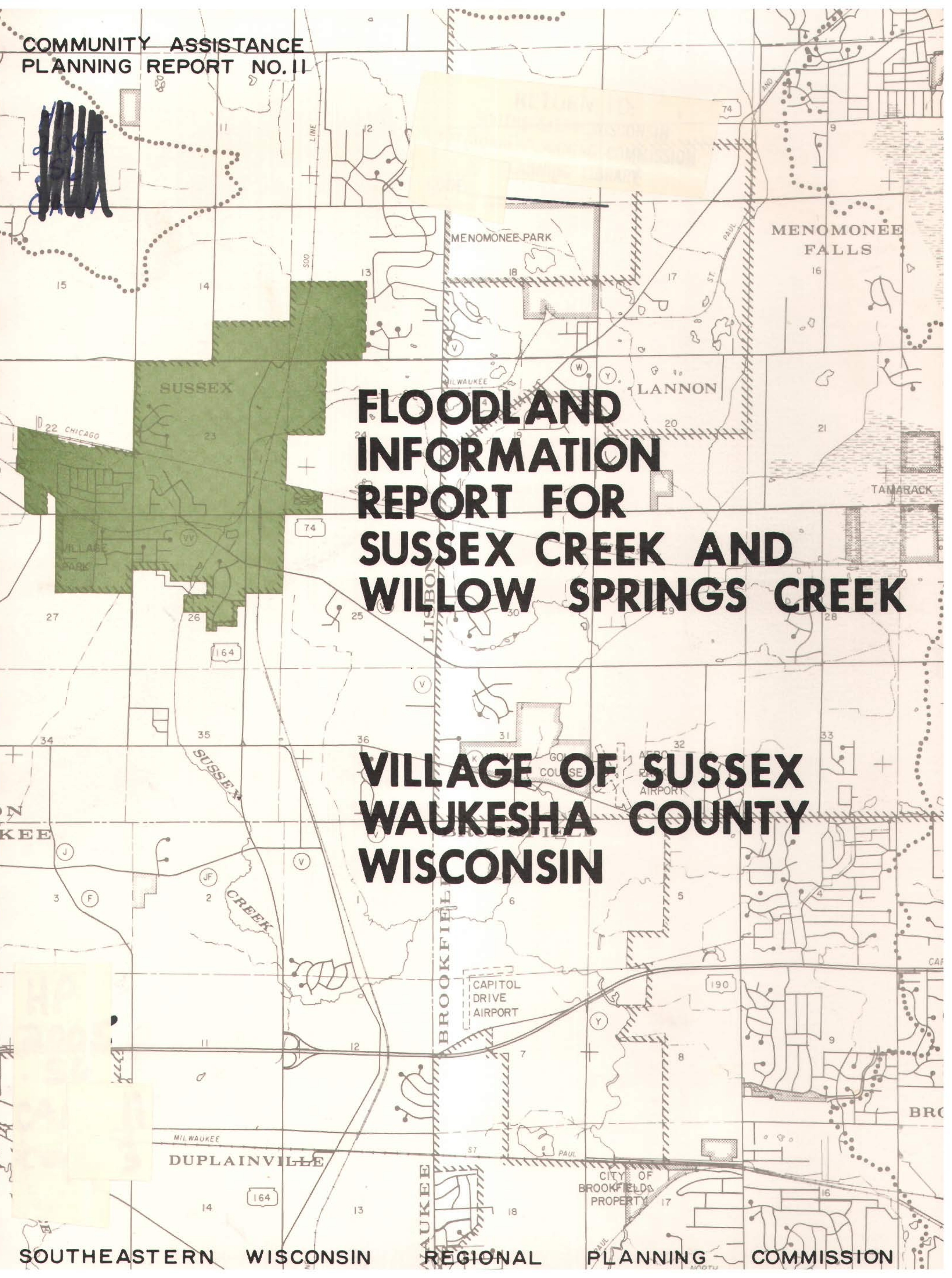
COMMUNITY ASSISTANCE
PLANNING REPORT NO. 11

FLOODLAND INFORMATION REPORT FOR SUSSEX CREEK AND WILLOW SPRINGS CREEK

VILLAGE OF SUSSEX
WAUKESHA COUNTY
WISCONSIN



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Special acknowledgement is due Mr. Daniel F. Snyder, SEWRPC Associate Engineer; Miss Lois A. Kawatski, SEWRPC Associate Planner; Mr. Stuart G. Walesh, P.E., SEWRPC Water Resources Engineer; Mr. Randolph M. Videkovich, P.E., SEWRPC Senior Engineer; and Mr. Roland O. Tonn, SEWRPC Senior Planner; for their efforts in the conduct of this study and in the preparation of this report.

COMMUNITY ASSISTANCE PLANNING REPORT
NUMBER 11

FLOODLAND INFORMATION REPORT FOR SUSSEX CREEK AND WILLOW SPRINGS CREEK

VILLAGE OF SUSSEX
WAUKESHA COUNTY, WISCONSIN

Southeastern Wisconsin Regional Planning Commission
P. O. Box 769
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916 N. East Avenue
Waukesha, Wisconsin 53186

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March 21, 1977

Mr. Paul J. Fleischmann
Village President
Village of Sussex
W240 N6689 Maple Avenue
Sussex, Wisconsin 53089

Dear Mr. Fleischmann:

By letter dated March 14, 1974, the Village Board of the Village of Sussex requested the Southeastern Wisconsin Regional Planning Commission staff to undertake a floodland information study for the Village. The Regional Planning Commission staff has now completed that study and is pleased to transmit herewith its findings as documented in this report entitled Floodland Information Report for Sussex Creek and Willow Springs Creek.

This report presents basic information concerning flooding along Sussex Creek and its major tributaries, and along Willow Springs Creek in and near the Village of Sussex, including information on historic flood events, hydrologic and hydraulic data pertinent to the identification and analyses of flood problems, flood discharges and stages, delineation of the natural floodlands, and delineation of recommended floodway and floodplain fringe areas. Also included are draft recommended floodland regulations. This information should permit the Village to adopt sound floodland use regulations meeting the requirements of Wisconsin's Flood Plain Management Program; to qualify its residents and property owners for continued participation in the federal flood insurance program administered by the U. S. Department of Housing and Urban Development; and to generally conduct sound community planning and development programs which recognize the flood hazards that exist within the Village.

The Regional Planning Commission staff stands ready to assist the Village of Sussex in presenting the information contained in this report for public review and evaluation and for integrating it into sound floodland use regulations.

Sincerely,

K. W. Bauer
Executive Director

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Chapter I

INTRODUCTION

The purpose of this report and the supporting inventories and analyses is to develop and present floodland information for Sussex Creek, its major tributaries, and Willow Springs Creek within and near the Village of Sussex, Waukesha County, Wisconsin. More specifically, this floodland information report presents flood discharges and stages, delineation of a floodway and floodplain fringe, and draft floodland regulations in order to provide the Village of Sussex with the information necessary for: the preparation and adoption of sound floodland use regulations in accordance with the requirements of Wisconsin's Flood Plain Management Program; acquisition of flood insurance under the program administered by the U. S. Department of Housing and Urban Development; and the conduct of sound community planning and development programs.

This report was prepared by the Southeastern Wisconsin Regional Planning Commission (SEWRPC) in response to a formal request made on March 14, 1974 by the Village of Sussex. The study was conducted by the Commission from September 1975 through December 1976. The study refines, details, and extends the floodland management recommendations initially set forth by the Commission in the adopted comprehensive plan for the Fox River watershed.[1] Commission data and information on the natural resource base and man-made features of the Sussex area were used in the conduct of this study. This data base was supplemented with information provided by the Village of Sussex, the Waukesha Freeman, the Menomonee Falls News, and private citizens of the Village, as well as information provided by the Waukesha County Park and Planning Commission, the Wisconsin Department of Transportation, the U. S. Geological Survey, and the National Weather Service.

In addition to this introductory chapter, this report consists of the following eight chapters which describe the inventory and analyses phases of the project or present study results:

- The Study Area: An Overview
- Historic Flood Events
- The Hydrologic-Hydraulic System
- The Hydrologic-Hydraulic Model
- Flood Discharges, Stages, and the Natural Floodlands
- The Regulatory Floodlands
- Floodland Regulations
- Summary

Since some users of this report may not be completely familiar with the technical terminology used in the field of floodland management, a glossary of selected terms is included in Appendix A.

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[1] *See SEWRPC Planning Report No. 12, A Comprehensive Plan for the Fox River Watershed, Volume I, Inventory Findings and Forecasts, and Volume II, Alternative Plans and Recommended Plans.*

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Chapter II

THE STUDY AREA: AN OVERVIEW

THE FOX RIVER WATERSHED

Sussex Creek originates in Section 17, Town 8 North, Range 19 East in the Town of Lisbon in northeastern Waukesha County and flows in a southeasterly direction to and through the Village of Sussex to discharge to the Fox River in Section 6, Town 7 North, Range 20 East in the Town of Brookfield, Waukesha County. Willow Springs Creek originates in Section 14, Town 8 North, Range 19 East in the Town of Lisbon in northeastern Waukesha County and also flows in a southeasterly direction to and through the Village of Sussex to discharge to the Fox River in Section 29, Town 8 North, Range 20 East in the Village of Menomonee Falls. Sussex Creek and Willow Springs Creek are as shown on Map 1, small headwater tributaries of the Fox River.

