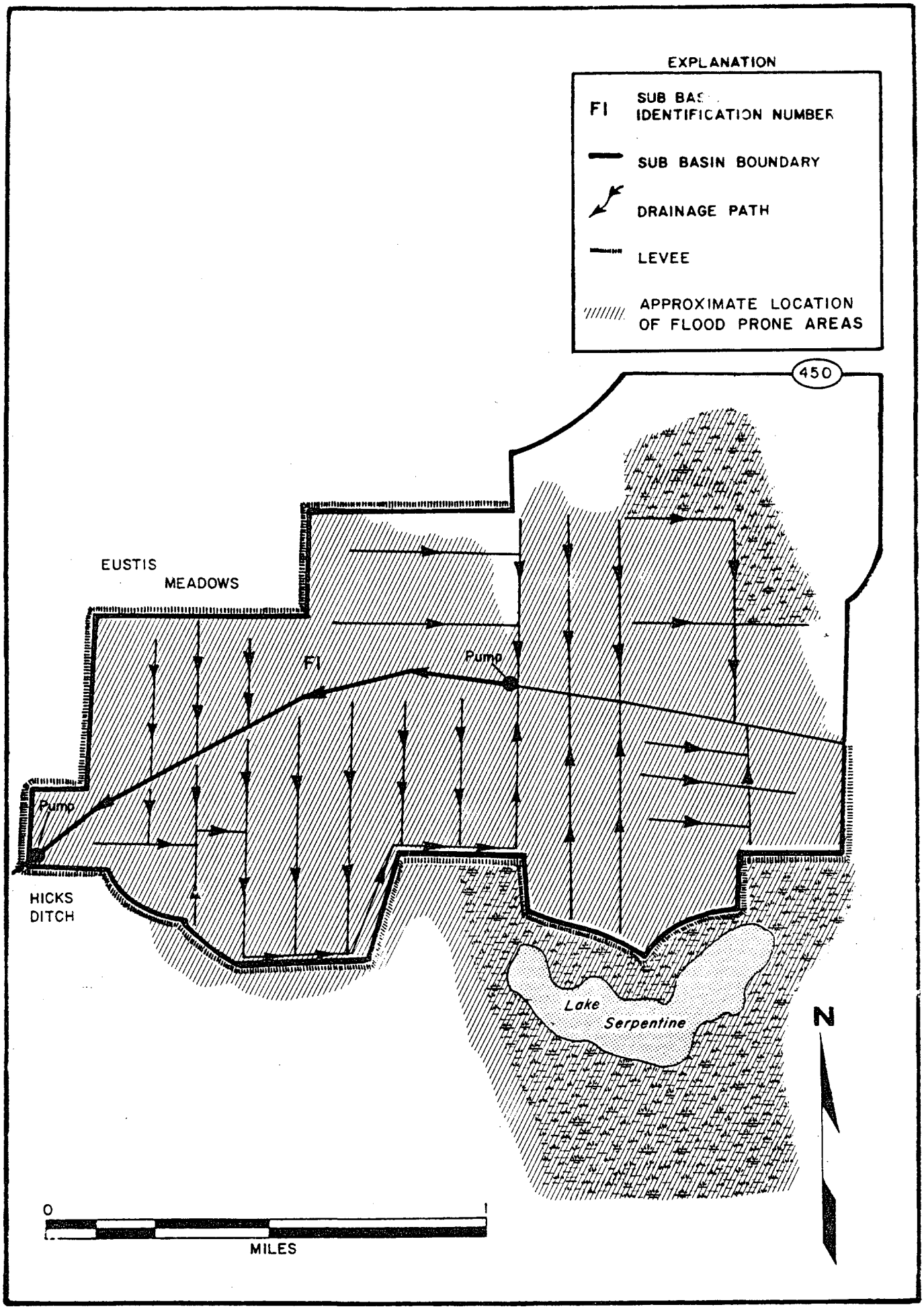

Figure 16. Flood prone areas in the muck farm area

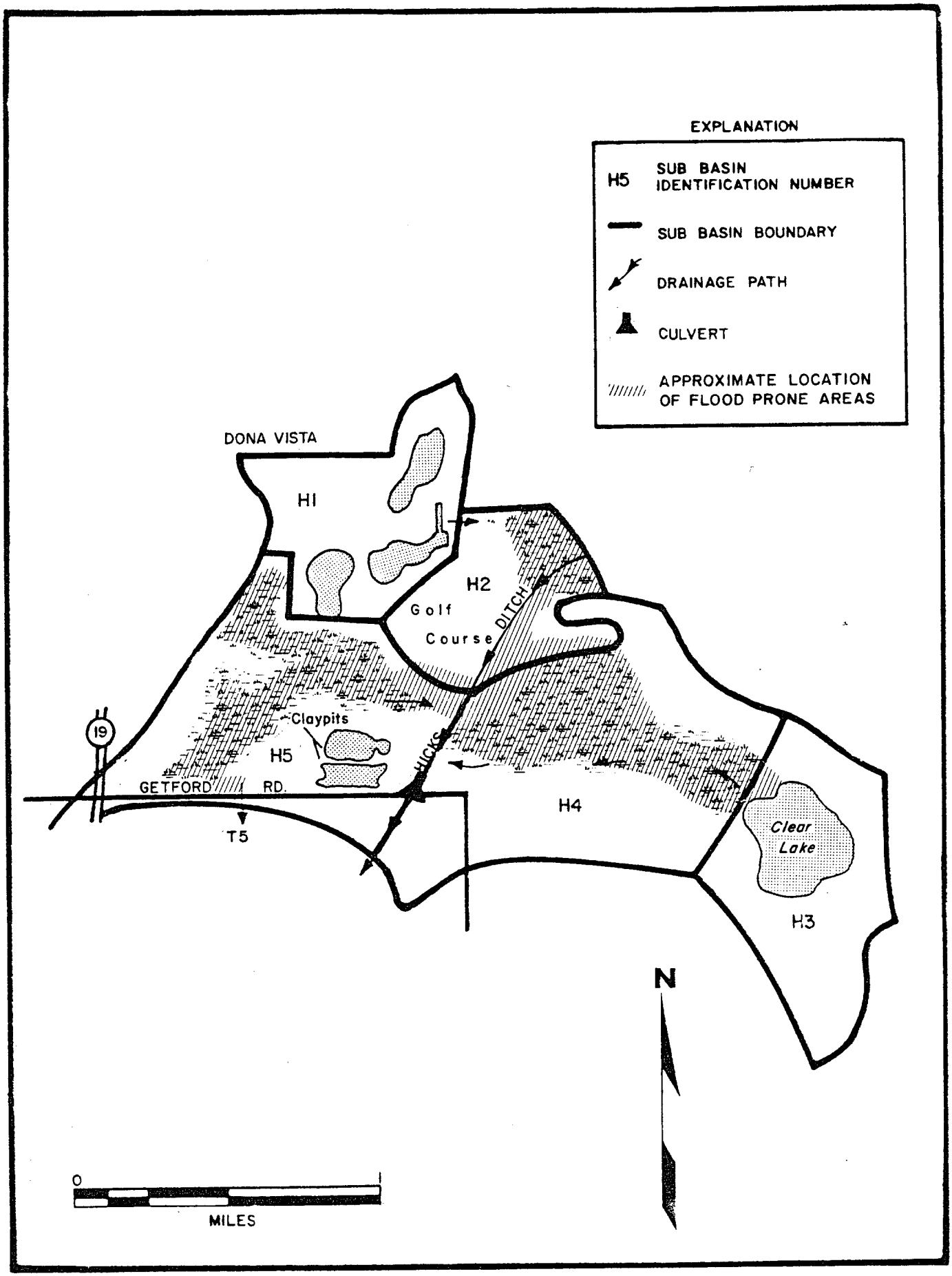

Figure 17. Flood prone areas in the Hicks Ditch area

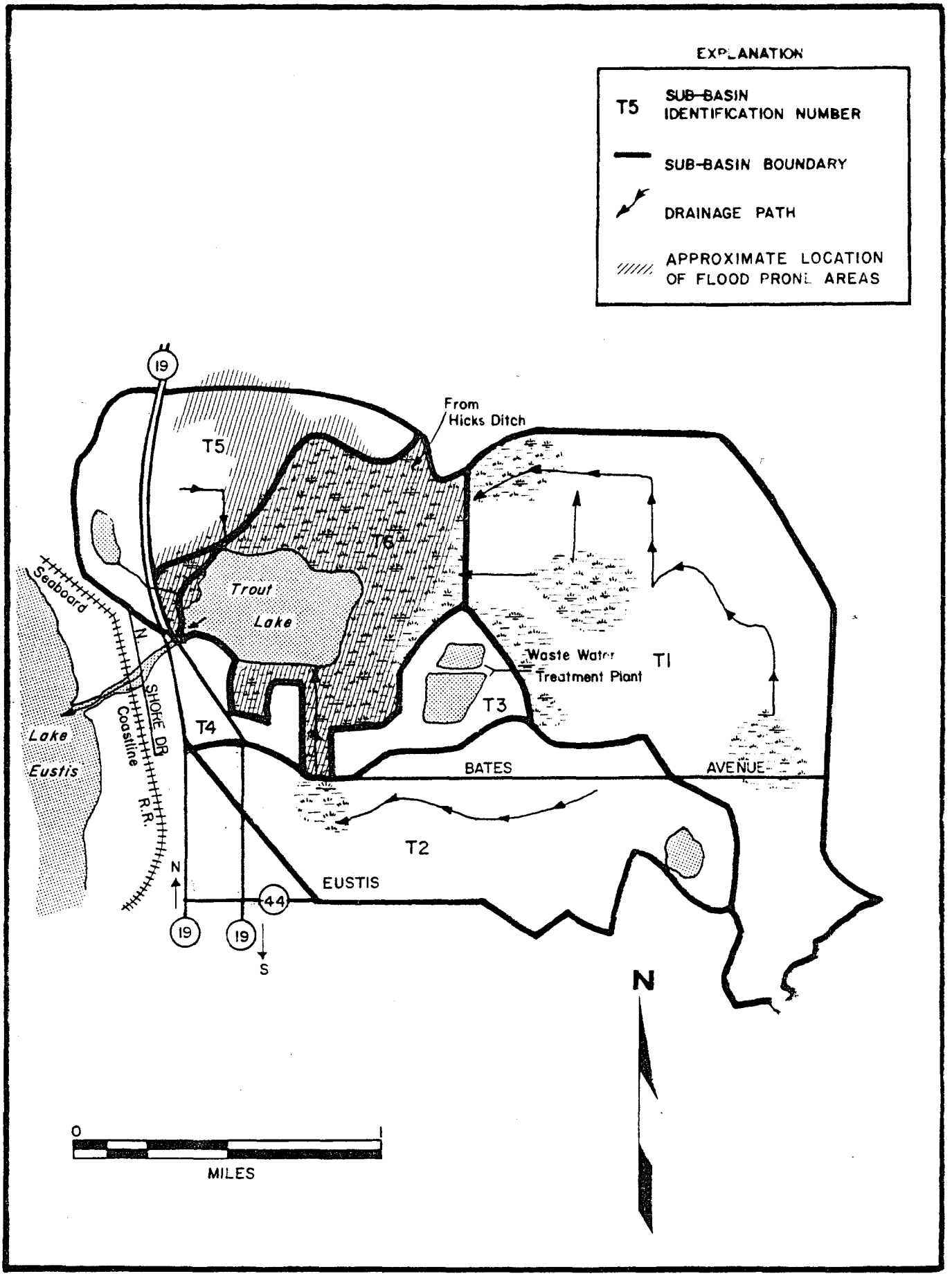

Figure 18. Flood prone areas in the Trout Lake area

CONCLUSIONS

The areas lying in the 100-yr floodplain of the Hicks Ditch basin are mostly undeveloped. Developed areas include some residential areas around lakes, the muck farm operation in the southeast portion of Eustis Meadows, and some golf courses. About 63 buildings around Trout Lake and two buildings in Dona Vista would be affected by the 100-yr flood event.

Flooding in Trout Lake can be reduced by increasing the conveyance capacity of the channel between Trout Lake and Lake Eustis. This could be done by removing the old railroad trestle bridge downstream of Trout Lake and expanding the corrugated metal pipe culvert immediately upstream.

Flooding in other areas can be reduced by proper maintenance of the drainage system. Although flooding in the northern and southern regions of Hicks Ditch basin does not at present affect developed areas, inadequate maintenance can cause culverts to become blocked and channels overgrown, which would increase the potential for flooding. Inspections of the drainage system during this study revealed that a culvert between Lake Joanna and SR44 was blocked. The flooding in the central region of the basin (that is, Eustis Meadows, Lake Serpentine, and the muck farms) is due primarily to runoff from adjacent areas and the inadequate conveyance capacity of Hicks Ditch.

Three alternative measures are possible to reduce the threat of flood damage to the muck farms:

- Increase the conveyance capacity of Hicks Ditch to accommodate the drainage needs of the central basin
- Increase the storage capacity in the muck farms so that pumped discharge rates can be reduced, allowing rapid removal of drainage from the surrounding areas
- Build a higher and more stable levee

The appropriate alternative(s) should be chosen only after a detailed water management study of the basin that includes environnmental and socio-economic considerations.

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Appendix A

FLOOD DISCHARGES AND ELEVATIONS IN HICKS DITCH BASIN

(Existing Conditions)

Table A1. Flood Discharges and Elevations--Lake Eustis to Lake Enola

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Lake Eustis	0.0	93.0	64.3	127.0	64.6	213.0	65.0	50.0		
Railroad	100.0	93.0	64.3	127.0	64.6	213.0	65.0	59.8	65.7	63.9
Trestle	120.0	93.0	64.3	127.0	64.6	213.0	65.0	59.8	65.7	63.9
	130.0	93.0	64.3	127.0	64.6	213.0	65.1	58.7		
North Shore	140.0	93.0	64.3	127.0	64.6	213.0	65.0	58.7	71.3	66.9
Drive	180.0	93.0	64.3	127.0	64.6	213.0	65.0	58.7	71.3	66.9
	240.0	93.0	64.3	127.0	64.7	213.0	65.2	56.0		
	710.0	93.0	64.5	127.0	64.9	213.0	65.6	56.0		
	760.0	93.0	64.5	127.0	64.9	213.0	65.6	56.8	71.6	66.8
SR 19	850.0	93.0	64.5	127.0	64.9	213.0	65.6	56.8	71.6	66.8
	1600.0	93.0	64.5	127.0	65.0	213.0	65.7	50.0		
	2360.0	93.0	64.5	127.0	65.0	213.0	65.7	48.0		
Trout Lake	3200.0	55.0	64.5	67.0	65.0	98.0	65.7	52.0		
	4080.0	55.0	64.5	67.0	65.0	98.0	65.7	62.5		
	5180.0	55.0	64.5	67.0	65.0	98.0	65.7	62.5		
	6100.0	55.0	64.7	67.0	65.1	98.0	65.8	62.5		
	6430.0	55.0	65.2	67.0	65.4	98.0	66.0	60.0		
	6620.0	55.0	65.7	67.0	65.8	98.0	66.2	59.8		
	7000.0	55.0	66.3	67.0	66.6	98.0	67.0	60.3		
	7100.0	55.0	66.3	67.0	66.6	98.0	67.0	60.6	73.6	68.6
Getford Rd	7190.0	55.0	66.3	67.0	66.6	98.0	67.0	60.6	73.6	68.6
	7250.0	55.0	66.4	67.0	66.6	98.0	67.1	59.6		
	7670.0	55.0	66.5	67.0	66.8	98.0	67.4	60.8		
	8280.0	55.0	66.8	67.0	67.1	98.0	67.8	59.1		
Confluence of	8680.0	55.0	66.8	67.0	67.1	98.0	67.9	60.5		
Swamps	9290.0	45.0	66.9	53.8	67.2	70.3	68.0	60.9		

Table A1 (continued)

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
	9870.0	45.0	67.0	53.8	67.3	70.3	68.1	59.7		
	10200.0	45.0	67.0	53.8	67.3	70.3	68.1	60.6		
	10450.0	45.0	67.0	53.8	67.4	70.3	68.1	58.6		
	10610.0	45.0	67.0	53.8	67.4	70.3	68.1	60.2		
	10870.0	45.0	67.0	53.8	67.4	70.3	68.1	60.1		
	11190.0	45.0	67.0	53.8	67.4	70.3	68.1	61.3		
	11390.0	45.0	67.0	53.8	67.4	70.3	68.1	61.6		
	11480.0	45.0	67.0	53.8	67.4	70.3	68.1	62.8		
	11780.0	45.0	67.1	53.8	67.4	70.3	68.2	61.6		
Hicks Ditch	11980.0	45.0	67.1	53.8	67.5	70.3	68.2	62.6		
Headwaters	12080.0	10.1	67.1	14.6	67.5	23.7	68.2	61.1		
	12130.0	10.1	67.2	14.6	67.5	23.7	68.3	61.1		
	12380.0	10.1	67.3	14.6	67.7	23.7	68.5	61.1		
Culvert to	12430.0	10.1	67.3	14.6	67.7	23.7	68.5	62.0	67.0	65.9
Eustis	12460.0	10.1	67.3	14.6	67.7	23.7	68.5	62.4	67.0	65.9
Meadows	12510.0	10.1	67.3	14.6	67.7	23.7	68.6	61.1		
	12660.0	10.1	67.3	14.6	67.8	23.7	68.6	61.1		
	12870.0	10.1	67.3	14.6	67.8	23.7	68.6	61.1		
	12920.0	10.1	67.3	14.6	67.8	23.7	68.6	64.3		
	13370.0	10.1	67.4	14.6	67.8	23.7	68.6	64.3		
Eustis	13870.0	10.1	67.4	14.6	67.8	23.7	68.6	64.4		
Meadows	14270.0	10.1	67.5	14.6	67.8	23.7	68.6	64.5		
	14930.0	10.1	67.5	14.6	67.8	23.7	68.6	64.7		
	15630.0	10.1	67.7	14.6	67.9	23.7	68.7	64.8		
	16030.0	10.1	67.7	14.6	68.0	23.7	68.7	64.8		