The stream gaging station (Station No. 05-5438.30) on the Fox River—cooperatively installed and maintained since January 1963 by Waukesha County, the Commission, and the U. S. Geological Survey—is the stream flow recordation station site closest to the Sussex and Willow Springs Creeks. This station has a tributary drainage area of 127 square miles and is located approximately 16 miles downstream from the Village of Sussex. The average discharge recorded at that location over the 12 year period of record is 87 cubic feet per second, and the maximum flood flow recorded is an instantaneous flow of 2,260 cubic feet per second recorded on April 22, 1973. The minimum flow recorded at the station is 3.0 cubic feet per second recorded on January 1, 1974.

SUSSEX CREEK SUBWATERSHED

For purposes of this report, the Sussex Creek subwatershed, as shown on Map 2, is defined as that 9.39-square-mile drainage area tributary to Sussex Creek at CTH JF in Section 2, Town 7 North, Range 19 East, in the Town of Pewaukee, about 2.8 miles downstream of the center of the Village of Sussex. Rural land uses predominate in the Sussex Creek subwatershed with about 79 percent of the watershed area being devoted in 1975 to agricultural and agricultural-related uses, water, wetlands, and other nonurban lands. In addition to a portion of the Village of Sussex, the Sussex Creek subwatershed contains portions of the Towns of Lisbon and Pewaukee (see Table 1). Detailed data and information pertaining to the natural resources base and man-made features of the Sussex Creek subwatershed are presented in Chapter IV of this report.

Table 1

AREA AND PROPORTION OF SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS IN VARIOUS CIVIL DIVISIONS IN WAUKESHA COUNTY: 1975

Subwatershed	Civil Division	Area: Square Miles	Area: Percent of the Subwatershed
Sussex Creek	Village of Sussex	1.60	17
	Town of Lisbon	7.69	82
	Town of Pewaukee	0.10	1
	Subtotal	9.39	100
Willow Springs Creek	Village of Sussex	0.40	18
	Village of Lannon	0.01	--[a]
	Village of Menomonee Falls .	0.04	2
	Town of Lisbon	1.77	80
	Subtotal	2.22	100
	Total	11.61	--

[a] *Less than 1 percent.*

Source: SEWRPC.

WILLOW SPRINGS CREEK SUBWATERSHED

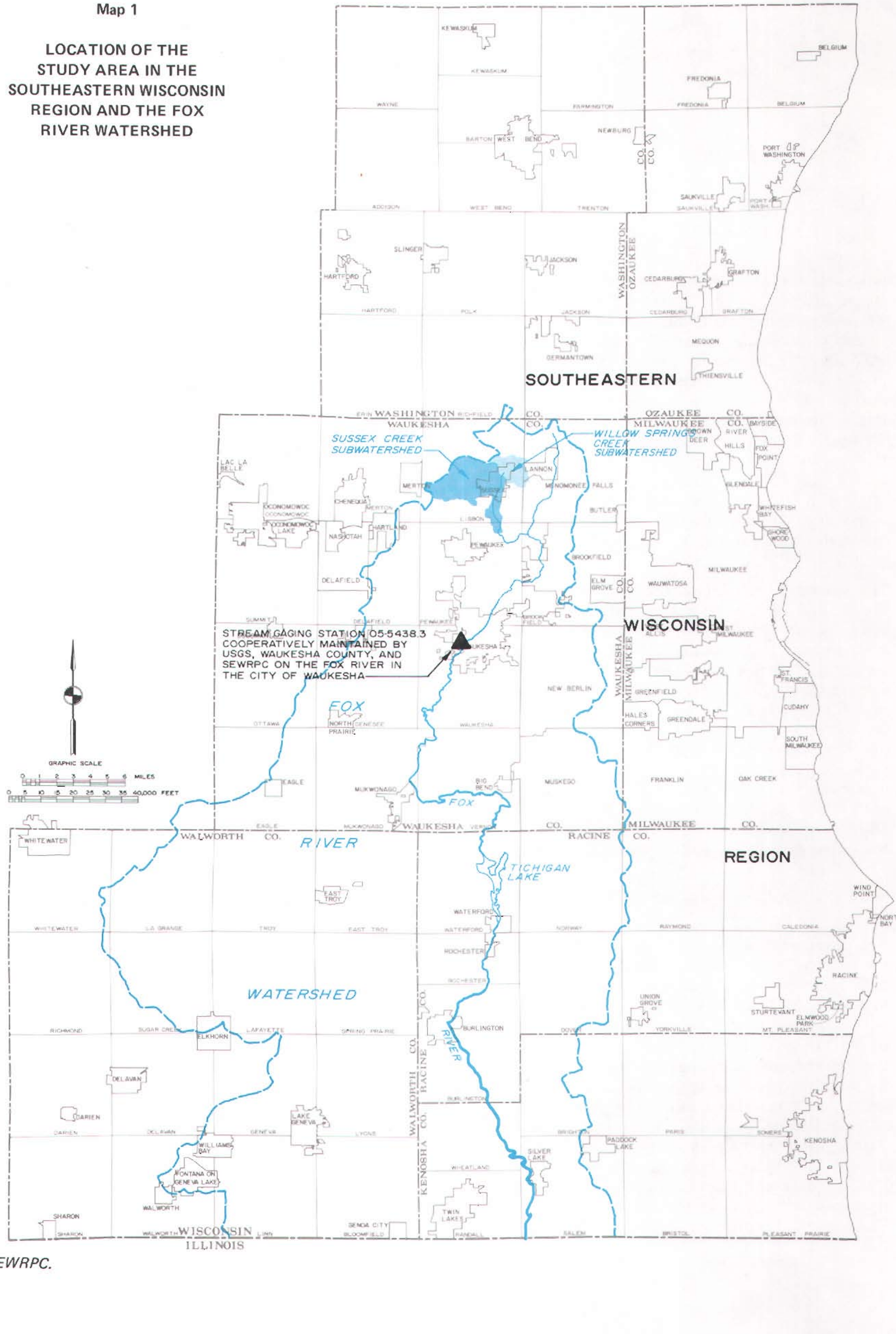
For purposes of this report, the Willow Springs Creek subwatershed, as shown on Map 2, is defined as that 2.22 square mile drainage area tributary to Willow Springs Creek just downstream of STH 74 in Section 19, Town 8 North, Range 20 East in the Village of Menomonee Falls about 1.6 miles downstream from the Village of Sussex limits. Rural land uses predominate in the Willow Springs Creek subwatershed with about 69 percent of the watershed area being devoted in 1975 to agriculture or agricultural-related uses, water, wetlands, and other nonurban lands. In addition to a portion of the Village of Sussex, the Willow Springs Creek subwatershed contains portions of the Towns of Lisbon, the Village of Menomonee Falls, and the Village of Lannon (see Table 1). Detailed data and information pertaining to the natural resources base and man-made features of the Willow Springs subwatershed are presented in Chapter IV of this report.

VILLAGE OF SUSSEX

The Village of Sussex derives its name from its first settlers who immigrated to the United States from Sussex County, England. The Village developed around pioneer industries including a sawmill, brewery, grain elevator, and a lumber yard.