Table A1 (continued)

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
	16390.0	10.1	67.8	14.6	68.0	23.7	68.7	64.9		
	16790.0	10.1	67.8	14.6	68.0	23.7	68.7	65.0		
	17200.0	10.1	67.8	14.6	68.0	23.7	68.7	65.1		
	17610.0	9.7	67.8	15.9	68.1	25.9	68.7	65.2		
	18020.0	9.7	67.8	15.9	68.1	25.9	68.7	65.3		
	18420.0	9.7	67.8	15.9	68.1	25.9	68.7	65.4		
	18820.0	9.7	67.8	15.9	68.1	25.9	68.7	65.5		
	19070.0	9.7	67.9	15.9	68.1	25.9	68.7	66.6		
	19320.0	9.7	67.9	15.9	68.1	25.9	68.7	66.7		
	19820.0	9.7	67.9	15.9	68.1	25.9	68.7	66.7		
	20320.0	9.7	67.9	15.9	68.1	25.9	68.7	66.8		
	20690.0	9.7	67.9	15.9	68.2	25.9	68.7	67.0		
	21060.0	9.7	67.9	15.9	68.2	25.9	68.7	66.3		
SR 450	21190.0	9.7	67.8	15.9	68.0	25.9	68.7	66.1	72.0	69.5
	21232.0	9.7	68.1	15.9	68.3	25.9	68.6	66.0	72.0	69.5
	21382.0	9.7	68.2	15.9	68.5	25.9	69.0	67.3		
	22222.0	9.7	68.3	15.9	68.6	25.9	69.1	67.5		
	23022.0	9.7	68.4	15.9	68.7	25.9	69.1	67.7		
	23252.0	9.7	68.4	15.9	68.7	25.9	69.1	62.0		
	26052.0	9.7	68.4	15.9	68.7	25.9	69.1	62.1		
Lake	27282.0	9.7	68.4	15.9	68.7	25.9	69.1	62.1		
Umatilla	28282.0	9.7	68.4	15.9	68.7	25.9	69.1	62.1		
	29012.0	9.7	68.4	15.9	68.7	25.9	69.1	62.1		
	29392.0	9.7	68.4	15.9	68.7	25.9	69.1	62.1		
	29532.0	4.9	68.4	6.8	68.7	9.5	69.1	65.1		
	29572.0	4.9	68.4	6.8	68.7	9.5	69.1	66.0		
	29582.0	4.9	68.4	6.8	68.7	9.5	69.1	67.1	76.1	69.6
SR 19	29688.0	4.9	69.0	6.8	69.3	9.5	69.8	68.1	76.1	69.6
	29718.0	4.9	69.4	6.8	69.8	9.5	70.3	68.1		
Lake Enola	29868.0	4.9	69.4	6.8	69.8	9.5	70.3	63.0		

Table A2. Flood Discharges and Elevations--Hicks Ditch Headwaters to Loch Leven

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
	0.0	0.1	67.1	6.5	67.5	11.8	68.2	62.1		
Flapped	200.0	0.1	67.1	6.5	67.5	11.8	68.2	62.6	67.1	64.5
Culvert	230.0	0.1	67.1	6.5	67.5	11.8	68.2	62.6	67.1	64.5
	305.0	0.1	67.1	6.5	67.5	11.8	68.2	61.0		
	1905.0	0.1	67.1	6.5	67.5	11.8	68.2	60.6		
Ditch along	2399.0	0.1	67.1	6.5	67.5	11.8	68.2	60.8		
Muck Farm	2874.0	0.1	67.1	6.5	67.5	11.8	68.2	60.8		
Levee	3124.0	0.1	67.1	6.5	67.5	11.8	68.2	59.7		
	3874.0	0.1	67.1	6.5	67.5	11.8	68.2	53.2		
	4174.0	0.1	67.1	6.5	67.5	11.8	68.2	53.2		
	5124.0	0.1	67.1	6.5	67.5	11.8	68.2	60.6		
	6069.0	0.1	67.1	6.5	67.5	11.8	68.2	60.7		
	6769.0	0.1	67.1	6.5	67.5	11.8	68.2	58.4		
	7454.0	0.1	67.1	6.5	67.5	11.8	68.2	61.7		
	7784.0	0.1	67.1	6.5	67.5	11.8	68.2	60.1		
Lake	7884.0	0.1	67.1	6.5	67.5	11.8	68.2	63.0		
Serpentine	8259.0	0.1	67.1	6.5	67.5	11.8	68.2	63.0		
	8859.0	0.1	67.1	6.5	67.5	11.8	68.2	50.0		
	9359.0	43.0	67.1	65.0	67.5	108.0	68.2	50.0		
	10109.0	43.0	67.1	65.0	67.5	108.0	68.2	65.0		
	10359.0	43.0	67.1	65.0	67.5	108.0	68.2	65.5		
	10634.0	43.0	68.0	65.0	68.2	108.0	68.7	67.0		
	10759.0	43.0	68.8	65.0	69.0	108.0	69.3	68.0		
	10859.0	43.0	68.9	65.0	69.2	108.0	69.5	67.5		
	11159.0	43.0	69.2	65.0	69.4	108.0	69.8	68.0		
	11509.0	43.0	69.2	65.0	69.5	108.0	70.1	68.0		
Lake	11809.0	43.0	69.2	65.0	69.5	108.0	70.1	62.0		
Myrtle	12234.0	43.0	69.2	65.0	69.5	108.0	70.1	60.0		
	12684.0	43.0	69.2	65.0	69.5	108.0	70.1	62.0		
	12934.0	13.6	69.2	16.6	69.5	21.8	70.1	67.9		

Table A2 (continued)

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
	13059.0	13.6	69.3	16.6	69.6	21.8	70.1	68.5		
	13089.0	13.6	69.7	16.6	69.7	21.8	70.2	69.0		
	13119.0	13.6	70.7	16.6	70.8	21.8	70.9	69.0		
	13169.0	13.6	71.5	16.6	71.6	21.8	71.8	70.1		
	13359.0	13.6	72.2	16.6	72.3	21.8	72.6	70.2		
	13809.0	13.6	72.3	16.6	72.5	21.8	72.7	70.3		
	14084.0	13.6	72.4	16.6	72.5	21.8	72.8	70.8		
	14159.0	13.6	73.2	16.6	73.3	21.8	73.6	70.5		
Culvert at	14219.0	13.6	73.2	16.6	73.4	21.8	73.7	68.5	78.4	72.1
Deland Rd	14271.0	13.6	73.9	16.6	74.5	21.8	75.5	68.5	78.4	72.1
	14281.0	13.6	73.9	16.6	74.5	21.8	75.5	72.0		
	14301.0	13.6	74.0	16.6	74.6	21.8	75.6	70.0		
	14321.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
	14646.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
	15296.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Lake	15821.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Swatara	16571.0	13.6	74.0	16.6	74.6	21.8	75.6	71.5		
	16581.0	13.6	74.0	16.6	74.6	21.8	75.6	71.6	79.2	71.6
Flashboard	16635.0	13.6	80.8	16.6	81.1	21.8	81.3	71.6	79.2	71.6
Culvert	16645.0	13.6	80.8	16.6	81.1	21.8	81.3	73.5		
	16945.0	13.6	80.8	16.6	81.1	21.8	81.3	74.2		
	16955.0	13.6	80.8	16.6	81.1	21.8	81.3	74.2	82.3	74.6
Flashboard	16999.0	13.6	83.9	16.6	84.1	21.8	84.5	74.2	82.3	74.6
Culvert	17009.0	13.6	83.9	16.6	84.2	21.8	84.5	74.7		
	17384.0	13.6	83.9	16.6	84.2	21.8	84.5	82.0		
Culvert	17394.0	13.6	83.9	16.6	84.2	21.8	84.5	82.0	88.0	85.9
Between Ponds	17432.0	13.6	84.1	16.6	84.3	21.8	84.7	82.0	88.0	85.9
	17442.0	13.6	84.5	16.6	84.6	21.8	85.0	84.0		
	17742.0	13.6	86.7	16.6	86.8	21.8	86.9	85.0		
Culvert into	17752.0	13.6	86.7	16.6	86.8	21.8	86.9	85.0	91.5	89.0
Ponds	17767.0	13.6	86.8	16.6	86.9	21.8	87.1	85.0	91.5	89.0

Table A2 (continued)

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
	17777.0	13.6	86.9	16.6	87.1	21.8	87.3	85.0		
	17917.0	13.6	87.3	16.6	87.4	21.8	87.7	86.0		
Confluence	18042.0	13.6	91.0	16.6	91.0	21.8	91.2	90.0		
of Stream and	18217.0	2.4	105.6	3.5	105.6	6.5	105.8	105.0		
Road Drainage	18442.0	2.4	109.6	3.5	109.7	6.5	110.7	109.0		
	18667.0	2.4	113.6	3.5	113.7	6.5	114.1	113.0		
	18892.0	2.4	117.6	3.5	117.7	6.5	118.6	117.0		
	19117.0	2.4	121.6	3.5	121.7	6.5	122.2	121.0		
	19267.0	2.4	121.7	3.5	121.9	6.5	122.3	118.8		
	19304.5	2.4	121.8	3.5	121.9	6.5	122.3	120.1		
	19342.0	2.4	121.8	3.5	121.9	6.5	122.4	121.3		
	19379.5	2.4	123.0	3.5	123.3	6.5	123.4	122.6		
	19417.0	2.4	124.2	3.5	124.5	6.5	124.8	123.8		
Culvert at	19427.0	2.4	124.8	3.5	124.9	6.5	125.1	124.4	129.8	127.2
Bates Ave	19477.0	2.4	125.7	3.5	125.8	6.5	126.0	125.2	129.8	127.2
	19487.0	2.4	126.2	3.5	126.3	6.5	126.5	125.7		
	19577.0	2.4	127.0	3.5	127.1	6.5	128.0	126.7		
	19747.0	2.4	130.2	3.5	130.2	6.5	130.4	130.0		
	20047.0	2.4	135.2	3.5	135.2	6.5	135.7	135.0		
	20307.0	2.4	138.4	3.5	138.5	6.5	138.8	138.3		
	20357.0	2.4	139.1	3.5	139.1	6.5	139.6	138.9		
	20407.0	2.4	139.7	3.5	139.7	6.5	140.2	139.6		
	20457.0	2.4	140.3	3.5	140.4	6.5	140.8	140.2		
	20507.0	2.4	140.9	3.5	141.0	6.5	141.4	140.8		
	20557.0	2.4	141.6	3.5	141.6	6.5	142.1	141.4		
	20607.0	2.4	142.2	3.5	142.2	6.5	142.7	142.1		
	20657.0	2.4	142.8	3.5	142.9	6.5	143.3	142.7		
	20707.0	2.4	143.4	3.5	143.5	6.5	143.9	143.3		
Culvert at	20717.0	2.4	143.5	3.5	143.5	6.5	144.0	142.4	147.6	142.2
Dirt Road	20747.0	2.4	147.8	3.5	147.8	6.5	147.9	142.4	147.6	142.2
	20757.0	2.4	147.8	3.5	147.8	6.5	147.9	142.8		

Table A2 (continued)

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
	20932.0	2.4	147.8	3.5	147.8	6.5	147.9	142.5		
	21062.0	2.4	147.8	3.5	147.8	6.5	147.9	137.0		
	21172.0	2.4	147.8	3.5	147.8	6.5	147.9	145.3		
	21262.0	2.4	150.4	3.5	150.4	6.5	150.6	150.0		
	21612.0	2.4	151.7	3.5	151.7	6.5	151.9	151.3		
	21732.0	2.4	153.3	3.5	153.4	6.5	153.5	152.8		
Culvert at	21742.0	2.4	153.4	3.5	153.5	6.5	153.5	152.8	162.4	155.7
SR 44A	21822.0	2.4	154.5	3.5	154.5	6.5	154.7	153.9	162.4	155.7
	21832.0	2.4	154.7	3.5	154.8	6.5	155.0	153.5		
	21982.0	2.4	155.3	3.5	155.5	6.5	155.9	153.7		
	22232.0	2.4	155.8	3.5	156.0	6.5	156.6	154.1		
	22557.0	2.4	156.1	3.5	156.4	6.5	157.0	154.5		
	22832.0	2.4	156.4	3.5	156.7	6.5	157.3	155.0		
	23082.0	2.4	156.5	3.5	156.8	6.5	157.4	154.5		
Lake	23382.0	2.4	156.5	3.5	156.8	6.5	157.4	150.0		
Joanna	24332.0	10.6	156.5	12.7	156.8	16.2	157.4	145.0		
	24832.0	10.6	156.5	12.7	156.8	16.2	157.4	145.0		
	25132.0	10.6	156.5	12.7	156.8	16.2	157.4	150.0		
	25192.0	10.6	156.5	12.7	156.8	16.2	157.4	150.0		
	25352.0	10.6	156.5	12.7	156.8	16.2	157.4	150.0		
Private	25382.0	10.6	156.5	12.7	156.8	16.2	157.4	153.7	161.5	160.0
Culvert	25532.0	10.6	159.7	12.7	161.5	16.2	161.6	158.4	161.5	159.7
	25542.0	10.6	160.1	12.7	161.5	16.2	161.7	158.4		
	26212.0	10.6	161.9	12.7	161.8	16.2	162.1	160.4		
	26262.0	10.6	162.0	12.7	162.1	16.2	162.3	159.1		
Culvert at	26272.0	10.6	162.1	12.7	162.1	16.2	162.3	159.7	167.0	162.1
Lk Joanna Dr	26335.0	10.6	163.0	12.7	163.1	16.2	164.3	162.0	167.0	162.1
	26385.0	10.6	163.6	12.7	163.8	16.2	164.5	160.7		

Table A2 (continued)

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
	27085.0	10.6	163.8	12.7	164.0	16.2	164.7	161.2		
	27165.0	10.6	163.8	12.7	164.0	16.2	164.7	161.8		
Culvert at	27175.0	10.6	163.8	12.7	164.0	16.2	164.7	161.5	167.6	164.2
SR 44B	27237.0	10.6	163.9	12.7	164.0	16.2	165.0	161.7	167.6	164.2
	27242.0	10.6	164.0	12.7	164.2	16.2	165.1	161.7		
	27317.0	10.6	164.0	12.7	164.2	16.2	165.1	161.0		
	27667.0	2.6	164.0	6.2	164.2	13.6	165.1	161.0		
	28257.0	2.6	164.0	6.2	164.2	13.6	165.1	161.0		
	28647.0	2.6	164.0	6.2	164.2	13.6	165.1	162.9		
	29187.0	2.6	164.3	6.2	164.6	13.6	165.2	163.2		
Loch	29657.0	2.6	164.3	6.2	164.6	13.6	165.2	163.5		
Leven	30137.0	2.6	164.3	6.2	164.6	13.6	165.2	158.6		

Table A3. Flood Discharges and Elevations--Minor Tributaries

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
	0.0	1.1	66.8	2.1	67.1	3.5	67.9	60.5		
Marsh	190.0	1.1	66.8	2.1	67.1	3.5	67.9	65.0		
West of	1030.0	1.1	67.2	2.1	67.5	3.5	68.0	65.0		
Hicks Ditch	2190.0	1.1	67.4	2.1	67.7	3.5	68.2	65.0		
	2890.0	1.1	67.4	2.1	67.7	3.5	68.2	64.5		
Marsh	0.0	19.0	66.8	27.0	67.1	45.0	67.9	60.5		
East of	510.0	19.0	67.5	27.0	68.1	45.0	69.1	63.5		
Hicks Ditch	610.0	19.0	67.9	27.0	68.4	45.0	69.3	63.5		
	810.0	19.0	68.0	27.0	68.4	45.0	69.3	65.0		
	1260.0	19.0	68.0	27.0	68.4	45.0	69.3	65.0		
	1760.0	19.0	68.0	27.0	68.4	45.0	69.3	64.4		
	2460.0	19.0	68.0	27.0	68.4	45.0	69.3	65.5		
	3060.0	3.9	68.0	10.7	68.4	31.1	69.3	67.1		
	3260.0	3.9	68.7	10.7	68.9	31.1	69.4	68.5		
	3460.0	3.9	70.0	10.7	70.5	31.1	70.6	70.0		
	3590.0	3.9	71.9	10.7	72.0	31.1	72.4	71.8		
	3710.0	3.9	72.6	10.7	73.1	31.1	73.3	72.5		
	3830.0	3.9	73.6	10.7	73.9	31.1	74.2	73.5		
	3970.0	3.9	74.8	10.7	75.2	31.1	75.4	74.8		
	4360.0	3.9	76.4	10.7	77.1	31.1	77.6	76.3		
	4710.0	3.9	76.5	10.7	77.2	31.1	77.6	75.5		
	4980.0	4.7	76.5	14.9	77.2	36.3	77.7	75.8		
	5100.0	4.7	77.2	14.9	77.5	36.3	78.0	76.5		
	5170.0	4.7	78.0	14.9	78.2	36.3	78.4	77.8		
Clear Lake	5270.0	4.7	78.2	14.9	78.5	36.3	78.8	77.8		
	5380.0	4.7	78.2	14.9	78.5	36.3	78.8	75.0		
	5750.0	4.7	78.2	14.9	78.5	36.3	78.8	72.0		