Map 1

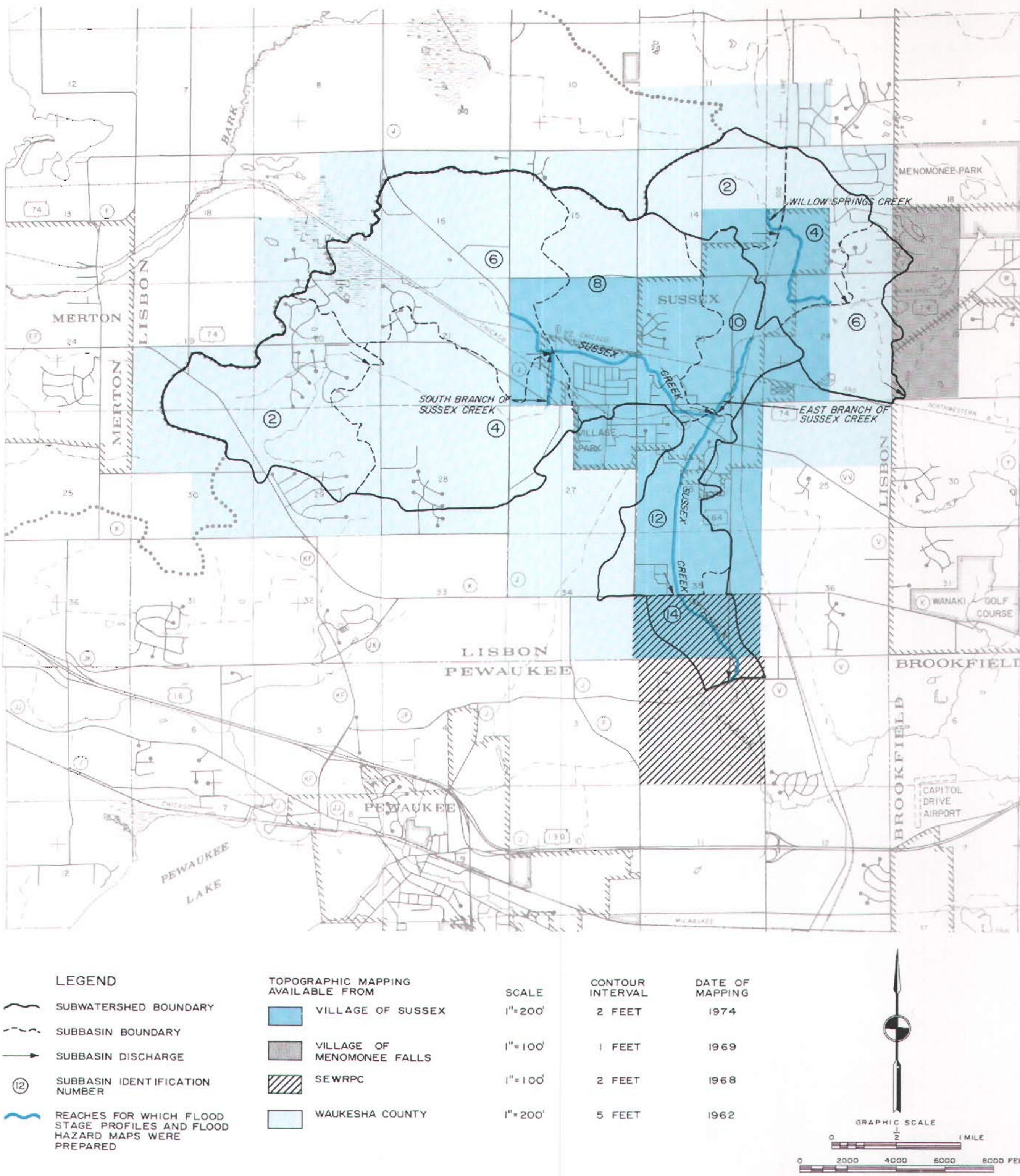
LOCATION OF THE STUDY AREA IN THE SOUTHEASTERN WISCONSIN REGION AND THE FOX RIVER WATERSHED



Source: SEWRPC.

Map 2

SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS



Source: SEWRPC.

As of 1975, the Village encompassed 2.6 square miles, of which about 1.6 square miles are located within the Sussex Creek subwatershed, about 0.4 square mile is located in the Willow Springs Creek subwatershed, and about 0.6 square mile is located in the Pewaukee River subwatershed. The Village had a resident population of 4,112 in 1975. The 1975 resident population of 4,112 was about 50 percent above the 1970 population of 2,758. Commission population forecasts and land use plans indicate that by the year 2000 the population of Sussex may be expected to increase to about 6,900 persons—approximately 68 percent above the 1975 level. Industrial development in the Village has been rapid and now includes a canning company, a tool and die plant, a lumber company, and two oil companies.

Chapter III

HISTORIC FLOOD EVENTS

INTRODUCTION

The collection, collation, and analysis of historic flood information is an important element in the preparation of any floodland information report. This information includes measurements or observations of flood flows, stages, areas of inundation, and flood damage. Such historic flood event data and information are particularly significant to this report for two reasons. First, because the flood flows, stages, and areas of inundation developed for this report are the result of the application of hydrologic-hydraulic simulation techniques, sound engineering practice requires comparison between the results obtained with these techniques and available, reliable observations of actual floodland hydrologic-hydraulic behavior. Such comparisons permit adjustments to, and refinements of, the simulation work, and therefore result in a more accurate representation of floodland hydrology and hydraulics. Second, experience indicates that public memory of, and concern over, flood problems tends to diminish rapidly with the passage of time after a major flood event. Consequently, both public and private development decisions tend to be made without sound, definitive knowledge of actual flood events. An effective way to bring the gravity of flood problems into proper perspective is to inventory and document historic flood information.

PROCEDURE

The inventory of historic flood events was initiated by examining annual instantaneous peak stream flows as measured at the Fox River gaging station at Waukesha. Although, as already noted, this gaging station is located about 16 miles downstream from Sussex and monitors flow from a 127-square-mile drainage area—which is large compared to the 9.39 square mile Sussex Creek subwatershed and the 2.22 square mile Willow Springs Creek subwatershed—the stream flow pattern at the gaging station serves as an index to the possible date of occurrence of flood events in the Village of Sussex area. In addition, the hydrologic-hydraulic simulation model described later in this report was used to identify those days when hydrometeorologic conditions were conducive to the occurrence of flood events. Historic flood information assembled by the Commission during comprehensive planning programs also were examined during the historic flood event inventory for the Fox River watershed; the Menomonee River watershed, which is located east of the Sussex Creek and Willow Springs Creek subwatersheds; and the Rubicon River watershed, which is located northwest of the Sussex Creek and Willow Springs Creek subwatersheds.

After completing this initial reconnaissance, the Commission staff contacted Sussex municipal officials, business people and private citizens, the Waukesha County Historical Society, and the State Historical Society, and examined back issues of the Waukesha Freeman, the Lake Country Reporter, and the Pewaukee Post. These sources provided a variety of flood and flood-related data and information, including historic flood stages, identification of riverine areas that have been flooded, photographs of flooding, and newspaper accounts of flooding events. This information was used to construct a comprehensive description of major and minor flood events associated with flood problems in and near the Village of Sussex. The various information sources revealed the occurrence of two flood events of sufficient magnitude to warrant attention in the news media or to have otherwise been recorded.

SEPTEMBER 19, 1972, FLOOD

Flooding was experienced in Waukesha County on September 19, 1972, as a result of approximately 2.25 inches of rainfall which occurred over a 48 hour period on September 18 and 19, 1972. Sussex residents reported that the quarry, which is located near Sussex Creek within the triangular area formed by Main Street (STH 74), Waukesha Avenue (STH 164) and Silver Spring Drive (CTH VV), and is used as a public swimming facility, exhibited a water surface elevation three or four feet higher than usual. In addition, floodwaters from the Sussex Creek were observed flowing over the Chicago, Milwaukee, St. Paul and Pacific Railroad bridge in the vicinity of the quarry.

APRIL 21 AND 22, 1973, FLOOD

Heavy spring rains falling on an unusually wet ground caused extensive flooding and flood damage in southeastern Wisconsin in April 1973. Approximately 2.8 inches of rainfall occurred in the Sussex area during a 24 hour period. In Sussex, Village-owned land along Sussex Creek in the vicinity of Clover Drive near the Village sewage treatment plant was subjected to overland flooding. Raw sewage was discharged into Sussex Creek from the Village sewage treatment plant in order to reduce the surcharging of sanitary sewers and to minimize the backup of mixed sanitary sewage and storm water into the basements of buildings. Flood damage and disruption, including inundation of yards, roads, and parking areas and flooding of at least one basement on W. Silver Spring Drive, occurred along Sussex Creek downstream of Main Street, a reach within which the channel is confined by the

U. S. Post Office and a commercial building. Floodwaters spilled across W. Silver Spring Drive about one block southeast of the intersection with Main Street. Locust Street, Champeny Road, and Westhaven Road, located in a residential area along Sussex Creek in the northwestern corner of the Village, sustained minor street flooding.

SUMMARY

Based on the historic flood data and information presented above, the Village of Sussex since 1940 has experienced at least one significant flood—in April 1973—and at least one earlier minor flood event—in September 1972. Flood problems in the Village appear to be located primarily along Sussex Creek downstream of Main Street and upstream of Maple Avenue and include: overland flooding along the Chicago, Milwaukee, St. Paul and Pacific Railroad bridge just downstream of Main Street (STH 74), overtopping the W. Silver Spring Drive (CTH VV), minor street flooding on Locust Street, Champeny Road, and Westhaven Road, and overloading of the sanitary sewer system and sewage treatment plant. The absence of flood problems within the Village along Sussex Creek tributaries and Willow Springs Creek does not necessarily mean that floodplain inundation has not occurred in recent years but probably reflects the agricultural and open space uses of the floodlands of these streams.

As described later in this report, the stages and area of inundation associated with the flood of record—April 1973 event—indicate that the event had a recurrence interval of approximately 40 years, or a chance of occurrence in any given year of 2.5 percent. Therefore, the flood of record was significantly less severe than the 100-year recurrence interval flood event specified for floodland regulation purposes. The absence of a flood of record approximating the 100-year recurrence interval event does not mean that such an event will not occur in the Sussex Creek or Willow Springs Creek subwatersheds. Major floods or, more specifically, the meteorological events and other conditions that cause such floods, are random events, and it is possible for those events to happen in such a manner that major flooding does not occur in a particular geographic area for a relatively long period of time. Such major flooding may, however, occur at any time.

Chapter IV

THE HYDROLOGIC-HYDRAULIC SYSTEM

INTRODUCTION

Hydrologic-hydraulic data constitute a key input to any floodland information study. While watershed hydrology and hydraulics may be inventoried and discussed separately, as is done in this report, they must be analyzed together since they function in an interrelated manner within the watershed hydrologic-hydraulic system. The mathematical simulation modeling techniques used to conduct the integrated analysis of watershed behavior are discussed in the following chapter.