Table A3 (continued)

Location Description	Channel Length	10 yr Discharge	10 yr Elevation	25 yr Discharge	25 yr Elevation	100 yr Discharge	100 yr Elevation	Channel Invert	Top of Road	Low Chord
	ft	cfs	ft NGVD	cfs	ft NGVD	cfs	ft NGVD	ft NGVD	ft NGVD	ft NGVD
Tributary	0.0	4.5	67.5	6.2	67.8	19.0	68.6	64.5		
From	370.0	4.5	67.5	6.2	67.8	19.0	68.6	66.0		
Lake Bracy	480.0	4.5	67.5	6.2	67.8	19.0	68.6	67.2		
	520.0	4.5	67.5	6.2	68.0	19.0	68.7	67.3		
	560.0	4.5	67.6	6.2	68.2	19.0	68.7	67.5		
	595.0	4.5	67.8	6.2	68.3	19.0	68.8	67.7		
	630.0	4.5	68.0	6.2	68.6	19.0	69.0	67.8		
	700.0	4.5	68.8	6.2	69.2	19.0	69.8	68.6		
	880.0	4.5	68.9	6.2	69.2	19.0	69.9	68.0		
	1280.0	4.5	68.9	6.2	69.2	19.0	69.9	60.0		
Tributary	0.0	2.4	67.9	3.9	68.1	6.7	68.7	66.8		
From	950.0	2.4	67.9	3.9	68.1	6.7	68.7	66.7		
Lakes	1060.0	2.4	67.9	3.9	68.1	6.7	68.7	67.1		
Whitcomb	1220.0	2.4	67.9	3.9	68.2	6.7	68.7	66.6		
and	1280.0	2.4	67.9	3.9	68.1	6.7	68.7	66.2	72.6	69.7
Blanchester	1322.0	2.4	68.0	3.9	68.2	6.7	68.7	66.2	72.6	69.7
	1672.0	2.4	68.0	3.9	68.3	6.7	68.8	66.8		
	2192.0	2.4	68.0	3.9	68.3	6.7	68.8	67.0		
	2652.0	2.4	68.0	3.9	68.3	6.7	68.8	67.2		
	3002.0	2.4	68.0	3.9	68.3	6.7	68.8	60.0		
	3222.0	1.7	68.0	2.8	68.3	4.6	68.8	67.2		
	3282.0	1.7	68.0	2.8	68.3	4.6	68.8	65.8	70.0	66.8
	3306.0	1.7	68.1	2.8	68.6	4.6	69.3	65.8	70.0	66.8
	3506.0	1.7	68.2	2.8	68.6	4.6	69.3	66.5		
	4706.0	1.7	68.2	2.8	68.6	4.6	69.3	55.0		

Appendix B

FLOOD DISCHARGES AND ELEVATIONS IN HICKS DITCH BASIN

(Siltation of Hicks Ditch, Case A: Hicks Ditch silted up to 62.50 ft NGVD)

Table B1. Flood Discharges and Elevations--Lake Eustis to Lake Enola with Hicks Ditch Silted Up to 62.5 ft NGVD

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Lake Eustis	0.0	91.0	64.3	124.0	64.6	208.0	65.0	50.0		
Railroad	100.0	91.0	64.3	124.0	64.6	208.0	65.0	59.8		
Trestle	120.0	91.0	64.3	124.0	64.6	208.0	65.0	59.8	65.7	63.9
	130.0	91.0	64.3	124.0	64.6	208.0	65.1	58.7	65.7	63.9
North Shore	140.0	91.0	64.3	124.0	64.6	208.0	65.0	58.7		
Drive	180.0	91.0	64.3	124.0	64.6	208.0	65.0	58.7	71.3	66.9
	240.0	91.0	64.3	124.0	64.7	208.0	65.2	56.0	71.3	66.9
	710.0	91.0	64.5	124.0	64.9	208.0	65.6	56.0		
	760.0	91.0	64.5	124.0	64.9	208.0	65.5	56.8		
SR 19	850.0	91.0	64.5	124.0	64.9	208.0	65.6	56.8	71.6	66.8
	1600.0	91.0	64.5	124.0	64.9	208.0	65.7	50.0	71.6	66.8
	2360.0	91.0	64.5	124.0	64.9	208.0	65.7	48.0		
Trout Lake	3200.0	50.0	64.5	61.0	64.9	83.0	65.7	52.0		
	4080.0	50.0	64.5	61.0	64.9	83.0	65.7	62.5		
	5180.0	50.0	64.5	61.0	64.9	83.0	65.7	62.5		
	6100.0	50.0	64.6	61.0	65.0	83.0	65.7	62.5		
	6430.0	50.0	65.2	61.0	65.3	83.0	65.8	62.5		
	6620.0	50.0	65.8	61.0	65.9	83.0	66.2	62.5		
	7000.0	50.0	66.6	61.0	66.8	83.0	67.1	62.5		
	7100.0	50.0	66.6	61.0	66.8	83.0	67.1	62.5		
Getford Rd	7190.0	50.0	66.6	61.0	66.8	83.0	67.1	62.5	73.6	68.6
	7250.0	50.0	66.6	61.0	66.8	83.0	67.2	62.5	73.6	68.6
	7670.0	50.0	66.9	61.0	67.2	83.0	67.6	62.5		
	8280.0	50.0	67.2	61.0	67.5	83.0	68.1	62.5		
Confluence of	8680.0	50.0	67.3	61.0	67.6	83.0	68.2	62.5		
Swamps	9290.0	38.4	67.4	44.5	67.7	60.4	68.3	62.5		

Table B1 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	9870.0	38.4	67.4	44.5	67.8	60.4	68.4	62.5		
	10200.0	38.4	67.5	44.5	67.8	60.4	68.4	62.5		
	10450.0	38.4	67.5	44.5	67.8	60.4	68.4	62.5		
	10610.0	38.4	67.5	44.5	67.8	60.4	68.4	62.5		
	10870.0	38.4	67.5	44.5	67.8	60.4	68.4	62.5		
	11190.0	38.4	67.5	44.5	67.8	60.4	68.4	62.5		
	11390.0	38.4	67.5	44.5	67.8	60.4	68.4	62.5		
	11480.0	38.4	67.5	44.5	67.8	60.4	68.4	62.8		
	11780.0	38.4	67.5	44.5	67.8	60.4	68.5	62.5		
Hicks Ditch	11980.0	38.4	67.5	44.5	67.9	60.4	68.5	62.6		
Headwater	12080.0	6.3	67.6	10.8	67.9	17.1	68.5	61.1		
	12130.0	6.3	67.6	10.8	67.9	17.1	68.5	61.1		
	12380.0	6.3	67.6	10.8	68.0	17.1	68.6	61.1		
Culvert to	12430.0	6.3	67.6	10.8	68.0	17.1	68.6	62.0		
Eustis	12460.0	6.3	67.6	10.8	68.0	17.1	68.6	62.4	67.0	65.9
Meadows	12510.0	6.3	67.6	10.8	68.0	17.1	68.6	61.1	67.0	65.9
	12660.0	6.3	67.6	10.8	68.0	17.1	68.7	61.1		
	12870.0	6.3	67.6	10.8	68.0	17.1	68.7	61.1		
	12920.0	6.3	67.6	10.8	68.0	17.1	68.7	64.3		
	13370.0	6.3	67.6	10.8	68.0	17.1	68.7	64.3		
Eustis	13870.0	6.3	67.6	10.8	68.0	17.1	68.7	64.4		
Meadows	14270.0	6.3	67.6	10.8	68.0	17.1	68.7	64.5		
	14930.0	6.3	67.6	10.8	68.0	17.1	68.7	64.7		
	15630.0	6.3	67.7	10.8	68.1	17.1	68.7	64.8		
	16030.0	6.3	67.7	10.8	68.1	17.1	68.7	64.8		
	16390.0	6.3	67.7	10.8	68.1	17.1	68.7	64.9		
	16790.0	6.3	67.7	10.8	68.1	17.1	68.7	65.0		

Table B1 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	17200.0	6.3	67.7	10.8	68.1	17.1	68.7	65.1		
	17610.0	9.5	67.8	13.8	68.1	21.2	68.7	65.2		
	18020.0	9.5	67.8	13.8	68.1	21.2	68.7	65.3		
	18420.0	9.5	67.8	13.8	68.1	21.2	68.7	65.4		
	18820.0	9.5	67.8	13.8	68.1	21.2	68.7	65.5		
	19070.0	9.5	67.8	13.8	68.1	21.2	68.7	66.6		
	19320.0	9.5	67.8	13.8	68.1	21.2	68.7	66.7		
	19820.0	9.5	67.8	13.8	68.2	21.2	68.7	66.7		
	20320.0	9.5	67.9	13.8	68.2	21.2	68.7	66.8		
	20690.0	9.5	67.9	13.8	68.2	21.2	68.7	67.0		
	21060.0	9.5	67.9	13.8	68.2	21.2	68.7	66.3		
SR 450	21190.0	9.5	67.7	13.8	68.1	21.2	68.7	66.1		
	21232.0	9.5	68.1	13.8	68.2	21.2	68.7	66.0	72.1	69.5
	21382.0	9.5	68.2	13.8	68.4	21.2	68.9	67.3	72.1	69.5
	22222.0	9.5	68.3	13.8	68.5	21.2	69.0	67.5		
	23022.0	9.5	68.4	13.8	68.6	21.2	69.0	67.7		
	23252.0	9.5	68.4	13.8	68.6	21.2	69.0	62.0		
	26052.0	9.5	68.4	13.8	68.6	21.2	69.0	62.1		
Lake	27282.0	9.5	68.4	13.8	68.6	21.2	69.0	62.1		
Umatilla	28282.0	9.5	68.4	13.8	68.6	21.2	69.0	62.1		
	29012.0	9.5	68.4	13.8	68.6	21.2	69.0	62.1		
	29392.0	9.5	68.4	13.8	68.6	21.2	69.0	62.1		
	29532.0	4.9	68.4	6.8	68.6	9.5	69.0	65.1		
	29572.0	4.9	68.4	6.8	68.6	9.5	69.0	66.0		
	29582.0	4.9	68.4	6.8	68.6	9.5	69.0	67.1		
SR 19	29688.0	4.9	69.0	6.8	69.3	9.5	69.8	68.1	76.1	69.6
	29718.0	4.9	69.5	6.8	69.7	9.5	70.4	68.1	76.1	69.6
Lake Enola	29868.0	4.9	69.5	6.8	69.7	9.5	70.4	63.0		

Table B2. Flood Discharges and Elevations--Hicks Ditch Headwaters to Lake Swatara with Hicks Ditch Silted Up to 62.5 ft NGVD

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	0.0	0.1	67.5	2.2	67.9	9.5	68.5	62.1		
Flapped	200.0	0.1	67.5	2.2	67.9	9.5	68.5	62.6		
Culvert	230.0	0.1	67.5	2.2	67.9	9.5	68.5	62.6	67.1	64.5
	305.0	0.1	67.5	2.2	67.9	9.5	68.5	61.0	67.1	64.5
	1905.0	0.1	67.5	2.2	67.9	9.5	68.5	60.6		
Ditch along	2399.0	0.1	67.5	2.2	67.9	9.5	68.5	60.8		
Muck Farm	2874.0	0.1	67.5	2.2	67.9	9.5	68.5	60.8		
Levee	3124.0	0.1	67.5	2.2	67.9	9.5	68.5	59.7		
	3874.0	0.1	67.5	2.2	67.9	9.5	68.5	53.2		
	4174.0	0.1	67.5	2.2	67.9	9.5	68.5	53.2		
	5124.0	0.1	67.5	2.2	67.9	9.5	68.5	60.6		
	6069.0	0.1	67.5	2.2	67.9	9.5	68.5	60.7		
	6769.0	0.1	67.5	2.2	67.9	9.5	68.5	58.4		
	7454.0	0.1	67.5	2.2	67.9	9.5	68.5	61.7		
	7784.0	0.1	67.5	2.2	67.9	9.5	68.5	60.1		
Lake	7884.0	0.1	67.5	2.2	67.9	9.5	68.5	63.0		
Serpentine	8259.0	0.1	67.5	2.2	67.9	9.5	68.5	63.0		
	8859.0	0.1	67.5	2.2	67.9	9.5	68.5	50.0		
	9359.0	41.0	67.5	64.0	67.9	109.0	68.5	50.0		
	10109.0	41.0	67.5	64.0	67.9	109.0	68.5	65.0		
	10359.0	41.0	67.6	64.0	67.9	109.0	68.5	65.5		
	10634.0	41.0	67.9	64.0	68.3	109.0	68.9	67.0		
	10759.0	41.0	68.8	64.0	69.0	109.0	69.3	68.0		
	10859.0	41.0	68.9	64.0	69.2	109.0	69.6	67.5		
	11159.0	41.0	69.1	64.0	69.4	109.0	69.9	68.0		

Table B2 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	11509.0	41.0	69.3	64.0	69.6	109.0	70.1	68.0		
Lake	11809.0	41.0	69.3	64.0	69.6	109.0	70.1	62.0		
Myrtle	12234.0	41.0	69.3	64.0	69.6	109.0	70.1	60.0		
	12684.0	41.0	69.3	64.0	69.6	109.0	70.1	62.0		
	12934.0	13.6	69.3	16.6	69.6	21.8	70.1	67.9		
	13059.0	13.6	69.3	16.6	69.6	21.8	70.1	68.5		
	13089.0	13.6	69.7	16.6	69.8	21.8	70.2	69.0		
	13119.0	13.6	70.6	16.6	70.8	21.8	70.9	69.0		
	13169.0	13.6	71.5	16.6	71.6	21.8	71.8	70.1		
	13359.0	13.6	72.2	16.6	72.3	21.8	72.6	70.2		
	13809.0	13.6	72.3	16.6	72.5	21.8	72.7	70.3		
	14084.0	13.6	72.4	16.6	72.5	21.8	72.8	70.8		
	14159.0	13.6	73.2	16.6	73.3	21.8	73.6	70.5		
Culvert at	14219.0	13.6	73.2	16.6	73.4	21.8	73.7	68.5		
Deland Rd	14271.0	13.6	73.9	16.6	74.5	21.8	75.5	68.5	78.4	72.1
	14281.0	13.6	73.9	16.6	74.5	21.8	75.5	72.0	78.4	72.1
	14301.0	13.6	74.0	16.6	74.6	21.8	75.6	70.0		
	14321.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
	14646.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Lake	15296.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Swatara	15821.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		

Table B3. Flood Discharges and Elevations--Minor Tributaries with Hicks Ditch Silted Up to 62.5 ft NGVD

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	0.0	0.8	67.3	1.4	67.6	2.3	68.2	60.5		
Marsh	190.0	0.8	67.3	1.4	67.6	2.3	68.2	65.0		
West of	1030.0	0.8	67.3	1.4	67.7	2.3	68.2	65.0		
Hicks Ditch	1190.0	0.8	67.4	1.4	67.8	2.3	68.3	65.0		
	1890.0	0.8	67.4	1.4	67.8	2.3	68.3	64.5		
Marsh	0.0	18.0	67.3	25.0	67.6	42.0	68.2	60.5		
East of	510.0	18.0	67.7	25.0	68.2	42.0	69.1	63.5		
Hicks Ditch	610.0	18.0	68.0	25.0	68.5	42.0	69.4	63.5		
	810.0	18.0	68.0	25.0	68.5	42.0	69.4	65.0		
	1260.0	18.0	68.0	25.0	68.5	42.0	69.4	65.0		
	1760.0	18.0	68.0	25.0	68.5	42.0	69.4	64.4		
	2460.0	18.0	68.1	25.0	68.5	42.0	69.4	65.5		
	3060.0	3.9	68.1	10.7	68.5	31.1	69.4	67.1		
	3260.0	3.9	68.7	10.7	68.8	31.1	69.5	68.5		
	3460.0	3.9	70.0	10.7	70.6	31.1	70.5	70.0		
	3590.0	3.9	71.9	10.7	72.0	31.1	72.5	71.8		
	3710.0	3.9	72.6	10.7	73.1	31.1	73.3	72.5		
	3830.0	3.9	73.6	10.7	73.9	31.1	74.2	73.5		
	3970.0	3.9	74.8	10.7	75.2	31.1	75.4	74.8		
	4360.0	3.9	76.4	10.7	77.1	31.1	77.6	76.3		
	4710.0	3.9	76.5	10.7	77.2	31.1	77.6	75.5		
	4980.0	4.7	76.5	14.9	77.2	36.3	77.7	75.8		
	5100.0	4.7	77.2	14.9	77.5	36.3	78.0	76.5		
	5170.0	4.7	78.0	14.9	78.2	36.3	78.4	77.8		
Clear Lake	5270.0	4.7	78.3	14.9	78.5	36.3	78.8	77.8		
	5380.0	4.7	78.3	14.9	78.5	36.3	78.8	75.0		
	5750.0	4.7	78.3	14.9	78.5	36.3	78.8	72.0		

Table B3 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Tributary	0.0	1.1	67.6	4.6	68.0	19.0	68.7	64.5		
From	370.0	1.1	67.6	4.6	68.0	19.0	68.7	66.0		
Lake Bracy	480.0	1.1	67.6	4.6	68.0	19.0	68.7	67.2		
	520.0	1.1	67.7	4.6	68.1	19.0	68.7	67.3		
	560.0	1.1	67.9	4.6	68.2	19.0	68.8	67.5		
	595.0	1.1	68.0	4.6	68.3	19.0	68.8	67.7		
	630.0	1.1	68.3	4.6	68.6	19.0	69.0	67.8		
	700.0	1.1	68.7	4.6	69.3	19.0	69.8	68.6		
	880.0	1.1	68.7	4.6	69.3	19.0	69.9	68.0		
	1280.0	1.1	68.7	4.6	69.3	19.0	69.9	60.0		
Tributary	0.0	2.4	67.9	3.5	68.2	5.6	68.7	66.8		
From	950.0	2.4	67.9	3.5	68.2	5.6	68.7	66.7		
Lakes	1060.0	2.4	67.9	3.5	68.2	5.6	68.7	67.1		
Whitcomb	1220.0	2.4	67.9	3.5	68.2	5.6	68.7	66.6		
and	1280.0	2.4	67.9	3.5	68.2	5.6	68.7	66.2		
Blanchester	1322.0	2.4	68.0	3.5	68.2	5.6	68.7	66.2	72.7	69.7
	1672.0	2.4	68.1	3.5	68.3	5.6	68.8	66.8	72.7	69.7
	2192.0	2.4	68.1	3.5	68.3	5.6	68.8	67.0		
	2652.0	2.4	68.1	3.5	68.3	5.6	68.8	67.2		
	3002.0	2.4	68.1	3.5	68.3	5.6	68.8	60.0		
	3222.0	1.7	68.1	2.6	68.3	4.0	68.8	67.2		
	3282.0	1.7	68.1	2.6	68.3	4.0	68.8	65.8		
	3306.0	1.7	68.2	2.6	68.5	4.0	69.4	65.8	70.0	66.8
	3506.0	1.7	68.2	2.6	68.5	4.0	69.4	66.5	70.0	66.8
	4706.0	1.7	68.2	2.6	68.5	4.0	69.4	55.0		

Appendix C

FLOOD DISCHARGES AND ELEVATIONS IN HICKS DITCH BASIN

(Siltation of Hicks Ditch, Case B:
Hicks Ditch silted up to 62.50 ft NGVD and
the Getford Road culvert silted up to 64.60 ft NGVD)

Table C1. Flood Discharges and Elevations--Lake Eustis to Lake Enola with Hicks Ditch Silted Up to 62.5 ft and Getford Rd Culvert Silted Up to 64.6 ft NGVD

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Lake Eustis	0.0	91.0	64.3	124.0	64.6	208.0	65.0	50.0		
Railroad	100.0	91.0	64.3	124.0	64.6	208.0	65.0	59.8	65.7	63.9
Trestle	120.0	91.0	64.3	124.0	64.6	208.0	65.0	59.8	65.7	63.9
	130.0	91.0	64.3	124.0	64.6	208.0	65.1	58.7		
North Shore	140.0	91.0	64.3	124.0	64.6	208.0	65.0	58.7	71.3	66.9
Drive	180.0	91.0	64.3	124.0	64.6	208.0	65.0	58.7	71.3	66.9
	240.0	91.0	64.3	124.0	64.7	208.0	65.2	56.0		
	710.0	91.0	64.5	124.0	64.9	208.0	65.6	56.0		
	760.0	91.0	64.5	124.0	64.9	208.0	65.5	56.8	71.6	66.8
SR 19	850.0	91.0	64.5	124.0	64.9	208.0	65.6	56.8	71.6	66.8
	1600.0	91.0	64.5	124.0	64.9	208.0	65.7	50.0		
	2360.0	91.0	64.5	124.0	64.9	208.0	65.7	48.0		
Trout Lake	3200.0	49.0	64.5	60.0	64.9	83.0	65.7	52.0		
	4080.0	49.0	64.5	60.0	64.9	83.0	65.7	62.5		
	5180.0	49.0	64.5	60.0	64.9	83.0	65.7	62.5		
	6100.0	49.0	64.6	60.0	65.0	83.0	65.7	62.5		
	6430.0	49.0	65.2	60.0	65.3	83.0	65.8	62.5		
	6620.0	49.0	65.7	60.0	65.9	83.0	66.2	62.5		
	7000.0	49.0	66.6	60.0	66.8	83.0	67.1	62.5		
	7100.0	49.0	66.6	60.0	66.8	83.0	67.1	64.6	73.6	68.6
Getford Rd	7190.0	49.0	66.6	60.0	66.8	83.0	67.1	64.6	73.6	68.6
	7250.0	49.0	66.8	60.0	67.0	83.0	67.4	62.5		
	7670.0	49.0	67.0	60.0	67.3	83.0	67.8	62.5		
	8280.0	49.0	67.3	60.0	67.6	83.0	68.2	62.5		
Confluence of	8680.0	49.0	67.3	60.0	67.7	83.0	68.3	62.5		
Swamps	9290.0	36.9	67.4	43.8	67.8	60.0	68.4	62.5		

Table C1 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	9870.0	36.9	67.5	43.8	67.8	60.0	68.5	62.5		
	10200.0	36.9	67.5	43.8	67.9	60.0	68.5	62.5		
	10450.0	36.9	67.5	43.8	67.9	60.0	68.5	62.5		
	10610.0	36.9	67.5	43.8	67.9	60.0	68.5	62.5		
	10870.0	36.9	67.5	43.8	67.9	60.0	68.5	62.5		
	11190.0	36.9	67.5	43.8	67.9	60.0	68.5	62.5		
	11390.0	36.9	67.5	43.8	67.9	60.0	68.5	62.5		
	11480.0	36.9	67.5	43.8	67.9	60.0	68.5	62.8		
	11780.0	36.9	67.6	43.8	67.9	60.0	68.6	62.5		
Hicks Ditch	11980.0	36.9	67.6	43.8	67.9	60.0	68.6	62.6		
Headwaters	12080.0	5.0	67.6	9.6	68.0	16.4	68.6	61.1		
	12130.0	5.0	67.6	9.6	68.0	16.4	68.6	61.1		
	12380.0	5.0	67.6	9.6	68.0	16.4	68.7	61.1		
Culvert to	12430.0	5.0	67.6	9.6	68.0	16.4	68.7	62.0	67.0	65.9
Eustis	12460.0	5.0	67.6	9.6	68.0	16.4	68.7	62.4	67.0	65.9
Meadows	12510.0	5.0	67.6	9.6	68.0	16.4	68.7	61.1		
	12660.0	5.0	67.6	9.6	68.0	16.4	68.7	61.1		
	12870.0	5.0	67.6	9.6	68.0	16.4	68.7	61.1		
	12920.0	5.0	67.6	9.6	68.0	16.4	68.7	64.3		
	13370.0	5.0	67.6	9.6	68.0	16.4	68.7	64.3		
Eustis	13870.0	5.0	67.6	9.6	68.0	16.4	68.7	64.4		
Meadows	14270.0	5.0	67.6	9.6	68.0	16.4	68.7	64.5		
	14930.0	5.0	67.6	9.6	68.0	16.4	68.8	64.7		
	15630.0	5.0	67.7	9.6	68.1	16.4	68.8	64.8		
	16030.0	5.0	67.7	9.6	68.1	16.4	68.8	64.8		

Table C1 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	16390.0	5.0	67.7	9.6	68.1	16.4	68.8	64.9		
	16790.0	5.0	67.7	9.6	68.1	16.4	68.8	65.0		
	17200.0	5.0	67.7	9.6	68.1	16.4	68.8	65.1		
	17610.0	9.6	67.7	13.4	68.1	19.7	68.8	65.2		
	18020.0	9.6	67.7	13.4	68.1	19.7	68.8	65.3		
	18420.0	9.6	67.8	13.4	68.1	19.7	68.8	65.4		
	18820.0	9.6	67.8	13.4	68.1	19.7	68.8	65.5		
	19070.0	9.6	67.8	13.4	68.1	19.7	68.8	66.6		
	19320.0	9.6	67.8	13.4	68.1	19.7	68.8	66.7		
	19820.0	9.6	67.8	13.4	68.2	19.7	68.8	66.7		
	20320.0	9.6	67.8	13.4	68.2	19.7	68.8	66.8		
	20690.0	9.6	67.9	13.4	68.2	19.7	68.8	67.0		
	21060.0	9.6	67.9	13.4	68.2	19.7	68.8	66.3		
SR 450	21190.0	9.6	67.7	13.4	68.1	19.7	68.8	66.1	72.1	69.5
	21232.0	9.6	68.1	13.4	68.2	19.7	68.7	66.0	72.1	69.5
	21382.0	9.6	68.2	13.4	68.4	19.7	68.9	67.3		
	22222.0	9.6	68.3	13.4	68.5	19.7	69.0	67.5		
	23022.0	9.6	68.4	13.4	68.6	19.7	69.0	67.7		
	23252.0	9.6	68.4	13.4	68.6	19.7	69.0	62.0		
	26052.0	9.6	68.4	13.4	68.6	19.7	69.0	62.1		
Lake	27282.0	9.6	68.4	13.4	68.6	19.7	69.0	62.1		
Umatilla	28282.0	9.6	68.4	13.4	68.6	19.7	69.0	62.1		
	29012.0	9.6	68.4	13.4	68.6	19.7	69.0	62.1		
	29392.0	9.6	68.4	13.4	68.6	19.7	69.0	62.1		
	29532.0	4.9	68.4	6.8	68.6	9.5	69.0	65.1		
	29572.0	4.9	68.4	6.8	68.6	9.5	69.0	66.0		
	29582.0	4.9	68.4	6.8	68.6	9.5	69.0	67.1	76.1	69.6
SR 19	29688.0	4.9	69.0	6.8	69.3	9.5	69.8	68.1	76.1	69.6
	29718.0	4.9	69.5	6.8	69.7	9.5	70.4	68.1		
Lake Enola	29868.0	4.9	69.5	6.8	69.7	9.5	70.4	63.0		

Table C2. Flood Discharges and Elevations--Hicks Ditch Headwaters to Lake Swatara with Hicks Ditch Silted Up to 62.5 ft and Getford Rd Culvert Silted Up to 64.6 ft NGVD

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	0.0	0.1	67.6	3.1	67.9	9.9	68.6	62.1		
Flapped	200.0	0.1	67.6	3.1	67.9	9.9	68.6	62.6	67.1	64.6
Culvert	230.0	0.1	67.6	3.1	67.9	9.9	68.6	62.6	67.1	64.6
	305.0	0.1	67.6	3.1	67.9	9.9	68.6	61.0		
	1905.0	0.1	67.6	3.1	67.9	9.9	68.6	60.6		
Ditch along	2399.0	0.1	67.6	3.1	67.9	9.9	68.6	60.8		
Muck Farm	2874.0	0.1	67.6	3.1	67.9	9.9	68.6	60.8		
Levee	3124.0	0.1	67.6	3.1	67.9	9.9	68.6	59.7		
	3874.0	0.1	67.6	3.1	67.9	9.9	68.6	53.2		
	4174.0	0.1	67.6	3.1	67.9	9.9	68.6	53.2		
	5124.0	0.1	67.6	3.1	67.9	9.9	68.6	60.6		
	6069.0	0.1	67.6	3.1	67.9	9.9	68.6	60.7		
	6769.0	0.1	67.6	3.1	67.9	9.9	68.6	58.4		
	7454.0	0.1	67.6	3.1	67.9	9.9	68.6	61.7		
	7784.0	0.1	67.6	3.1	67.9	9.9	68.6	60.1		
Lake	7884.0	0.1	67.6	3.1	67.9	9.9	68.6	63.0		
Serpentine	8259.0	0.1	67.6	3.1	67.9	9.9	68.6	63.0		
	8859.0	0.1	67.6	3.1	67.9	9.9	68.6	50.0		
	9359.0	41.0	67.6	64.0	67.9	109.0	68.6	50.0		
	10109.0	41.0	67.6	64.0	67.9	109.0	68.6	65.0		
	10359.0	41.0	67.6	64.0	68.0	109.0	68.6	65.5		
	10634.0	41.0	67.9	64.0	68.3	109.0	68.9	67.0		
	10759.0	41.0	68.8	64.0	69.0	109.0	69.3	68.0		
	10859.0	41.0	68.9	64.0	69.2	109.0	69.6	67.5		
	11159.0	41.0	69.1	64.0	69.4	109.0	69.9	68.0		

Table C2 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	11509.0	41.0	69.3	64.0	69.6	109.0	70.1	68.0		
Lake	11809.0	41.0	69.3	64.0	69.6	109.0	70.1	62.0		
Myrtle	12234.0	41.0	69.3	64.0	69.6	109.0	70.1	60.0		
	12684.0	41.0	69.3	64.0	69.6	109.0	70.1	62.0		
	12934.0	13.6	69.3	16.6	69.6	21.8	70.1	67.9		
	13059.0	13.6	69.3	16.6	69.6	21.8	70.1	68.5		
	13089.0	13.6	69.7	16.6	69.8	21.8	70.2	69.0		
	13119.0	13.6	70.6	16.6	70.8	21.8	70.9	69.0		
	13169.0	13.6	71.5	16.6	71.6	21.8	71.8	70.1		
	13359.0	13.6	72.2	16.6	72.3	21.8	72.6	70.2		
	13809.0	13.6	72.3	16.6	72.5	21.8	72.7	70.3		
	14084.0	13.6	72.4	16.6	72.5	21.8	72.8	70.8		
	14159.0	13.6	73.2	16.6	73.3	21.8	73.6	70.5		
Culvert at	14219.0	13.6	73.2	16.6	73.4	21.8	73.7	68.5	78.4	72.2
Deland Rd	14271.0	13.6	73.9	16.6	74.5	21.8	75.5	68.5	78.4	72.2
	14281.0	13.6	73.9	16.6	74.5	21.8	75.5	72.0		
	14301.0	13.6	74.0	16.6	74.6	21.8	75.6	70.0		
	14321.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
	14646.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Lake	15296.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Swatara	15821.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		

Table C3. Flood Discharges and Elevations--Minor Tributaries with Hicks Ditch Silted Up to 62.5 ft and Getford Rd Culvert Silted Up to 64.6 ft NGVD

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	0.0	0.7	67.3	1.3	67.7	2.3	68.3	60.5		
Marsh	190.0	0.7	67.3	1.3	67.7	2.3	68.3	65.0		
West of	1030.0	0.7	67.4	1.3	67.7	2.3	68.3	65.0		
Hicks Ditch	1190.0	0.7	67.5	1.3	67.8	2.3	68.4	65.0		
	1890.0	0.7	67.5	1.3	67.8	2.3	68.4	64.5		
Marsh	0.0	17.0	67.3	24.0	67.7	41.0	68.3	60.5		
East of	510.0	17.0	67.7	24.0	68.2	41.0	69.1	63.5		
Hicks Ditch	610.0	17.0	68.0	24.0	68.5	41.0	69.4	63.5		
	810.0	17.0	68.0	24.0	68.5	41.0	69.4	65.0		
	1260.0	17.0	68.0	24.0	68.5	41.0	69.4	65.0		
	1760.0	17.0	68.0	24.0	68.5	41.0	69.4	64.4		
	2460.0	17.0	68.0	24.0	68.5	41.0	69.4	65.5		
	3060.0	3.9	68.1	10.7	68.5	31.1	69.4	67.1		
	3260.0	3.9	68.7	10.7	68.8	31.1	69.5	68.5		
	3460.0	3.9	70.0	10.7	70.6	31.1	70.5	70.0		
	3590.0	3.9	71.9	10.7	72.0	31.1	72.5	71.8		
	3710.0	3.9	72.6	10.7	73.1	31.1	73.3	72.5		
	3830.0	3.9	73.6	10.7	73.9	31.1	74.2	73.5		
	3970.0	3.9	74.8	10.7	75.2	31.1	75.4	74.8		
	4360.0	3.9	76.4	10.7	77.1	31.1	77.6	76.3		
	4710.0	3.9	76.5	10.7	77.2	31.1	77.6	75.5		
	4980.0	4.7	76.5	14.9	77.2	36.3	77.7	75.8		
	5100.0	4.7	77.2	14.9	77.5	36.3	78.0	76.5		
	5170.0	4.7	78.0	14.9	78.2	36.3	78.4	77.8		
Clear Lake	5270.0	4.7	78.3	14.9	78.5	36.3	78.8	77.8		
	5380.0	4.7	78.3	14.9	78.5	36.3	78.8	75.0		
	5750.0	4.7	78.3	14.9	78.5	36.3	78.8	72.0		

Table C3 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Tributary	0.0	1.0	67.6	4.4	68.0	18.9	68.7	64.5		
From	370.0	1.0	67.6	4.4	68.0	18.9	68.7	66.0		
Lake Bracy	480.0	1.0	67.6	4.4	68.0	18.9	68.8	67.2		
	520.0	1.0	67.7	4.4	68.1	18.9	68.8	67.3		
	560.0	1.0	67.8	4.4	68.2	18.9	68.8	67.5		
	595.0	1.0	68.0	4.4	68.3	18.9	68.9	67.7		
	630.0	1.0	68.2	4.4	68.5	18.9	69.1	67.8		
	700.0	1.0	68.7	4.4	69.3	18.9	69.8	68.6		
	880.0	1.0	68.7	4.4	69.3	18.9	69.9	68.0		
	1280.0	1.0	68.7	4.4	69.3	18.9	69.9	60.0		
Tributary	0.0	2.3	67.8	3.3	68.2	5.0	68.8	66.8		
From	950.0	2.3	67.8	3.3	68.2	5.0	68.8	66.7		
Lakes	1060.0	2.3	67.8	3.3	68.2	5.0	68.8	67.1		
Whitcomb	1220.0	2.3	67.9	3.3	68.2	5.0	68.8	66.6		
and	1280.0	2.3	67.8	3.3	68.2	5.0	68.8	66.2	72.7	69.7
Blanchester	1322.0	2.3	68.0	3.3	68.2	5.0	68.8	66.2	72.7	69.7
	1672.0	2.3	68.0	3.3	68.3	5.0	68.8	66.8		
	2192.0	2.3	68.0	3.3	68.3	5.0	68.8	67.0		
	2652.0	2.3	68.0	3.3	68.3	5.0	68.8	67.2		
	3002.0	2.3	68.0	3.3	68.3	5.0	68.8	60.0		
	3222.0	1.7	68.0	2.6	68.3	3.7	68.8	67.2		
	3282.0	1.7	68.0	2.6	68.3	3.7	68.8	65.8	70.0	66.8
	3306.0	1.7	68.1	2.6	68.5	3.7	69.3	65.8	70.0	66.8
	3506.0	1.7	68.2	2.6	68.5	3.7	69.4	66.5		
	4706.0	1.7	68.2	2.6	68.5	3.7	69.4	55.0		