HYDROLOGY OF THE SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS

Meteorologic Data

Precipitation within the two subwatersheds takes the form of rain, sleet, hail, and snow, and ranges from gentle showers of trace quantities to brief but intense and potentially destructive thunderstorms or major rainfall-snowmelt events causing property damage. Average monthly and annual total precipitation and snowfall for the Waukesha National Weather Service Station, an observation station in relatively close proximity to the Village of Sussex, are presented in Table 2. The average annual total precipitation in the Sussex area based on the City of Waukesha data is 30.70 inches, expressed as water equivalent, while the average annual snowfall and sleet measured as snow and sleet is 41.8 inches. Assuming that 10 inches of measured snowfall and sleet are equivalent to 1 inch of water, the average annual snowfall of 41.8 inches is equivalent to 4.18 inches of water and, therefore, only about 14 percent of the average annual total precipitation occurs as snowfall and sleet. Average total monthly precipitation for the Sussex area ranges from 1.04 inches in February to 3.75 inches in June. The principal snowfall months are December, January, February, and March, during which 88 percent of the average annual snowfall may be expected to occur.

Use of the hydrologic-hydraulic simulation model described later in this report required assembly of six types of meteorological data—precipitation, temperature, solar radiation, wind movement, dewpoint temperature, and potential evaporation—for a continuous period extending from 1940 through 1974. The meteorologic data set contains daily precipitation values as recorded at the Waukesha and Germantown National Weather Service Stations and hourly precipitation values calculated by examining the distribution of hourly rainfall recorded for the National Weather Service Station at Mitchell Field in Milwaukee. Daily maximum-minimum temperature contained within the files are based on observations made at Waukesha and Germantown during the period of 1940 through 1974. The file contains daily solar radiation values which were calculated using percent sunshine observations made at the Mitchell Field National Weather Service Station. Daily wind movement data, based on measurements made at the Mitchell Field National Weather Service Station, are included in the meteorologic data base. The meteorologic data set also contains daily dewpoint temperature values based partly on direct measurements made at the Mitchell Field Station and partly on calculations using temperature and atmospheric pressure measurements at Mitchell Field. Daily potential evaporation amounts included in the 35-year meteorologic data base were calculated as a function of average daily temperature, daily wind movement, daily solar radiation, and average daily dewpoint temperature for Mitchell Field in Milwaukee.

The 35-year meteorologic data set makes maximum use of historic meteorologic data from the Waukesha and Germantown observation stations—the two stations closest to Sussex—supplementing this data as needed by meteorologic data collected at the National Weather Service Mitchell Field Station in the City of Milwaukee. For purposes of hydrologic-hydraulic modeling, the meteorologic data from Waukesha, Germantown, and Milwaukee, as included in the data base, are considered representative of the meteorology of the Sussex Creek and Willow Springs Creek subwatersheds.

Table 2

MONTHLY PRECIPITATION CHARACTERISTICS FOR THE VILLAGE OF SUSSEX

Month	Average Total Precipitation[a] (1890-1974) (Inches)	Average Snow and Sleet[a] (1930-1959) (Inches)
January	1.57	11.8
February . . .	1.04	6.6
March	2.23	10.7
April.	2.90	1.1
May	3.37	0.4
June	3.75	0.0
July	3.66	0.0
August	2.99	0.0
September . .	3.20	0.0
October. . . .	2.13	0.0
November . .	2.16	3.5
December . .	1.70	7.7
Year	30.70	41.8

[a] *Based on observations at the City of Waukesha.*

Source: National Weather Service.

Runoff

Streamflow data are not available for the Sussex Creek and Willow Springs Creek subwatersheds. As already noted, the nearest stream flow gaging station is the Fox River station at Waukesha. In order to obtain some measure of the long-term runoff from the two subwatersheds, average annual runoff under existing (1975) land use conditions was estimated at 6.9 inches per year for the Sussex Creek subwatershed and 6.0 inches per year for the Willow Springs Creek subwatershed using the hydrologic-hydraulic model described later in this report, for an average annual discharge of 4.8 cubic feet per second and 1.0 cubic foot per second, respectively.[1]

Hydrologic Soil Groups

The nature of soils in the Sussex Creek and Willow Springs Creek subwatersheds has been determined primarily by the interaction of parent glacial deposits covering the area and the topography, climate, plants, and animals over time. The U. S. Soil Conservation Service (SCS), under a 1963 cooperative agreement with the Commission, has completed a detailed soil survey for the seven-county Southeastern Wisconsin Region, including the Sussex Creek and Willow Springs Creek subwatersheds. With respect to subwatershed hydrology, the most significant soil interpretation completed by SCS is the categorization of soils into hydrologic soil groups A, B, C, and D. In terms of runoff characteristics, these four soil groups vary from group A soils which generate relatively little runoff because of high infiltration capacity, high permeability, and good drainage to group D soils which generate relatively large amounts of runoff because of very low infiltration capacity, low permeability, and poor drainage.

The spatial distribution of the four hydrologic soil groups within the Sussex Creek and Willow Springs Creek subwatersheds is shown on Map 3. Hydrologic soils group A does not appear in either subwatershed, whereas hydrologic soils groups B, C, and D comprise 67 percent, 14 percent, and 17 percent, respectively, of the Sussex Creek subwatershed area, with the remaining 2 percent covered with man-made or water features. Hydrologic soils groups B, C, and D comprise 66 percent, 16 percent, and 16 percent, respectively, of the Willow Springs Creek subwatershed area, with the remaining 2 percent covered with man-made or water features. It is important to note that two-thirds of the Sussex Creek subwatershed and two-thirds of the Willow Springs Creek subwatershed are covered by group B soils which generate only moderate runoff compared with other soil groups.

Land Use

The nature and distribution of land uses—both existing and planned—within a subwatershed constitute an important element in a hydrologic inventory since both the volume and timing of direct runoff to the stream system are influenced by land uses and land use changes. While the underlying hydrologic soil groups are generally the primary determinant of hydrologic response, the type of land uses superimposed on the soil group can significantly modify that response. This is particularly true when lands are converted from rural to urban uses, since such a conversion results in a large increase in impervious surface and, therefore, an increase in runoff volume and a decrease in runoff time. Since the Sussex Creek and Willow Springs Creek subwatersheds are covered primarily by hydrologic soil group B, which exhibits moderate runoff volumes, it follows that the subwatersheds or portions of them may be significantly and adversely affected by improperly planned urbanization.

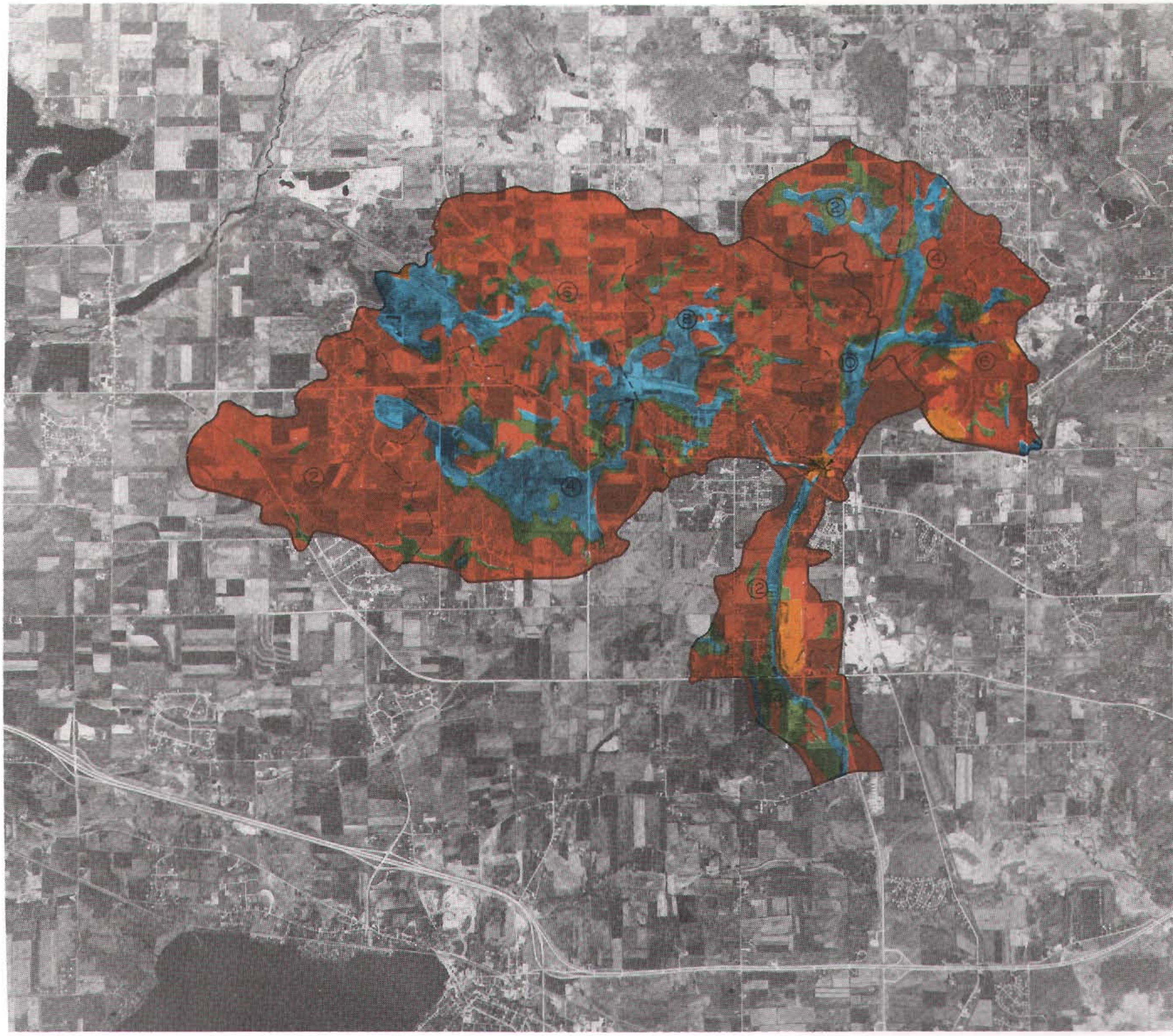
Existing Conditions: Existing (1975) land use within the Sussex Creek subwatershed and Willow Springs Creek subwatershed, based on the Regional Planning Commission's 1975 land use inventory, is shown in graphic summary on Map 4. Urban land uses—such as residential, commercial, industrial, and transportation—cover 2.1 square miles, or 21 percent of the Sussex Creek subwatershed area, and 0.7 square mile, or 31 percent of the Willow Springs Creek subwatershed area. Urban land uses in the Sussex Creek subwatershed are mainly concentrated within the Village of Sussex with similar land uses being found along the CTH V corridor in the Willow Springs Creek subwatershed.

Year 2000 Conditions: A year 2000 land use plan for the Sussex Creek and Willow Springs Creek subwatersheds is shown on Map 5. This plan, which is based upon the new regional land use plan presently under preparation, was developed to facilitate determination of probable impact of incremental urbanization on flood discharges and stages. Since the SEWRPC has not yet completed and adopted a year 2000 land use plan for the Region, the year 2000 plan for the Sussex Creek and Willow Springs Creek subwatersheds set forth herein should be viewed as an interim plan. It is not anticipated, however, that the final year 2000 regional land use plan will significantly differ from the plan used for this study. Factors considered in developing the interim plan include the adopted 1990 regional land use plan, urban development that has occurred since preparation of that plan, sanitary sewer service areas as recommended in the adopted regional

[1] *The difference in estimated average annual runoff is due primarily to proximity to meteorologic stations used to provide input to the hydrologic-hydraulic model described in Chapter V of this report. The Willow Springs Creek subwatershed was modeled as being under the influence of meteorologic conditions as recorded at the Germantown observation station whereas the Sussex Creek subwatershed was modeled as being under the influence of both the Germantown and Waukesha observation stations. A review of historic precipitation records at these two stations indicates that average annual precipitation at Waukesha exceeds that at Germantown. The Willow Springs Creek and Sussex Creek subwatersheds are quite similar in all other factors that may influence average annual runoff, consequently any difference in runoff between the Sussex Creek and Willow Springs Creek subwatersheds must be attributed to differences in precipitation as recorded at the nearest meteorologic stations.*

Map 3

HYDROLOGIC SOIL GROUPS IN THE SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS



LEGEND

- SUBWATERSHED BOUNDARY
- SUBBASIN BOUNDARY
- SUBBASIN DISCHARGE
- (12) SUBBASIN IDENTIFICATION NUMBER
- (NONE) HYDROLOGIC SOIL GROUP A: VERY LITTLE RUNOFF BECAUSE OF HIGH INFILTRATION CAPACITY, HIGH PERMEABILITY, AND GOOD DRAINAGE
- HYDROLOGIC SOIL GROUP B: MODERATE AMOUNTS OF RUNOFF BECAUSE OF MODERATE INFILTRATION CAPACITY, MODERATE PERMEABILITY, AND GOOD DRAINAGE
- HYDROLOGIC SOIL GROUP C: LARGE AMOUNTS OF RUNOFF BECAUSE OF LOW INFILTRATION CAPACITY, LOW PERMEABILITY, AND MODERATE DRAINAGE
- HYDROLOGIC SOIL GROUP D: LARGE AMOUNTS OF RUNOFF BECAUSE OF VERY LOW INFILTRATION CAPACITY, LOW PERMEABILITY, AND POOR DRAINAGE
- MADE LAND

GRAPHIC SCALE

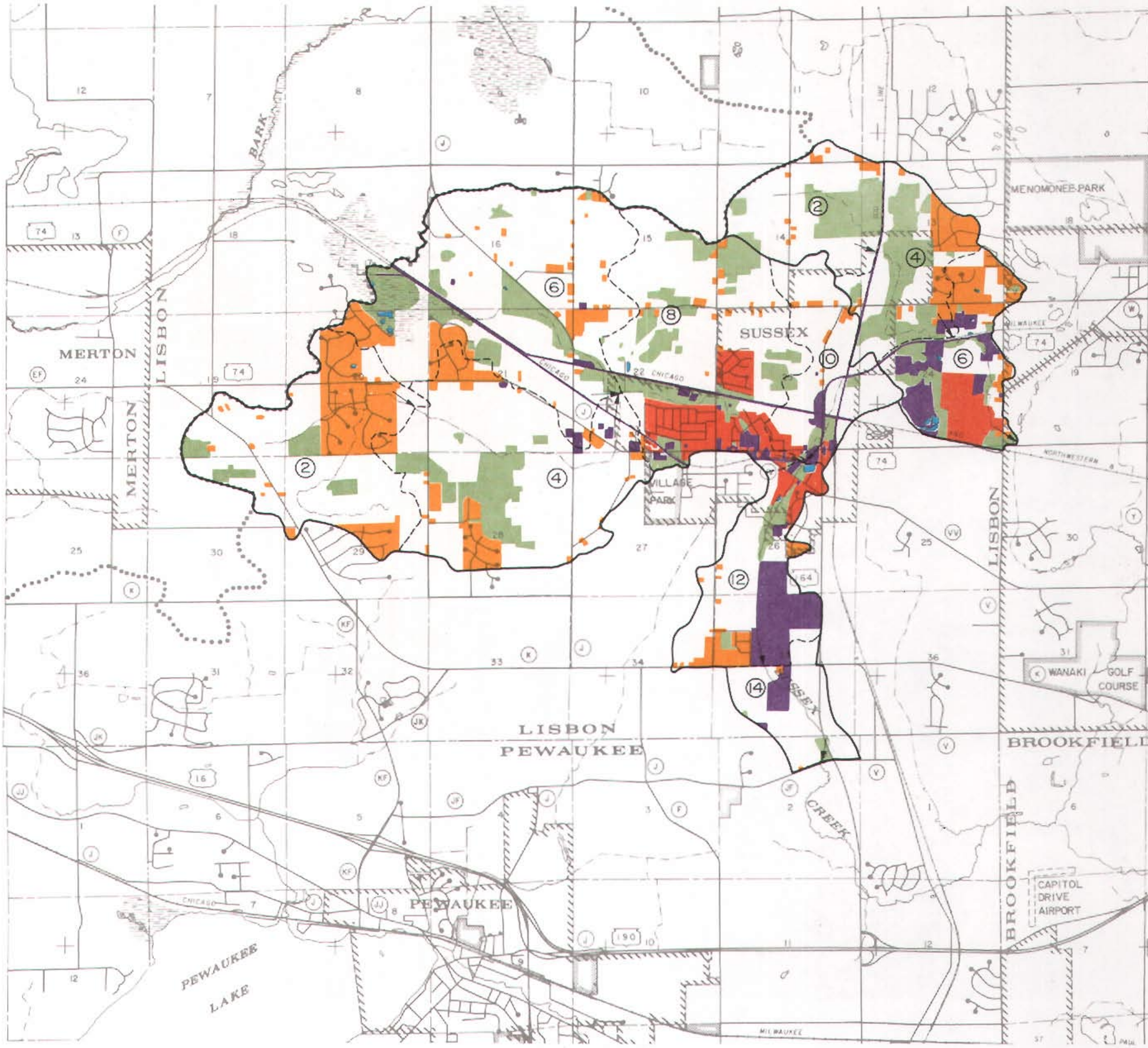
0 1/2 1 MILE

0 2000 4000 6000 8000 FEET

Source: SEWRPC.