Appendix D

FLOOD DISCHARGES AND ELEVATIONS IN HICKS DITCH BASIN

(Retention ponds in muck farms, Case B:
Muck farms retain the 10-yr storm
floodwaters)

Table D1. Flood Discharges and Elevations--Lake Eustis to Lake Enola with Muck Farms Designed to Retain the 10 Year Storm Event

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Lake Eustis	0.0	84.0	64.3	121.0	64.6	207.0	65.0	50.0		
Railroad	100.0	84.0	64.3	121.0	64.6	207.0	65.0	59.8	65.7	63.9
Trestle	120.0	84.0	64.3	121.0	64.6	207.0	65.0	59.8	65.7	63.9
	130.0	84.0	64.3	121.0	64.6	207.0	65.1	58.7		
North Shore	140.0	84.0	64.3	121.0	64.6	207.0	65.0	58.7	71.3	66.9
Drive	180.0	84.0	64.3	121.0	64.6	207.0	65.0	58.7	71.3	66.9
	240.0	84.0	64.3	121.0	64.7	207.0	65.2	56.0		
	710.0	84.0	64.5	121.0	64.9	207.0	65.6	56.0		
	760.0	84.0	64.5	121.0	64.8	207.0	65.5	56.8	71.6	66.8
SR 19	850.0	84.0	64.5	121.0	64.9	207.0	65.5	56.8	71.6	66.8
	1600.0	84.0	64.5	121.0	64.9	207.0	65.6	50.0		
	2360.0	84.0	64.5	121.0	64.9	207.0	65.6	48.0		
Trout Lake	3200.0	36.0	64.5	49.0	64.9	78.0	65.6	52.0		
	4080.0	36.0	64.5	49.0	64.9	78.0	65.6	62.5		
	5180.0	36.0	64.5	49.0	64.9	78.0	65.7	62.5		
	6100.0	36.0	64.6	49.0	65.0	78.0	65.7	62.5		
	6430.0	36.0	64.9	49.0	65.2	78.0	65.8	60.0		
	6620.0	36.0	65.4	49.0	65.6	78.0	66.0	59.8		
	7000.0	36.0	65.9	49.0	66.2	78.0	66.7	60.3		
	7100.0	36.0	65.9	49.0	66.2	78.0	66.7	60.6	73.6	68.6
Getford Rd	7190.0	36.0	65.9	49.0	66.2	78.0	66.7	60.6	73.6	68.6
	7250.0	36.0	65.9	49.0	66.2	78.0	66.8	59.6		
	7670.0	36.0	66.0	49.0	66.4	78.0	67.0	60.8		
	8280.0	36.0	66.2	49.0	66.6	78.0	67.3	59.1		
Confluence of	8680.0	36.0	66.2	49.0	66.6	78.0	67.4	60.5		
Swamps	9290.0	22.5	66.3	30.0	66.7	49.3	67.5	60.9		

Table D1 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	9870.0	22.5	66.3	30.0	66.7	49.3	67.6	59.7		
	10200.0	22.5	66.3	30.0	66.8	49.3	67.6	60.6		
	10450.0	22.5	66.3	30.0	66.8	49.3	67.6	58.6		
	10610.0	22.5	66.3	30.0	66.8	49.3	67.6	60.2		
	10870.0	22.5	66.3	30.0	66.8	49.3	67.6	60.1		
	11190.0	22.5	66.3	30.0	66.8	49.3	67.6	61.3		
	11390.0	22.5	66.3	30.0	66.8	49.3	67.6	61.6		
	11480.0	22.5	66.3	30.0	66.8	49.3	67.6	62.8		
	11780.0	22.5	66.3	30.0	66.8	49.3	67.6	61.6		
Hicks Ditch	11980.0	22.5	66.3	30.0	66.8	49.3	67.7	62.6		
Headwaters	12080.0	17.5	66.4	22.8	66.8	34.5	67.7	61.1		
	12130.0	17.5	66.5	22.8	67.0	34.5	67.9	61.1		
	12380.0	17.5	67.0	22.8	67.5	34.5	68.5	61.1		
Culvert to	12430.0	17.5	67.0	22.8	67.5	34.5	68.5	62.0	67.0	65.9
Eustis	12460.0	17.5	67.0	22.8	67.5	34.5	68.5	62.4	67.0	65.9
Meadows	12510.0	17.5	67.0	22.8	67.5	34.5	68.5	61.1		
	12660.0	17.5	67.2	22.8	67.7	34.5	68.6	61.1		
Muck Farm	12870.0	17.5	67.2	22.8	67.7	34.5	68.6	61.1		
Pump	12920.0	9.9	67.3	14.9	67.7	23.5	68.6	64.3		
	13370.0	9.9	67.3	14.9	67.7	23.5	68.6	64.3		
Eustis	13870.0	9.9	67.4	14.9	67.8	23.5	68.6	64.4		
Meadows	14270.0	9.9	67.4	14.9	67.8	23.5	68.6	64.5		
	14930.0	9.9	67.4	14.9	67.8	23.5	68.6	64.7		
	15630.0	9.9	67.6	14.9	67.9	23.5	68.7	64.8		
	16030.0	9.9	67.7	14.9	68.0	23.5	68.7	64.8		

Table D1 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	16390.0	9.9	67.7	14.9	68.0	23.5	68.7	64.9		
	16790.0	9.9	67.8	14.9	68.0	23.5	68.7	65.0		
	17200.0	9.9	67.8	14.9	68.0	23.5	68.7	65.1		
	17610.0	9.9	67.8	14.9	68.0	23.5	68.7	65.2		
	18020.0	9.9	67.8	14.9	68.0	23.5	68.7	65.3		
	18420.0	9.9	67.8	14.9	68.0	23.5	68.7	65.4		
	18820.0	9.9	67.8	14.9	68.1	23.5	68.7	65.5		
	19070.0	9.9	67.8	14.9	68.1	23.5	68.7	66.6		
	19320.0	9.9	67.9	14.9	68.1	23.5	68.7	66.7		
	19820.0	9.9	67.9	14.9	68.1	23.5	68.7	66.7		
	20320.0	9.9	67.9	14.9	68.1	23.5	68.7	66.8		
	20690.0	9.9	67.9	14.9	68.1	23.5	68.7	67.0		
	21060.0	9.9	67.9	14.9	68.1	23.5	68.7	66.3		
SR 450	21190.0	9.9	67.8	14.9	68.0	23.5	68.7	66.1	72.1	69.5
	21232.0	9.9	68.1	14.9	68.2	23.5	68.7	66.0	72.1	69.5
	21382.0	9.9	68.3	14.9	68.5	23.5	69.0	67.3		
	22222.0	9.9	68.3	14.9	68.6	23.5	69.0	67.5		
	23022.0	9.9	68.4	14.9	68.6	23.5	69.1	67.7		
	23252.0	9.9	68.4	14.9	68.6	23.5	69.1	62.0		
	26052.0	9.9	68.4	14.9	68.6	23.5	69.1	62.1		
Lake	27282.0	9.9	68.4	14.9	68.6	23.5	69.1	62.1		
Umatilla	28282.0	9.9	68.4	14.9	68.6	23.5	69.1	62.1		
	29012.0	9.9	68.4	14.9	68.6	23.5	69.1	62.1		
	29392.0	9.9	68.4	14.9	68.6	23.5	69.1	62.1		
	29532.0	4.9	68.4	6.9	68.6	9.3	69.1	65.1		
	29572.0	4.9	68.4	6.9	68.6	9.3	69.1	66.0		
	29582.0	4.9	68.4	6.9	68.6	9.3	69.1	67.1	76.1	69.6
SR 19	29688.0	4.9	69.0	6.9	69.3	9.3	69.8	68.1	76.1	69.6
	29718.0	4.9	69.5	6.9	69.8	9.3	70.3	68.1		
Lake Enola	29868.0	4.9	69.5	6.9	69.8	9.3	70.3	63.0		

Table D2. Flood Discharges and Elevations--Hicks Ditch Headwaters to Lake Swatara with Muck Farms Designed to Retain the 10 Year Storm Event

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	0.0	5.6	66.3	7.3	66.8	17.3	67.7	62.1		
Flapped	200.0	5.6	66.3	7.3	66.8	17.3	67.7	62.6	67.1	64.6
Culvert	230.0	5.6	66.6	7.3	67.1	17.3	67.7	62.9	67.1	64.6
	305.0	5.6	66.6	7.3	67.1	17.3	67.7	61.0		
	1905.0	5.6	66.6	7.3	67.2	17.3	67.7	60.6		
Ditch along	2399.0	5.6	66.6	7.3	67.2	17.3	67.7	60.8		
Muck Farm	2874.0	5.6	66.6	7.3	67.2	17.3	67.7	60.8		
Levee	3124.0	5.6	66.6	7.3	67.2	17.3	67.7	59.7		
	3874.0	5.6	66.6	7.3	67.2	17.3	67.7	53.2		
	4174.0	5.6	66.6	7.3	67.2	17.3	67.7	53.2		
	5124.0	5.6	66.6	7.3	67.2	17.3	67.7	60.6		
	6069.0	5.6	66.6	7.3	67.2	17.3	67.7	60.7		
	6769.0	5.6	66.6	7.3	67.2	17.3	67.7	58.4		
	7454.0	5.6	66.6	7.3	67.2	17.3	67.7	61.7		
	7784.0	5.6	66.6	7.3	67.2	17.3	67.7	60.1		
Lake	7884.0	5.6	66.6	7.3	67.2	17.3	67.7	63.0		
Serpentine	8259.0	5.6	66.6	7.3	67.2	17.3	67.7	63.0		
	8859.0	5.6	66.6	7.3	67.2	17.3	67.7	50.0		
	9359.0	41.0	66.6	64.0	67.2	109.0	67.7	50.0		
	10109.0	41.0	66.6	64.0	67.2	109.0	67.7	65.0		
	10359.0	41.0	66.7	64.0	67.3	109.0	67.8	65.5		
	10634.0	41.0	68.1	64.0	68.2	109.0	68.7	67.0		
	10759.0	41.0	68.7	64.0	69.0	109.0	69.3	68.0		
	10859.0	41.0	68.9	64.0	69.2	109.0	69.5	67.5		
	11159.0	41.0	69.1	64.0	69.4	109.0	69.8	68.0		

Table D2 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	11509.0	41.0	69.3	64.0	69.6	109.0	70.1	68.0		
Lake	11809.0	41.0	69.3	64.0	69.6	109.0	70.1	62.0		
Myrtle	12234.0	41.0	69.3	64.0	69.6	109.0	70.1	60.0		
	12684.0	41.0	69.3	64.0	69.6	109.0	70.1	62.0		
	12934.0	13.6	69.3	16.6	69.6	21.8	70.1	67.9		
	13059.0	13.6	69.3	16.6	69.6	21.8	70.1	68.5		
	13089.0	13.6	69.7	16.6	69.8	21.8	70.2	69.0		
	13119.0	13.6	70.6	16.6	70.8	21.8	70.9	69.0		
	13169.0	13.6	71.5	16.6	71.6	21.8	71.8	70.1		
	13359.0	13.6	72.2	16.6	72.3	21.8	72.6	70.2		
	13809.0	13.6	72.3	16.6	72.5	21.8	72.7	70.3		
	14084.0	13.6	72.4	16.6	72.5	21.8	72.8	70.8		
Culvert at	14159.0	13.6	73.2	16.6	73.3	21.8	73.6	70.5		
Deland Rd	14219.0	13.6	73.2	16.6	73.4	21.8	73.7	68.5	78.4	72.2
	14271.0	13.6	73.9	16.6	74.5	21.8	75.5	68.5	78.4	72.2
	14281.0	13.6	73.9	16.6	74.5	21.8	75.5	72.0		
	14301.0	13.6	74.0	16.6	74.6	21.8	75.6	70.0		
	14321.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
	14646.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Lake	15296.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Swatara	15821.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		

Table D3. Flood Discharges and Elevations--Minor Tributaries with Muck Farms Designed to Retain the 10 Year Storm Event

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	0.0	1.1	66.2	2.1	66.6	4.2	67.4	60.5		
Marsh	190.0	1.1	66.2	2.1	66.6	4.2	67.4	65.0		
West of	1030.0	1.1	67.1	2.1	67.4	4.2	67.9	65.0		
Hicks Ditch	1190.0	1.1	67.4	2.1	67.7	4.2	68.1	65.0		
	1890.0	1.1	67.4	2.1	67.7	4.2	68.1	64.5		
Marsh	0.0	20.3	66.2	27.6	66.6	43.9	67.4	60.5		
East of	510.0	20.3	67.4	27.6	68.0	43.9	68.9	63.5		
Hicks Ditch	610.0	20.3	67.9	27.6	68.4	43.9	69.3	63.5		
	810.0	20.3	68.0	27.6	68.4	43.9	69.3	65.0		
	1260.0	20.3	68.0	27.6	68.4	43.9	69.3	65.0		
	1760.0	20.3	68.0	27.6	68.4	43.9	69.3	64.4		
	2460.0	20.3	68.0	27.6	68.4	43.9	69.3	65.5		
	3060.0	3.9	68.0	10.7	68.5	31.1	69.3	67.1		
	3260.0	3.9	68.7	10.7	68.9	31.1	69.4	68.5		
	3460.0	3.9	70.0	10.7	70.6	31.1	70.6	70.0		
	3590.0	3.9	71.9	10.7	72.0	31.1	72.4	71.8		
	3710.0	3.9	72.6	10.7	73.1	31.1	73.3	72.5		
	3830.0	3.9	73.6	10.7	73.9	31.1	74.2	73.5		
	3970.0	3.9	74.8	10.7	75.2	31.1	75.4	74.8		
	4360.0	3.9	76.4	10.7	77.1	31.1	77.6	76.3		
	4710.0	3.9	76.5	10.7	77.2	31.1	77.6	75.5		
	4980.0	4.7	76.5	14.9	77.2	36.3	77.7	75.8		
	5100.0	4.7	77.2	14.9	77.5	36.3	78.0	76.5		
	5170.0	4.7	78.0	14.9	78.2	36.3	78.4	77.8		
Clear Lake	5270.0	4.7	78.3	14.9	78.5	36.3	78.8	77.8		
	5380.0	4.7	78.3	14.9	78.5	36.3	78.8	75.0		
	5750.0	4.7	78.3	14.9	78.5	36.3	78.8	72.0		

Table D3 (continue)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Tributary	0.0	4.5	67.4	6.2	67.8	19.0	68.6	64.5		
From	370.0	4.5	67.4	6.2	67.8	19.0	68.6	66.0		
Lake Bracy	480.0	4.5	67.4	6.2	67.8	19.0	68.6	67.2		
	520.0	4.5	67.5	6.2	68.0	19.0	68.7	67.3		
	560.0	4.5	67.6	6.2	68.2	19.0	68.7	67.5		
	595.0	4.5	67.8	6.2	68.3	19.0	68.8	67.7		
	630.0	4.5	68.0	6.2	68.6	19.0	69.0	67.8		
	700.0	4.5	68.8	6.2	69.4	19.0	69.8	68.6		
	880.0	4.5	68.8	6.2	69.4	19.0	69.9	68.0		
	1280.0	4.5	68.8	6.2	69.4	19.0	69.9	60.0		
Tributary	0.0	2.6	67.9	3.6	68.1	5.0	68.7	66.8		
From	950.0	2.6	67.9	3.6	68.1	5.0	68.7	66.7		
Lakes	1060.0	2.6	67.9	3.6	68.1	5.0	68.7	67.1		
Whitcomb	1220.0	2.6	67.9	3.6	68.1	5.0	68.7	66.6		
and	1280.0	2.6	67.9	3.6	68.1	5.0	68.7	66.2	72.7	69.7
Blanchester	1322.0	2.6	68.0	3.6	68.2	5.0	68.7	66.2	72.7	69.7
	1672.0	2.6	68.1	3.6	68.3	5.0	68.8	66.8		
	2192.0	2.6	68.1	3.6	68.3	5.0	68.8	67.0		
	2652.0	2.6	68.1	3.6	68.3	5.0	68.8	67.2		
	3002.0	2.6	68.1	3.6	68.3	5.0	68.8	60.0		
	3222.0	1.4	68.1	2.5	68.3	3.7	68.8	67.2		
	3282.0	1.4	68.1	2.5	68.3	3.7	68.8	65.8	70.0	66.8
	3306.0	1.4	68.2	2.5	68.5	3.7	69.3	65.8	70.0	66.8
	3506.0	1.4	68.2	2.5	68.5	3.7	69.3	66.5		
	4706.0	1.4	68.2	2.5	68.5	3.7	69.3	55.0		

Appendix E

FLOOD DISCHARGES AND ELEVATIONS IN HICKS DITCH BASIN

(Retention ponds in muck farms, Case C:
Siltation of Hicks Ditch to 62.50 ft NGVD
and muck farms retain the 10-yr storm
floodwaters)

Table E1. Flood Discharges and Elevations--Lake Eustis to Lake Enola with Combined Hicks Ditch Silted Up and Muck Farms Retaining the 10 Year Storm

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Lake Eustis	0.0	82.0	64.3	119.0	64.6	203.0	65.0	50.0		
Railroad	100.0	82.0	64.3	119.0	64.6	203.0	65.0	59.8	65.7	63.9
Trestle	120.0	82.0	64.3	119.0	64.6	203.0	65.0	59.8	65.7	63.9
	130.0	82.0	64.3	119.0	64.6	203.0	65.1	58.7		
North Shore	140.0	82.0	64.3	119.0	64.6	203.0	65.0	58.7	71.3	66.9
Drive	180.0	82.0	64.3	119.0	64.6	203.0	65.0	58.7	71.3	66.9
	240.0	82.0	64.3	119.0	64.7	203.0	65.2	56.0		
	710.0	82.0	64.5	119.0	64.9	203.0	65.6	56.0		
	760.0	82.0	64.5	119.0	64.8	203.0	65.5	56.8	71.6	66.8
SR 19	850.0	82.0	64.5	119.0	64.8	203.0	65.5	56.8	71.6	66.8
	1600.0	82.0	64.5	119.0	64.9	203.0	65.6	50.0		
	2360.0	82.0	64.5	119.0	64.9	203.0	65.6	48.0		
Trout Lake	3200.0	31.0	64.5	43.0	64.9	70.0	65.6	52.0		
	4080.0	31.0	64.5	43.0	64.9	70.0	65.6	62.5		
	5180.0	31.0	64.5	43.0	64.9	70.0	65.6	62.5		
	6100.0	31.0	64.5	43.0	64.9	70.0	65.7	62.5		
	6430.0	31.0	64.9	43.0	65.2	70.0	65.8	62.5		
	6620.0	31.0	65.5	43.0	65.7	70.0	66.1	62.5		
	7000.0	31.0	66.1	43.0	66.4	70.0	66.9	62.5		
	7100.0	31.0	66.1	43.0	66.4	70.0	66.9	62.5	73.6	68.6
Getford Rd	7190.0	31.0	66.1	43.0	66.4	70.0	66.9	62.5	73.6	68.6
	7250.0	31.0	66.2	43.0	66.5	70.0	67.0	62.5		
	7670.0	31.0	66.3	43.0	66.7	70.0	67.3	62.5		
	8280.0	31.0	66.6	43.0	67.0	70.0	67.8	62.5		
Confluence of	8680.0	31.0	66.6	43.0	67.1	70.0	67.8	62.5		
Swamps	9290.0	18.3	66.7	26.2	67.1	43.2	67.9	62.5		

Table E1 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	9870.0	18.3	66.7	26.2	67.2	43.2	68.0	62.5		
	10200.0	18.3	66.7	26.2	67.2	43.2	68.0	62.5		
	10450.0	18.3	66.7	26.2	67.2	43.2	68.0	62.5		
	10610.0	18.3	66.7	26.2	67.2	43.2	68.0	62.5		
	10870.0	18.3	66.7	26.2	67.2	43.2	68.0	62.5		
	11190.0	18.3	66.7	26.2	67.2	43.2	68.0	62.5		
	11390.0	18.3	66.7	26.2	67.2	43.2	68.0	62.5		
	11480.0	18.3	66.7	26.2	67.2	43.2	68.0	62.8		
	11780.0	18.3	66.7	26.2	67.2	43.2	68.1	62.5		
Hicks Ditch	11980.0	18.3	66.7	26.2	67.2	43.2	68.1	62.6		
Headwaters	12080.0	15.3	66.7	20.0	67.2	31.3	68.1	61.1		
	12130.0	15.3	66.8	20.0	67.3	31.3	68.2	61.1		
	12380.0	15.3	67.1	20.0	67.6	31.3	68.6	61.1		
Culvert to	12430.0	15.3	67.1	20.0	67.6	31.3	68.6	62.0	67.0	65.9
Eustis	12460.0	15.3	67.1	20.0	67.6	31.3	68.6	62.4	67.0	65.9
Meadows	12510.0	15.3	67.1	20.0	67.7	31.3	68.7	61.1		
	12660.0	15.3	67.2	20.0	67.7	31.3	68.7	61.1		
Muck Farm	12870.0	15.3	67.3	20.0	67.8	31.3	68.7	61.1		
Pump	12920.0	9.8	67.3	13.9	67.8	21.7	68.7	64.3		
	13370.0	9.8	67.3	13.9	67.8	21.7	68.7	64.3		
Eustis	13870.0	9.8	67.4	13.9	67.8	21.7	68.7	64.4		
Meadows	14270.0	9.8	67.4	13.9	67.8	21.7	68.7	64.5		
	14930.0	9.8	67.4	13.9	67.8	21.7	68.7	64.7		
	15630.0	9.8	67.6	13.9	67.9	21.7	68.8	64.8		
	16030.0	9.8	67.7	13.9	68.0	21.7	68.8	64.8		

Table E1 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	16390.0	9.8	67.7	13.9	68.0	21.7	68.8	64.9		
	16790.0	9.8	67.8	13.9	68.0	21.7	68.8	65.0		
	17200.0	9.8	67.8	13.9	68.0	21.7	68.8	65.1		
	17610.0	9.8	67.8	13.9	68.0	21.7	68.8	65.2		
	18020.0	9.8	67.8	13.9	68.0	21.7	68.8	65.3		
	18420.0	9.8	67.8	13.9	68.0	21.7	68.8	65.4		
	18820.0	9.8	67.8	13.9	68.1	21.7	68.8	65.5		
	19070.0	9.8	67.8	13.9	68.1	21.7	68.8	66.6		
	19320.0	9.8	67.9	13.9	68.1	21.7	68.8	66.7		
	19820.0	9.8	67.9	13.9	68.1	21.7	68.8	66.7		
	20320.0	9.8	67.9	13.9	68.1	21.7	68.8	66.8		
	20690.0	9.8	67.9	13.9	68.1	21.7	68.8	67.0		
	21060.0	9.8	67.9	13.9	68.1	21.7	68.8	66.3		
SR 450	21190.0	9.8	67.8	13.9	68.0	21.7	68.8	66.1		
	21232.0	9.8	68.1	13.9	68.2	21.7	68.7	66.0	72.1	69.5
	21382.0	9.8	68.2	13.9	68.4	21.7	69.0	67.3		
	22222.0	9.8	68.3	13.9	68.5	21.7	69.0	67.5		
	23022.0	9.8	68.4	13.9	68.6	21.7	69.1	67.7		
	23252.0	9.8	68.4	13.9	68.6	21.7	69.1	62.0		
	26052.0	9.8	68.4	13.9	68.6	21.7	69.1	62.1		
Lake	27282.0	9.8	68.4	13.9	68.6	21.7	69.1	62.1		
Umatilla	28282.0	9.8	68.4	13.9	68.6	21.7	69.1	62.1		
	29012.0	9.8	68.4	13.9	68.6	21.7	69.1	62.1		
	29392.0	9.8	68.4	13.9	68.6	21.7	69.1	62.1		
	29532.0	4.9	68.4	6.9	68.6	9.3	69.1	65.1		
	29572.0	4.9	68.4	6.9	68.6	9.3	69.1	66.0		
	29582.0	4.9	68.4	6.9	68.6	9.3	69.1	67.1		
SR 19	29688.0	4.9	69.0	6.9	69.3	9.3	69.8	68.1	76.1	69.6
	29718.0	4.9	69.5	6.9	69.8	9.3	70.3	68.1		
Lake Enola	29868.0	4.9	69.5	6.9	69.8	9.3	70.3	63.0		

Table E2. Flood Discharges and Elevations--Hicks Ditch Headwaters to Lake Swatara with Combined Hicks Ditch Silted Up and Muck Farms Retaining the 10 Year Storm

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	0.0	3.8	66.7	6.4	67.2	12.6	68.1	62.1		
Flapped	200.0	3.8	66.7	6.4	67.2	12.6	68.1	62.6	67.1	64.6
Culvert	230.0	3.8	66.8	6.4	67.2	12.6	68.1	62.9	67.1	64.6
	305.0	3.8	66.8	6.4	67.2	12.6	68.1	61.0		
	1905.0	3.8	66.8	6.4	67.2	12.6	68.1	60.6		
Ditch along	2399.0	3.8	66.8	6.4	67.2	12.6	68.1	60.8		
Muck Farm	2874.0	3.8	66.8	6.4	67.2	12.6	68.1	60.8		
Levee	3124.0	3.8	66.8	6.4	67.2	12.6	68.1	59.7		
	3874.0	3.8	66.8	6.4	67.2	12.6	68.1	53.2		
	4174.0	3.8	66.8	6.4	67.2	12.6	68.1	53.2		
	5124.0	3.8	66.8	6.4	67.2	12.6	68.1	60.6		
	6069.0	3.8	66.8	6.4	67.2	12.6	68.1	60.7		
	6769.0	3.8	66.8	6.4	67.2	12.6	68.1	58.4		
	7454.0	3.8	66.8	6.4	67.2	12.6	68.1	61.7		
	7784.0	3.8	66.8	6.4	67.2	12.6	68.1	60.1		
Lake	7884.0	3.8	66.8	6.4	67.2	12.6	68.1	63.0		
Serpentine	8259.0	3.8	66.8	6.4	67.2	12.6	68.1	63.0		
	8859.0	3.8	66.8	6.4	67.2	12.6	68.1	50.0		
	9359.0	41.0	66.8	64.0	67.2	109.0	68.1	50.0		
	10109.0	41.0	66.8	64.0	67.2	109.0	68.1	65.0		
	10359.0	41.0	66.9	64.0	67.3	109.0	68.2	65.5		
	10634.0	41.0	68.0	64.0	68.2	109.0	68.7	67.0		
	10759.0	41.0	68.8	64.0	69.0	109.0	69.3	68.0		
	10859.0	41.0	68.9	64.0	69.2	109.0	69.5	67.5		
	11159.0	41.0	69.1	64.0	69.4	109.0	69.8	68.0		

Table E2 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	11509.0	41.0	69.3	64.0	69.6	109.0	70.1	68.0		
Lake	11809.0	41.0	69.3	64.0	69.6	109.0	70.1	62.0		
Myrtle	12234.0	41.0	69.3	64.0	69.6	109.0	70.1	60.0		
	12684.0	41.0	69.3	64.0	69.6	109.0	70.1	62.0		
	12934.0	13.6	69.3	16.6	69.6	21.8	70.1	67.9		
	13059.0	13.6	69.3	16.6	69.6	21.8	70.1	68.5		
	13089.0	13.6	69.7	16.6	69.8	21.8	70.2	69.0		
	13119.0	13.6	70.6	16.6	70.8	21.8	70.9	69.0		
	13169.0	13.6	71.5	16.6	71.6	21.8	71.8	70.1		
	13359.0	13.6	72.2	16.6	72.3	21.8	72.6	70.2		
	13809.0	13.6	72.3	16.6	72.5	21.8	72.7	70.3		
	14084.0	13.6	72.4	16.6	72.5	21.8	72.8	70.8		
	14159.0	13.6	73.2	16.6	73.3	21.8	73.6	70.5		
Culvert at	14219.0	13.6	73.2	16.6	73.4	21.8	73.7	68.5	78.4	72.2
Deland Rd	14271.0	13.6	73.9	16.6	74.5	21.8	75.5	68.5	78.4	72.2
	14281.0	13.6	73.9	16.6	74.5	21.8	75.5	72.0		
	14301.0	13.6	74.0	16.6	74.6	21.8	75.6	70.0		
	14321.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
	14646.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Lake	15296.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		
Swatara	15821.0	13.6	74.0	16.6	74.6	21.8	75.6	65.0		

Table E3. Flood Discharges and Elevations--Minor Tributaries with Combined Hicks Ditch Silted Up and Muck Farms Retaining the 10 Year Storm

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
	0.0	1.1	66.6	2.1	67.1	4.2	67.8	60.5		
Marsh	190.0	1.1	66.6	2.1	67.1	4.2	67.8	65.0		
West of	1030.0	1.1	67.1	2.1	67.5	4.2	68.1	65.0		
Hicks Ditch	1190.0	1.1	67.4	2.1	67.8	4.2	68.2	65.0		
	1890.0	1.1	67.4	2.1	67.8	4.2	68.2	64.5		
Marsh	0.0	20.3	66.6	27.6	67.1	43.9	67.8	60.5		
East of	510.0	20.3	67.5	27.6	68.1	43.9	69.0	63.5		
Hicks Ditch	610.0	20.3	68.0	27.6	68.5	43.9	69.3	63.5		
	810.0	20.3	68.0	27.6	68.5	43.9	69.3	65.0		
	1260.0	20.3	68.0	27.6	68.5	43.9	69.4	65.0		
	1760.0	20.3	68.0	27.6	68.5	43.9	69.4	64.4		
	2460.0	20.3	68.0	27.6	68.5	43.9	69.4	65.5		
	3060.0	3.9	68.0	10.7	68.5	31.1	69.4	67.1		
	3260.0	3.9	68.7	10.7	68.8	31.1	69.4	68.5		
	3460.0	3.9	70.0	10.7	70.6	31.1	70.5	70.0		
	3590.0	3.9	71.9	10.7	72.0	31.1	72.4	71.8		
	3710.0	3.9	72.6	10.7	73.1	31.1	73.3	72.5		
	3830.0	3.9	73.6	10.7	73.9	31.1	74.2	73.5		
	3970.0	3.9	74.8	10.7	75.2	31.1	75.4	74.8		
	4360.0	3.9	76.4	10.7	77.1	31.1	77.6	76.3		
	4710.0	3.9	76.5	10.7	77.2	31.1	77.7	75.5		
	4980.0	4.7	76.5	14.9	77.2	36.3	77.7	75.8		
	5100.0	4.7	77.2	14.9	77.5	36.3	78.0	76.5		
	5170.0	4.7	78.0	14.9	78.2	36.3	78.4	77.8		
Clear Lake	5270.0	4.7	78.3	14.9	78.5	36.3	78.8	77.8		
	5380.0	4.7	78.3	14.9	78.5	36.3	78.8	75.0		
	5750.0	4.7	78.3	14.9	78.5	36.3	78.8	72.0		

Table E3 (continued)

Location Description	Channel Length ft	10 yr Discharge cfs	10 yr Elevation ft NGVD	25 yr Discharge cfs	25 yr Elevation ft NGVD	100 yr Discharge cfs	100 yr Elevation ft NGVD	Channel Invert ft NGVD	Top of Road ft NGVD	Low Chord ft NGVD
Tributary	0.0	4.5	67.4	6.2	67.8	19.0	68.7	64.5		
From	370.0	4.5	67.4	6.2	67.8	19.0	68.7	66.0		
Lake Bracy	480.0	4.5	67.4	6.2	67.8	19.0	68.7	67.2		
	520.0	4.5	67.5	6.2	68.0	19.0	68.8	67.3		
	560.0	4.5	67.6	6.2	68.2	19.0	68.8	67.5		
	595.0	4.5	67.8	6.2	68.3	19.0	68.9	67.7		
	630.0	4.5	68.0	6.2	68.6	19.0	69.1	67.8		
	700.0	4.5	68.8	6.2	69.4	19.0	69.8	68.6		
	880.0	4.5	68.8	6.2	69.4	19.0	69.9	68.0		
	1280.0	4.5	68.8	6.2	69.4	19.0	69.9	60.0		
Tributary	0.0	2.5	67.9	3.5	68.1	4.7	68.8	66.8		
From	950.0	2.5	67.9	3.5	68.1	4.7	68.8	66.7		
Lakes	1060.0	2.5	67.9	3.5	68.1	4.7	68.8	67.1		
Whitcomb	1220.0	2.5	67.9	3.5	68.1	4.7	68.8	66.6		
and	1280.0	2.5	67.9	3.5	68.1	4.7	68.8	66.2	72.7	69.7
Blanchester	1322.0	2.5	68.0	3.5	68.2	4.7	68.8	66.2	72.7	69.7
	1672.0	2.5	68.1	3.5	68.2	4.7	68.8	66.8		
	2192.0	2.5	68.1	3.5	68.3	4.7	68.8	67.0		
	2652.0	2.5	68.1	3.5	68.3	4.7	68.8	67.2		
	3002.0	2.5	68.1	3.5	68.3	4.7	68.8	60.0		
	3222.0	1.4	68.1	2.5	68.3	3.5	68.8	67.2		
	3282.0	1.4	68.1	2.5	68.2	3.5	68.8	65.8	70.0	66.8
	3306.0	1.4	68.1	2.5	68.5	3.5	69.3	65.8	70.0	66.8
	3506.0	1.4	68.2	2.5	68.5	3.5	69.3	66.5		
	4706.0	1.4	68.2	2.5	68.5	3.5	69.3	55.0		

Appendix F

FLOOD PROFILES FOR 10-YEAR, 25-YEAR, AND 100-YEAR 24-HOUR STORM EVENTS

ELEVATION, FEET NGVD

90
85
80
75
70
65
60
55
50
45

SEABOARD COASTLINE RAILROAD (HS-1)
NORTH SHORE DRIVE (HS-2)
STATE ROAD 19 (HS-3)