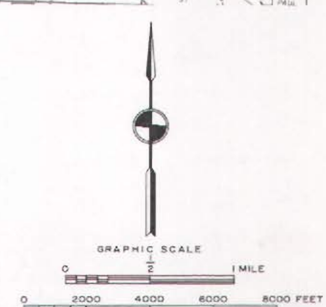
Map 4

EXISTING LAND USE IN THE SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS: 1975



LEGEND

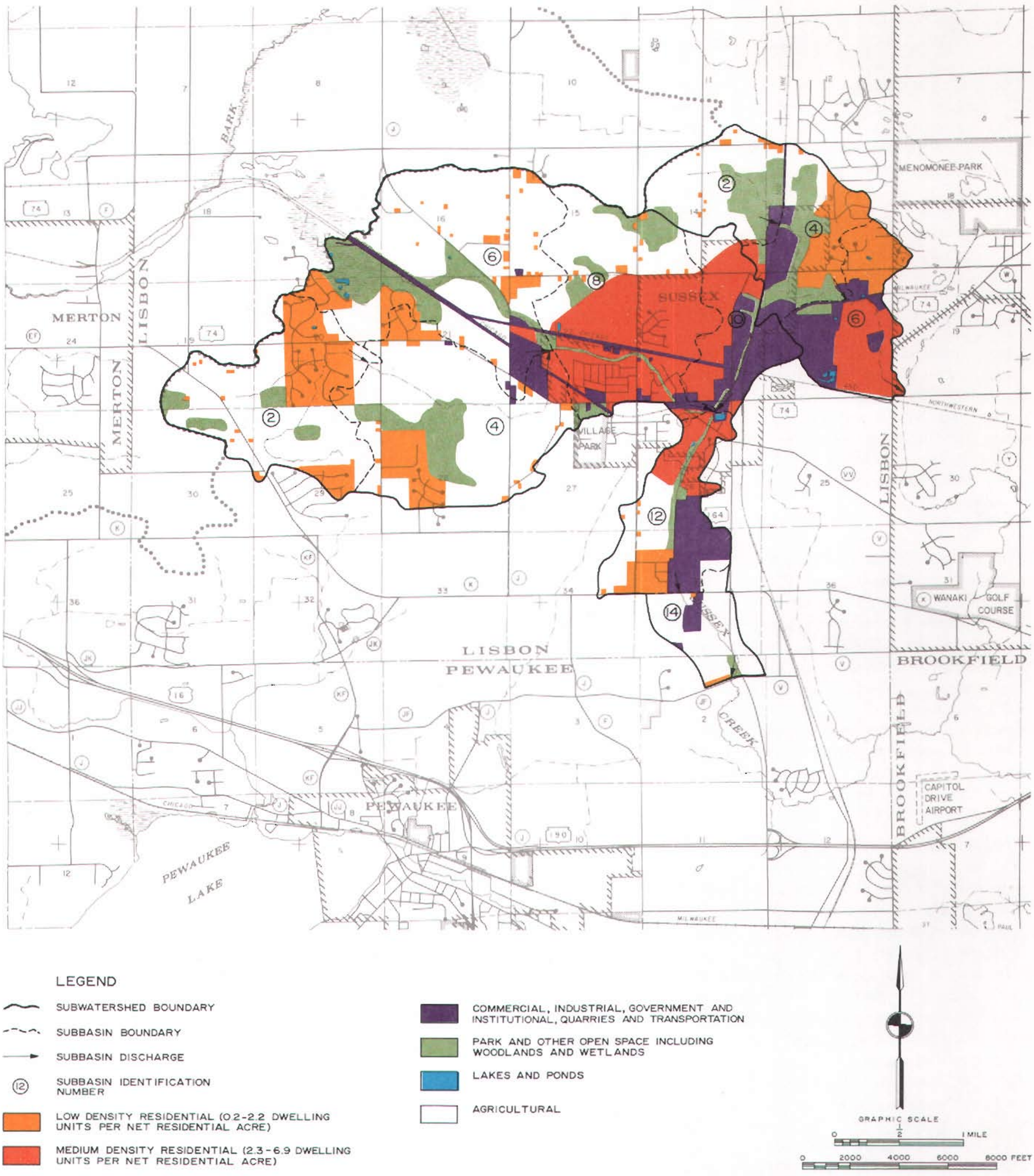
- SUBWATERSHED BOUNDARY
- SUBBASIN BOUNDARY
- SUBBASIN DISCHARGE
- (12) SUBBASIN IDENTIFICATION NUMBER
- LOW DENSITY RESIDENTIAL (0.2-2.2 DWELLING UNITS PER NET RESIDENTIAL ACRE)
- MEDIUM DENSITY RESIDENTIAL (2.3-6.9 DWELLING UNITS PER NET RESIDENTIAL ACRE)
- COMMERCIAL, INDUSTRIAL, GOVERNMENT AND INSTITUTIONAL, QUARRIES AND TRANSPORTATION
- PARK AND OTHER OPEN SPACE INCLUDING WOODLANDS AND WETLANDS
- LAKES AND PONDS
- AGRICULTURAL



Source: SEWRPC.

Map 5

PLANNED LAND USE IN THE SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS: 2000



Source: SEWRPC.

sanitary sewerage system plan for southeastern Wisconsin, preliminary neighborhood plans for the Village of Sussex, and the preliminary 2000 regional land use plan.

Under year 2000 plan land use conditions, about 3.6 square miles, or about 38 percent of the Sussex Creek subwatershed, and about 1.2 square miles, or about 55 percent of the Willow Springs Creek subwatershed, may be expected to be devoted to urban use. Approximately 1.5 square miles of rural land in the Sussex Creek subwatershed and 0.5 square mile of rural land in the Willow Springs Creek subwatershed may be expected to be converted from rural to urban uses between 1975 and the year 2000. Based on the land use plan for the two subwatersheds, incremental urban development would occur contiguous to existing urban development.

Subbasins

The Sussex Creek and Willow Springs Creek subwatersheds were divided into smaller hydrologic units called subbasins to permit accurate representation of the watershed hydrology in the computer model used to compute flood discharges and stages. In effect, the subbasin is the "building block" within which watershed hydrologic characteristics are quantified prior to hydrologic modeling.

The Sussex Creek subwatershed was divided into seven subbasins ranging in size from 0.44 square mile to 2.22 square miles, as shown on Map 6. The Willow Springs Creek subwatershed was divided into three subbasins ranging in size from 0.71 square mile to 0.77 square mile, as shown on Map 6. Many factors, in addition to topographic considerations, entered into delineation of the subbasins. The subbasins were delineated, for example, to define areas tributary to intermittent streams and drainageways, and to have their discharge points located at or near corporate limits and at hydrologic structures such as bridges.

The dominant hydrologic soil group, dominant land use and cover, nominal percent imperviousness, and proximity to the most representative meteorologic station of the various subbasins within each subwatershed were determined. Based on this information, seven land segment types were identified—I, II, III, IV, V, VI, and VII—with a land segment type being defined as a unique combination of dominant hydrologic soil type, dominant land use and cover, nominal percent imperviousness, and proximity to meteorologic station. The characteristics of each of the seven land segment types are set forth in Table 3, while the land segment types associated with each subbasin under existing and planned conditions are shown on Map 6 for the Sussex Creek and the Willow Springs Creek subwatersheds. The land segment type associated with the given subbasin is the primary factor used to model direct and indirect runoff from that subbasin to a successive downstream subbasin or to the major stream system of the subwatershed.

HYDRAULICS OF THE SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS

Sussex Creek Subwatershed

Sussex Creek: Sussex Creek originates in the northwest corner of the subwatershed. From its point of origin, Sussex Creek flows as an intermittent stream in a southeasterly direction for about two miles to the western limits of the Village at Station 409,950.[2] Sussex Creek becomes a perennial stream approximately 1.7 miles downstream of this point, and a total of 2.5 miles of the Creek are contained within the corporate limits of the Village of Sussex, with the Creek flowing out of the southeastern corner of the Village at Station 396,960. Sussex Creek then flows in a southeasterly direction for 5.6 miles to join the Fox River approximately 9.2 miles upstream of the City of Waukesha. The total length of Sussex Creek within the subwatershed is approximately six miles and the average fall of the channel bottom is about 20 feet per mile.

East Branch of Sussex Creek: The East Branch of Sussex Creek originates in the northeast corner of the subwatershed. From its point of origin the East Branch of Sussex Creek, which is contained entirely within the Village limits, flows as an intermittent stream in a southwesterly direction for about 0.7 mile to its confluence with Sussex Creek at Station 400,820. The average fall of the East Branch of Sussex Creek channel bottom is about 32 feet per mile.

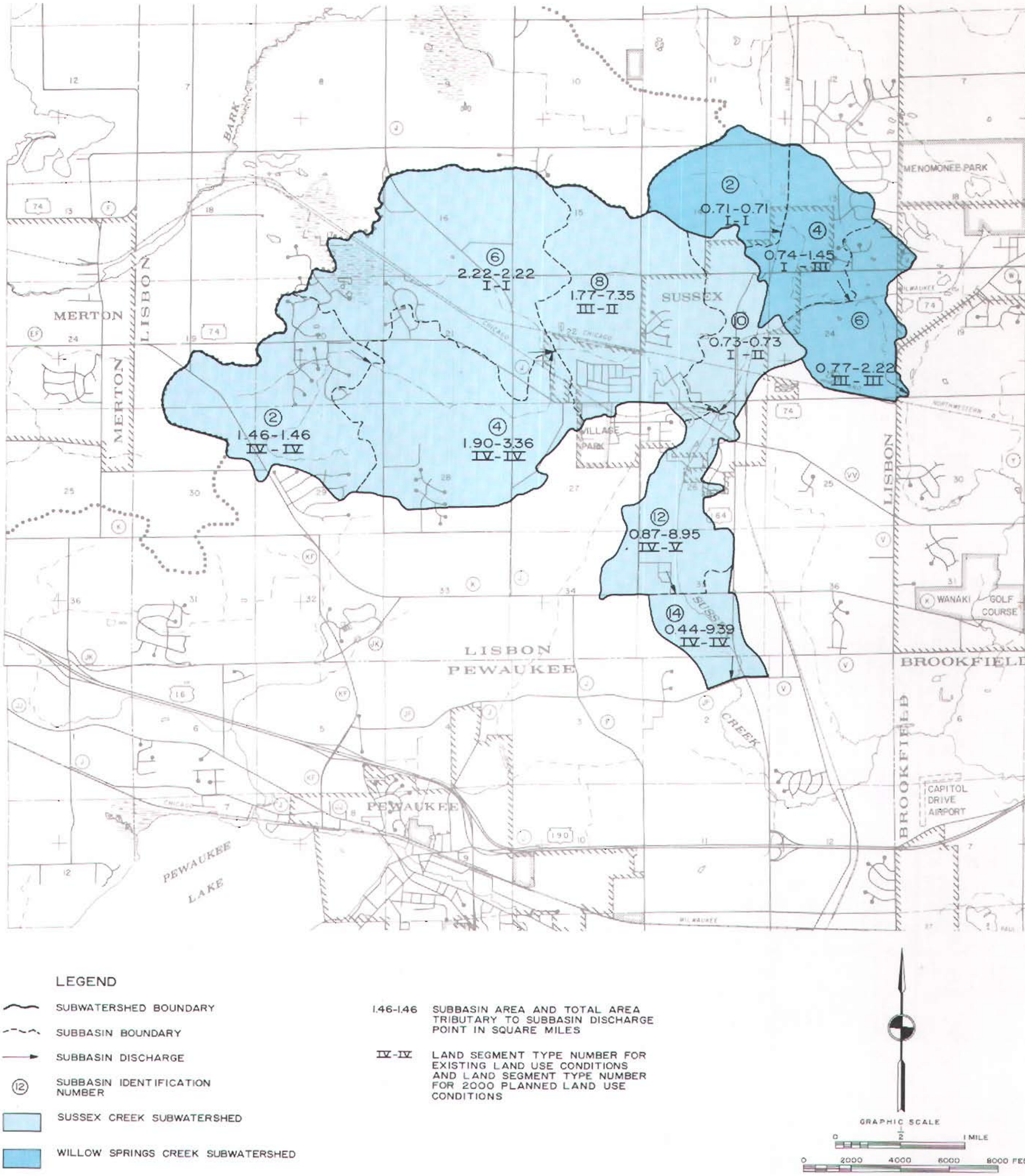
South Branch of Sussex Creek: The South Branch of Sussex Creek originates in the southwest corner of the subwatershed. From its point of origin, the South Branch of Sussex Creek flows as an intermittent stream in an easterly direction for about three miles to the southwestern limits of the Village. The South Branch of Sussex Creek then flows in a northerly direction about 0.5 mile to the confluence with Sussex Creek at Station 409,100. The total length of the South Branch of Sussex Creek in the subwatershed is approximately 3.5 miles, and the average fall of the channel bottom is about five feet per mile.

Flood flows and flood stage information suitable for detailed flood hazard mapping was developed, as shown on Map 2, for the 4.6-mile-long reach of Sussex Creek extending from Station 412,200, about 0.4 mile upstream of the western limits of the Village of Sussex, to Station 388,170, about 1.7 miles downstream of the southern limits of the Village; for the 0.7-mile-long reach of the East Branch of Sussex Creek extending from its confluence with Sussex Creek at Station 400,820 to Station 404,510; and for the 0.5-mile-long reach of the South

[2] *Stationing in feet along the stream system referenced to the Wilmot Dam on the main stem of the Fox River in Kenosha County.*

Map 6

SUBBASINS IN THE SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS



Source: SEWRPC.

Table 3

LAND SEGMENT TYPES REPRESENTATIVE OF THE SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS

Identification	Dominant Hydrologic Soil Group	Dominant Land Use-Cover	Nominal Percent Imperviousness	Meteorologic Station
I	B	Rural-Agriculture and Open Space	2	Germantown
II	B	Low-Density Residential with Supporting Urban Land Uses	20	Germantown
III	B	Medium-Density Residential with Supporting Urban Land Uses	45	Germantown
IV	B	Rural-Agriculture and Open Space	2	Waukesha
V	B	Low-Density Residential with Supporting Urban Land Uses	15	Waukesha
VI	B	Medium-Density Residential with Supporting Urban Land Uses	28	Waukesha
VII	B	Medium-Density Residential with Supporting Urban Land Uses	45	Waukesha

Source: SEWRPC.

Branch of Sussex Creek extending from its confluence with Sussex Creek at Station 409,100 to Station 411,535 at the Village limits. The Sussex Creek channel bottom falls about 90 feet in this distance at an average slope of 20 feet per mile. The East and South Branches of Sussex Creek fall about 22 feet and 2 feet, respectively, in this distance at an average slope of 32 feet per mile and 5 feet per mile, respectively. The detailed study of the Sussex Creek subwatershed was restricted to the reaches listed because photogrammetrically compiled large-scale (1" = 200', 2' contour interval) topographic maps meeting National Map Accuracy Standards and prepared since 1968 were available for these reaches from the Commission and the Village of Sussex and because the development of detailed flood hazard information for riverine areas outside of the corporate limits of the Village of Sussex was beyond the scope of this project. Map 2 shows the aerial extent of large-scale topographic mapping currently available for the Sussex Creek subwatershed, the source of the mapping, the scale and contour interval, and the date of preparation of the maps.

<u>Willow Springs Creek Subwatershed</u>

<u>Willow Springs Creek</u>: Willow Springs Creek originates in the northwest corner of the subwatershed. From its point of origin, Willow Springs Creek flows as an intermittent stream in a southeasterly direction for about 0.8 mile to the northern limits of the Village of Sussex at Station 13,500.[3] A total of 0.9 mile of Willow Springs Creek is contained within the corporate limits of the Village of Sussex with the Creek flowing out of the northeastern corner of the Village at Station 8,710. The Creek then flows in a southeasterly direction for about 1.6 miles before leaving the subwatershed. The total length of Willow Springs Creek within the subwatershed is 3.3 miles and the average fall of the channel bottom is about 40 feet per mile.

While flood flows were determined at selective points along the entire reach of Willow Springs Creek within the subwatershed, flood stage information suitable for detailed flood hazard mapping was developed, as shown on Map 2, for that 1.3-mile-long reach of Willow Springs Creek extending from Station 13,580 at the upstream Village limits, to Station 6,980, about 0.3 mile downstream of the Village limits. The Willow Springs Creek channel bottom falls about 36 feet in this distance at an average slope of 29 feet per mile. The detailed study of the Willow Springs Creek was restricted to this reach because photogrammetrically compiled large-scale (1" = 200', 2' contour interval) topographic maps meeting National Map Accuracy Standards and prepared since 1974 were available for this reach from the Village of Sussex and because the development of detailed flood hazard information for riverine areas outside of the corporate limits of the Village of Sussex was beyond the scope of this project. Map 2 shows the aerial extent of large-scale topographic mapping currently available for

[3] *Stationing in feet along the stream system referenced to the STH 74 bridge on Willow Springs Creek.*

the Willow Springs Creek subwatershed, the source of the mapping, the scale and contour interval, and the date of preparation of the maps.

Floodland Cross Sections

The width, slope, and flow resistance of the channel and its floodplain are important hydraulic elements of the streams since they are the primary determinant of the stage at which a given flood discharge will occur. Channel-floodplain cross sections were developed by combining information from topographic maps—Village of Sussex and Commission large-scale maps where available as shown on Map 2 and 1" = 200' scale Waukesha County maps elsewhere—with channel bottom data obtained as part of a hydraulic structure inventory conducted by field survey methods. A total of 84 channel-floodplain cross sections were constructed along Sussex Creek, the East Branch of Sussex Creek, and the South Branch of Sussex Creek in the Sussex Creek subwatershed, and a total of 36 channel-floodplain cross sections were constructed along Willow Spring Creek in the Willow Springs Creek subwatershed. Channel-floodplain cross sections were spaced at an average of 500 feet within the detailed study reaches for which large-scale topographic maps were available. These cross sections, along with channel and floodplain Manning roughness coefficients determined by field inspection, were used as input to the flood flow simulation computer program.