LAKE EUSTIS
TROUT LAKE

LEGEND
100-YR FLOOD
25-YR FLOOD
10-YR FLOOD
STREAM BED
HYDRAULIC STRUCTURE (HS-4)

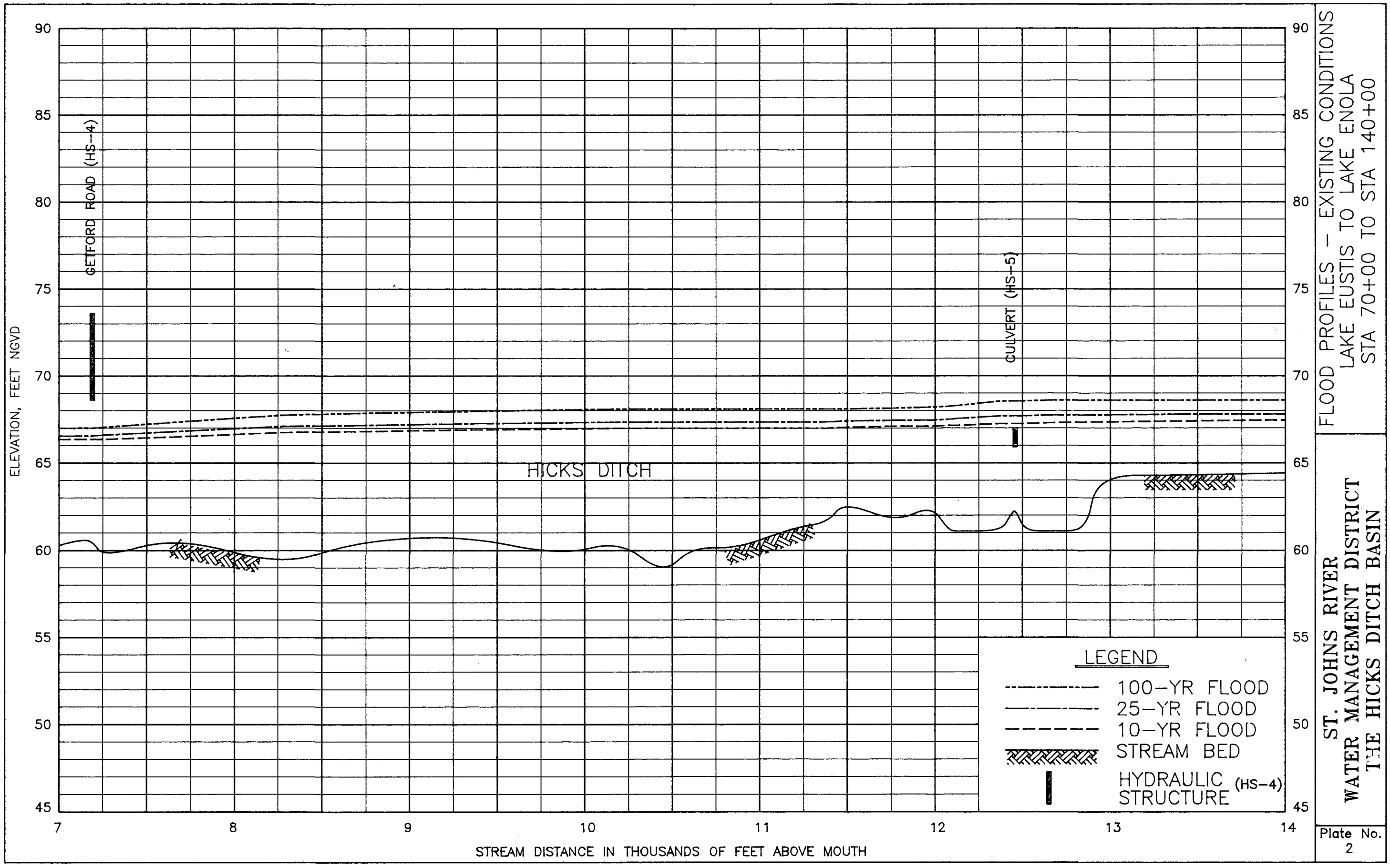
0 1 2 3 4 5 6 7

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH

FLOOD PROFILES - EXISTING CONDITIONS
LAKE EUSTIS TO LAKE ENOLA
STA 0+00 TO STA 70+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No
1



FLOOD PROFILES -- EXISTING CONDITIONS
LAKE EUSTIS TO LAKE ENOLA
STA 70+00 TO STA 140+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
2

ELEVATION, FEET NGVD

90
85
80
75
70
65
60
55
50
45

EUSTIS MEADOWS

LEGEND

100-YR FLOOD
25-YR FLOOD
10-YR FLOOD
STREAM BED
HYDRAULIC (HS-4) STRUCTURE

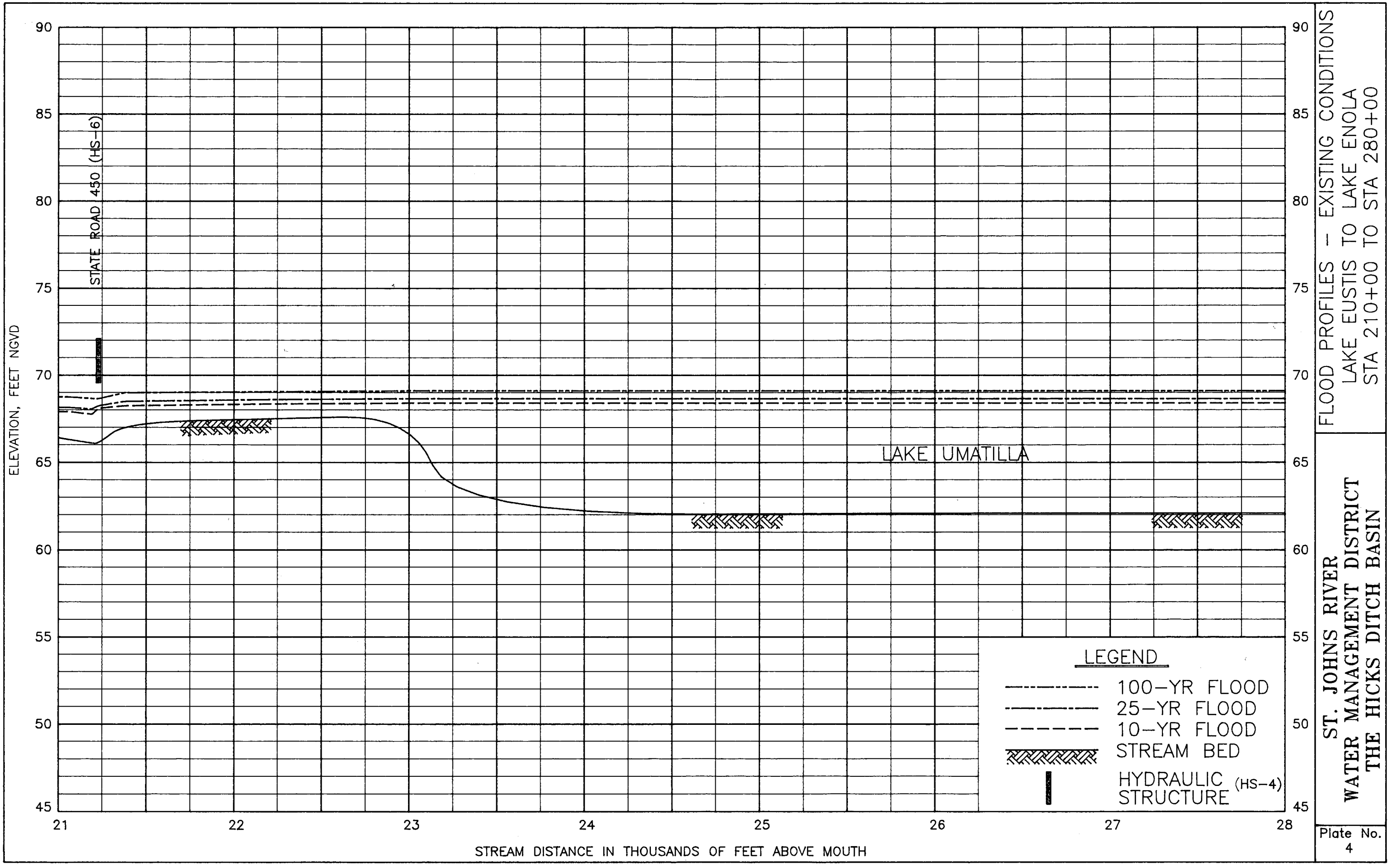
14 15 16 17 18 19 20 21

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH

FLOOD PROFILES - EXISTING CONDITIONS
LAKE EUSTIS TO LAKE ENOLA
STA 140+00 TO STA 210+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

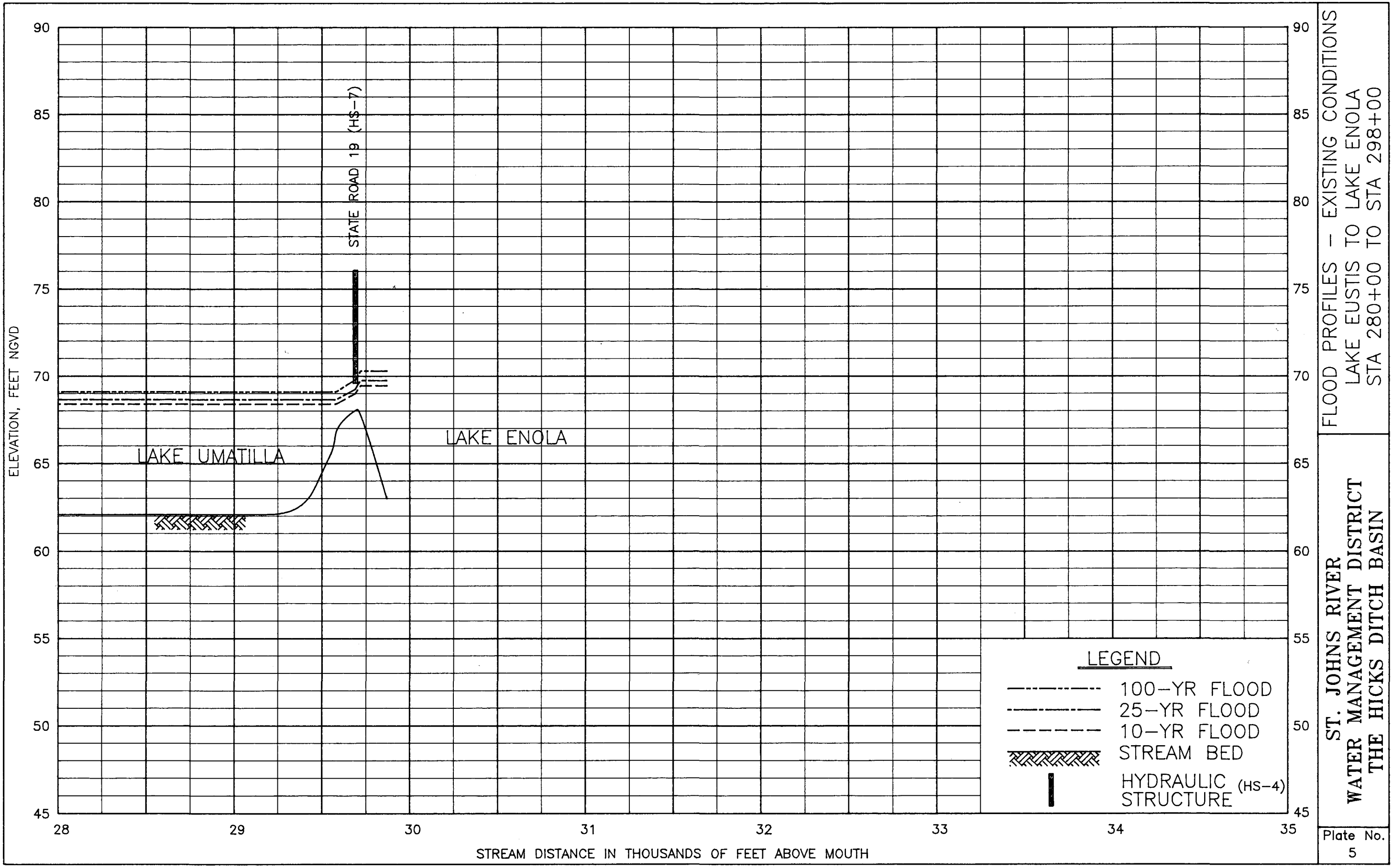
Plate No.
3



FLOOD PROFILES -- EXISTING CONDITIONS
LAKE EUSTIS TO LAKE ENOLA
STA 210+00 TO STA 280+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
4



FLOOD PROFILES - EXISTING CONDITIONS
LAKE EUSTIS TO LAKE ENOLA
STA 280+00 TO STA 298+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
5

ELEVATION, FEET NGVD

90
85
80
75
70
65
60
55
50
45

CONFLUENCE WITH HICKS DITCH

CLEAR LAKE

0 1 2 3 4 5 6 7

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH

LEGEND

- 100-YR FLOOD
- 25-YR FLOOD
- 10-YR FLOOD
- STREAM BED
- HYDRAULIC (HS-4) STRUCTURE

FLOOD PROFILES – EXISTING CONDITIONS
EAST SWAMP TO CLEAR LAKE
STA 0+00 TO STA 57+50

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
6

ELEVATION, FEET NGVD

90
85
80
75
70
65
60
55
50
45

CONFLUENCE WITH HICKS DITCH

0
1
2
3
4
5
6
7

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH

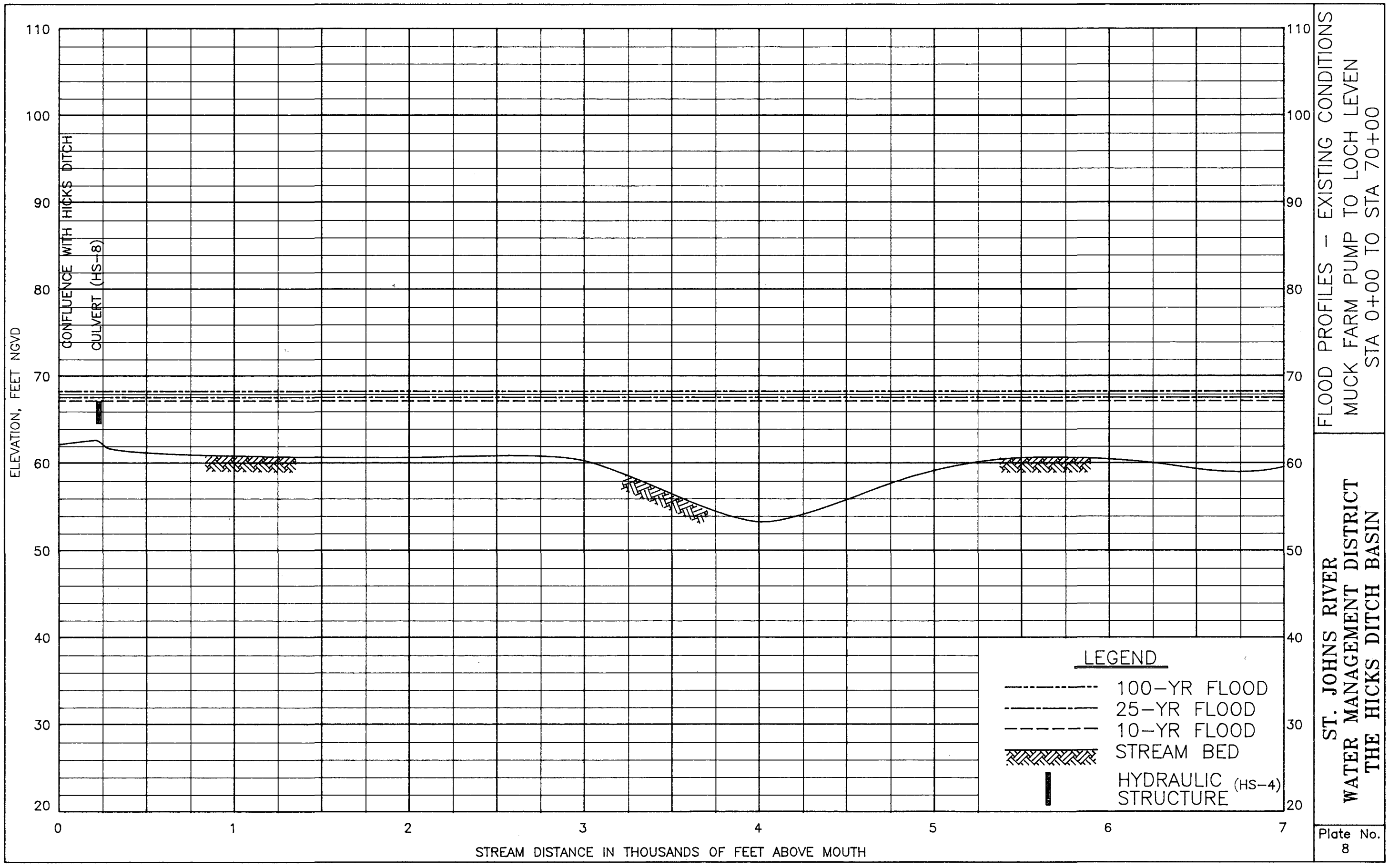
LEGEND

- 100-YR FLOOD
- 25-YR FLOOD
- 10-YR FLOOD
- STREAM BED
- HYDRAULIC STRUCTURE (HS-4)

FLOOD PROFILES -- EXISTING CONDITIONS
WEST SWAMP
STA 0+00 TO STA 29+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

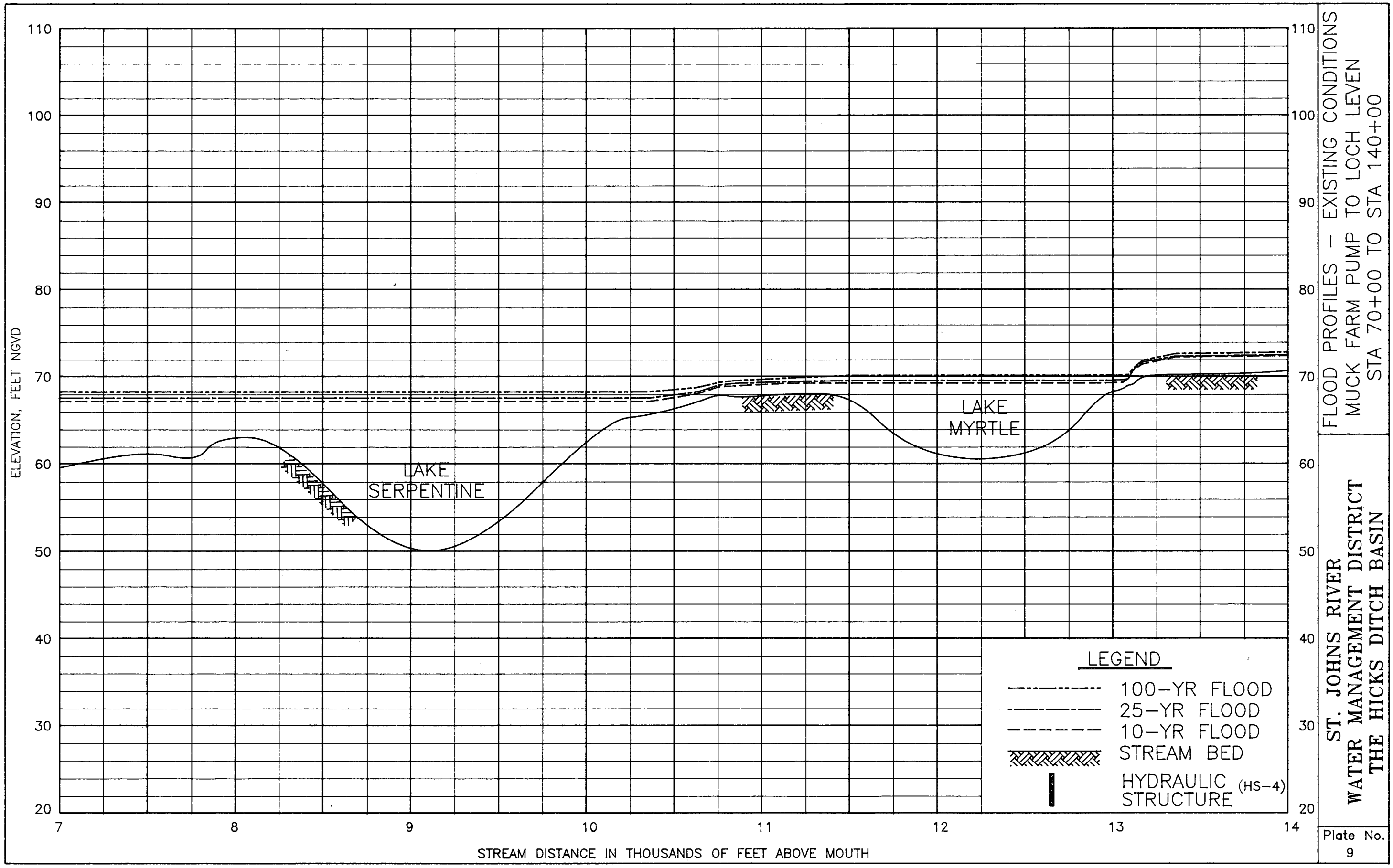
Plate No.
7



FLOOD PROFILES - EXISTING CONDITIONS
MUCK FARM PUMP TO LOCH LEVEN
STA 0+00 TO STA 70+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
8



FLOOD PROFILES - EXISTING CONDITIONS
MUCK FARM PUMP TO LOCH LEVEN
STA 70+00 TO STA 140+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
9

ELEVATION, FEET NGVD

DELAND ROAD (HS-9)

FLASHBOARD CULVERT (HS-10)

FLASHBOARD CULVERT (HS-11)

CULVERT (HS-12)

CULVERT (HS-13)

BATES AVE (HS-14)

LAKE SWATARA

LEGEND

100-YR FLOOD

25-YR FLOOD

10-YR FLOOD

STREAM BED

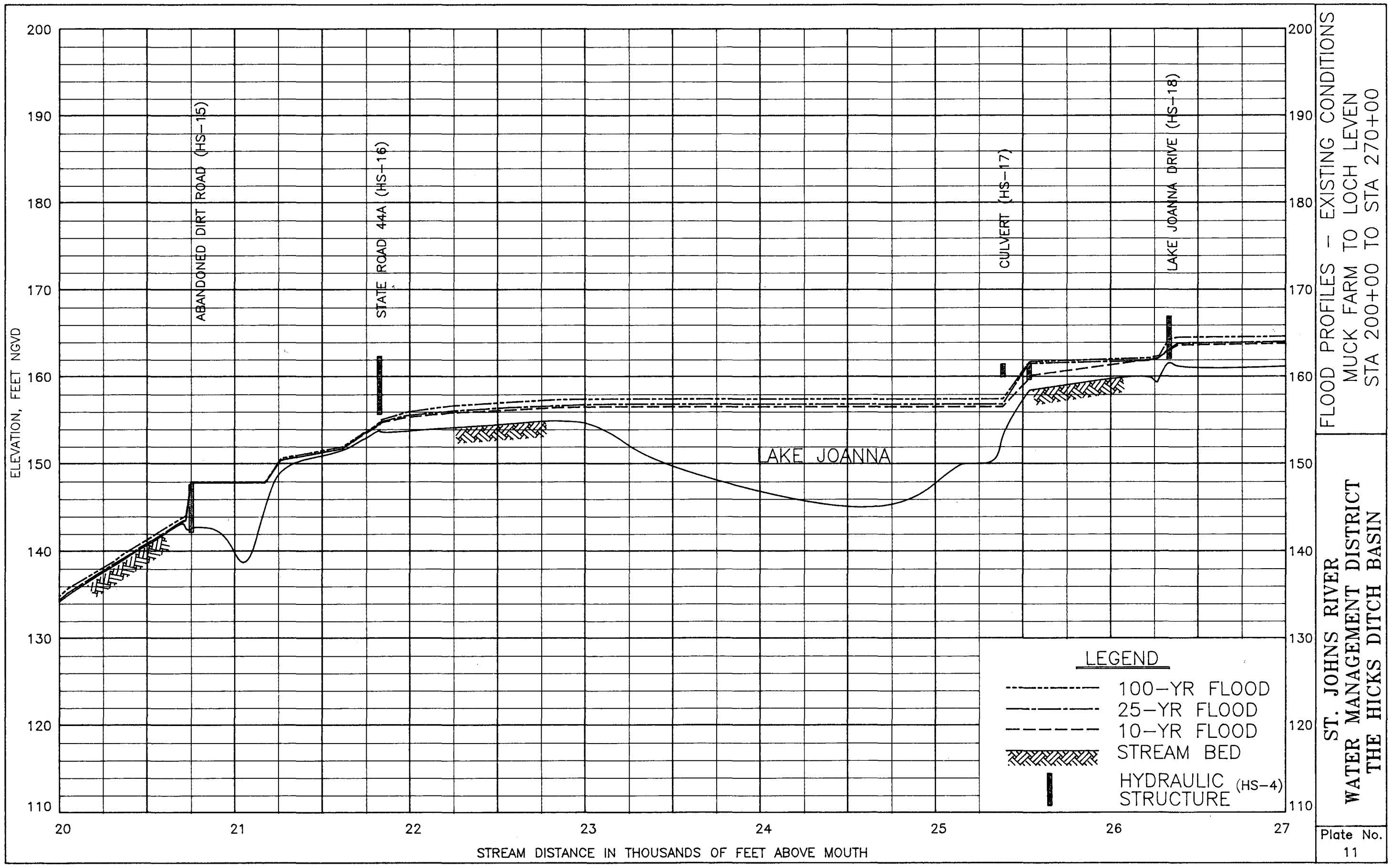
HYDRAULIC STRUCTURE (HS-4)

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH

FLOOD PROFILES - EXISTING CONDITIONS
MUCK FARM TO LOCH LEVEN
STA 140+00 TO STA 200+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No. 10



FLOOD PROFILES - EXISTING CONDITIONS
MUCK FARM TO LOCH LEVEN
STA 200+00 TO STA 270+00

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
11

ELEVATION, FEET NGVD

210
200
190
180
170
160
150
140
130
120

STATE ROAD 44B (HS-19)

LOCH LEVEN

27
28
29
30
31
32
33
34

STREAM DISTANCE IN THOUSANDS OF FEET ABOVE MOUTH

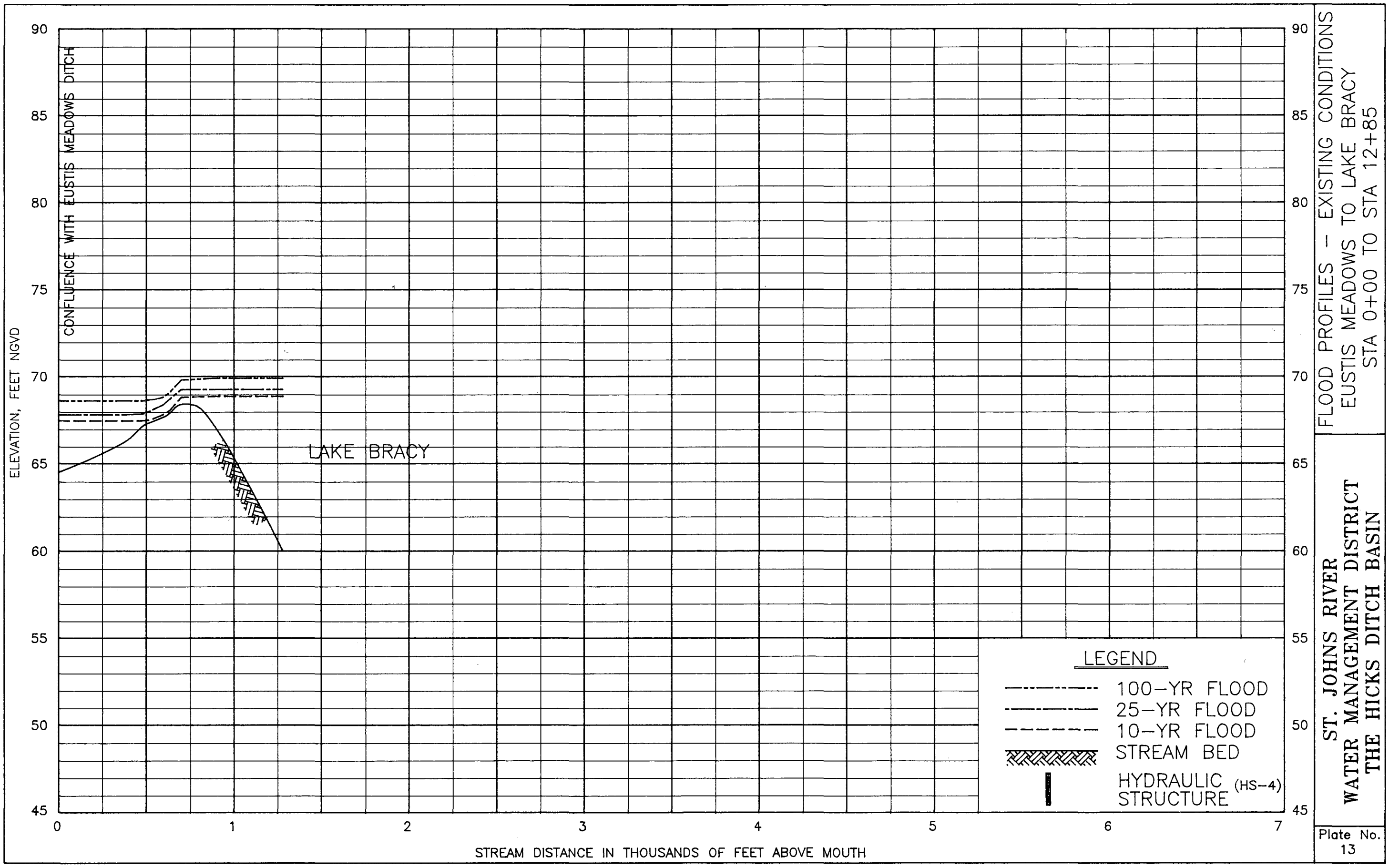
LEGEND

- 100-YR FLOOD
- 25-YR FLOOD
- 10-YR FLOOD
- STREAM BED
- HYDRAULIC (HS-4) STRUCTURE

FLOOD PROFILES - EXISTING CONDITIONS
MUCK FARM PUMP TO LOCH LEVEN
STA 270+00 TO STA 301+30

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

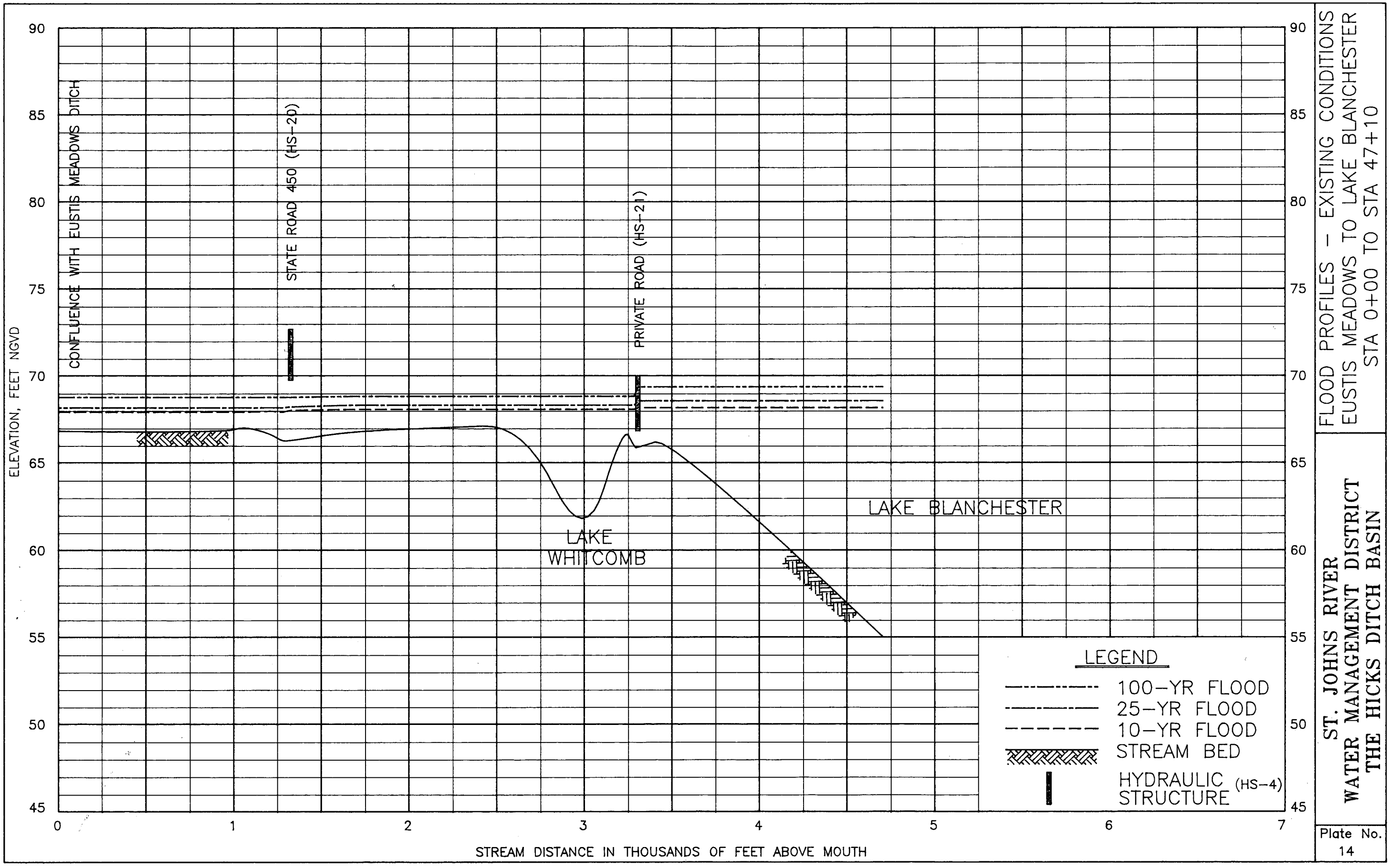
Plate No.
12



FLOOD PROFILES – EXISTING CONDITIONS
EUSTIS MEADOWS TO LAKE BRACY
STA 0+00 TO STA 12+85

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
13



FLOOD PROFILES - EXISTING CONDITIONS
EUSTIS MEADOWS TO LAKE BLANCHESTER
STA 0+00 TO STA 47+10

ST. JOHNS RIVER
WATER MANAGEMENT DISTRICT
THE HICKS DITCH BASIN

Plate No.
14

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St. Johns River Water Management District
P. O. Box 1429
Palatka, Florida 32178-1429
(904) 328-8321