Bridges and Culverts

Depending on the size of the waterway opening and the characteristics of the approaches, bridges and culverts can significantly influence the hydraulic behavior of a subwatershed stream system. Constrictions caused by inadequately designed bridges and culverts can, under flood discharge conditions, result in large backwater effects thereby creating a floodland area upstream of the structure that is significantly larger than that which would exist in the absence of the bridge or culvert. As shown in Table 4, Sussex Creek is crossed 23 times by existing pedestrianways, roadways, and railroads in the 4.6 mile reach extending from Station 388,170 to Station 412,200; the South Branch of Sussex Creek is crossed three times by existing roadways and railroads in the 0.5 mile reach extending from Station 409,100 to Station 411,535; the East Branch of Sussex Creek is crossed seven times by existing roadways and railroads in the 0.7 mile reach from Station 400,820 to Station 404,510; and Willow Springs Creek is crossed nine times by roadways and railroads in the 3.3 mile reach extending from Station 0 to Station 17,470. Existing structures were examined in order to incorporate data on all structures that might affect discharges or stages within Sussex Creek, the South Branch of Sussex Creek, the East Branch of Sussex Creek, and Willow Springs Creek reaches selected for development of detailed flood hazard information. Based on that examination, certain bridges and culverts were determined to be hydraulically insignificant, either because they were located upstream of the detailed study reach or were of such size or elevation as not to influence flood stages more than 0.5 feet during 10- to 100-year recurrence interval flood events. A bridge or culvert is likely to be hydraulically insignificant if it simply spans a stream from bank to bank, has approach roads with little or no fill on the floodplain, and has a relatively small superstructure. Data and information such as waterway opening size, roadway profile, and channel-bottom elevation were obtained for the hydraulically significant bridges and culverts from the Commission Fox River watershed planning program files supplemented with field data provided by the Village of Sussex, and were used as input to the hydrologic-hydraulic computer model used to compute flood discharges and stages.

Table 4

HYDRAULIC STRUCTURE INDEX FOR SUSSEX CREEK, THE EAST BRANCH OF SUSSEX CREEK, THE SOUTH BRANCH OF SUSSEX CREEK, AND WILLOW SPRINGS CREEK IN AND NEAR THE VILLAGE OF SUSSEX

Sussex Creek in and Near the Village of Sussex

Structure Identification			Structure Type		Hydraulically Significant	
Structure Number	Station[a]	Name	Bridge	Culvert	Yes	No
2	388,300	CTH JF Bridge	X	--	X	--
4	391,840	Private Bridge	X	--	X	--
6	392,020	Private Bridge	--	X	X	--
8	393,100	CTH K Bridge	X	--	X	--
10	394,600	Private Bridge	--	X	--	X
12	397,620	Private Bridge	--	X	X	--
14	398,320	Clover Drive Bridge	--	X	X	--
16	400,320	Silver Spring Drive Bridge	X	--	X	--
17	400,780	Swimming Beach Bridge	X	--	--	X
18	402,120	Silver Spring Drive Bridge	X	--	X	--
20	402,630	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	X	--	X	--
22	402,910	Main Street Bridge	X	--	X	--
24	403,030	Private Bridge	X	--	X	--
26	403,240	Public Foot Bridge	X	--	X	--
28	403,820	Old Mill Lane Bridge	X	--	X	--
30	404,475	Private Bridge	X	--	--	X
32	404,850	Private Bridge	X	--	--	X
34	405,110	Private Bridge	X	--	X	--
36	405,610	Maple Avenue Bridge	X	--	X	--
38	405,870	Private Bridge	X	--	--	X
40	406,300	Private Bridge	--	X	X	--
42	410,750	Chicago and North Western Railroad Bridge	X	--	X	--
44	412,200	CTH J Bridge	--	X	X	--

The East Branch of Sussex Creek in and Near the Village of Sussex

Structure Identification			Structure Type		Hydraulically Significant	
Structure Number	Station[a]	Name	Bridge	Culvert	Yes	No
46	401,000	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	X	--	X	--
48	401,270	Downstream End Main Street Culvert	--	X	X	--
48	401,775	Upstream End Main Street Culvert	--	X	X	--
50	402,345	Waukesha Avenue Bridge	--	X	X	--
52	402,380	Chicago, Milwaukee, St. Paul, and Pacific Railroad	--	X	X	--
54	403,070	Chicago and North Western Railroad Bridge	--	X	X	--
56	403,270	Private Bridge	--	X	--	X
58	404,630	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	X	--	--	X

Table 4 (continued)

The South Branch of Sussex Creek in and Near the Village of Sussex

Structure Identification			Structure Type		Hydraulically Significant	
Structure Number	Station[a]	Name	Bridge	Culvert	Yes	No
60	409,825	Private Bridge	X	--	--	X
62	410,385	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	X	--	X	--
64	411,435	Main Street Bridge	--	X	X	--

Willow Springs Creek in and Near the Village of Sussex

Structure Identification			Structure Type		Hydraulically Significant	
Structure Number	Station[a]	Name	Bridge	Culvert	Yes	No
2	0	STH 74 Bridge	X	--	X	--
4	420	St. James Parkway Bridge	--	X	X	--
6	2,030	McLaughlin Road Bridge	--	X	X	--
8	2,755	Private Bridge	--	X	X	--
10	5,135	Private Bridge	--	X	X	--
12	6,205	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	--	X	X	--
14	10,250	Good Hope Road (CTH W) Bridge	--	X	X	--
16	12,850	Soo Line Railroad Bridge	--	X	X	--
18	17,470	Woodside Road Bridge	--	X	X	--

[a] *Stationing begins at Wilmot Dam for Sussex Creek, the East Branch of Sussex Creek, and the South Branch of Sussex Creek. Stationing begins at STH 74 for Willow Springs Creek.*

Source: SEWRPC.

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Chapter V

THE HYDROLOGIC-HYDRAULIC MODEL

INTRODUCTION

In order to accomplish the objective of this floodland information report—that is, to delineate a regulatory floodplain and floodway for Sussex Creek, the East Branch of Sussex Creek, the South Branch of Sussex Creek, and Willow Springs Creek in and near the Village of Sussex—it was necessary to apply a suitable analytic technique to supplement the meager amount of available stream stage and inundation data. A digital computer model capable of simulating the watershed hydrologic-hydraulic system was selected as that analytic technique.

DESCRIPTION OF THE MODEL

The digital computer model used to simulate the behavior of the hydrologic-hydraulic system of the Sussex Creek and Willow Springs Creek subwatersheds consists of three submodels operated in sequence and is illustrated in Figure 1. All the necessary inputs of the hydrologic-hydraulic model were obtained from the inventory of the subwatersheds' hydrologic-hydraulic systems as described in the preceding chapter of this report. The principal function of the Hydrologic Submodel[1] is to determine the volume and temporal distribution of runoff from the land to the stream system. As used here, the concept of runoff from the land is broadly interpreted to include direct or surface runoff, interflow, and groundwater flow to the streams. The amount and rate of runoff from the land to the watershed stream system is largely a function of two factors—the meteorologic events which determine the quantity of water available along or beneath the land surface and the nature and use of the land.

The primary function of Hydraulic Submodel 1 is to accept as input the runoff from the Hydrologic Submodel, aggregate it in, and route it through the stream system thereby producing a continuous series of discharge values at predetermined locations along the subwatershed stream system. In addition to output of the Hydrologic Submodel, operation of Hydraulic Submodel 1 requires data describing the physical characteristics of the stream channel and floodplain.

The primary function of Hydraulic Submodel 2[2] is to determine the flood stages commensurate with flood flows of specified recurrence interval as obtained by the statistical analysis of the output from Hydraulic Submodel 1. In addition to the necessary flood flows, use of Hydraulic Submodel 2 requires additional detailed information concerning the hydraulics of the stream system including channel-floodplain cross sections; Manning roughness coefficients; and bridge, culvert, and dam data.

MODEL USES

The hydrologic-hydraulic model was used to determine flood discharges and stages along Sussex Creek, South Branch of Sussex Creek, East Branch of Sussex Creek, and Willow Springs Creek in and near the Village of Sussex for the 10-, 25-, 50-, 100-, and 500-year recurrence interval flood events under existing (1975) and year 2000 planned land use conditions. Flood discharges and stages were simulated for 100-year recurrence interval flood conditions for land use regulatory purposes, while 10-, 25-, 50-, and 500-year recurrence interval events were simulated so as to yield a full spectrum of flood discharges and stages in areas of inundation to be used for federal flood insurance purposes and for detailed local land use planning and engineering applications.

Proper consideration of water resource related development decisions requires consideration of future, as well as existing, land use conditions, which may affect water resources in general, and flood problems in particular. Flood flows were first simulated under existing land use conditions in order to determine the present flood characteristics of the Sussex Creek and Willow Springs Creek subwatersheds in and near Sussex and to establish a point of reference for the results of simulation model applications based on the year 2000 plan land use conditions. The hydrologic-hydraulic response of the planned year 2000 land use conditions was modeled in order to test the sensitivity of the flow regime of Sussex Creek, East and South Branches of Sussex Creek, and Willow Springs Creek to the urbanization that is likely to occur, and to produce 100-year recurrence interval flood discharges and stages under future conditions for land use regulatory purposes.

It should be noted that year 2000 land use conditions apply to areas within the floodlands of Sussex Creek, the East Branch of Sussex Creek, the South Branch of Sussex Creek, and Willow Springs Creek, as well as to areas

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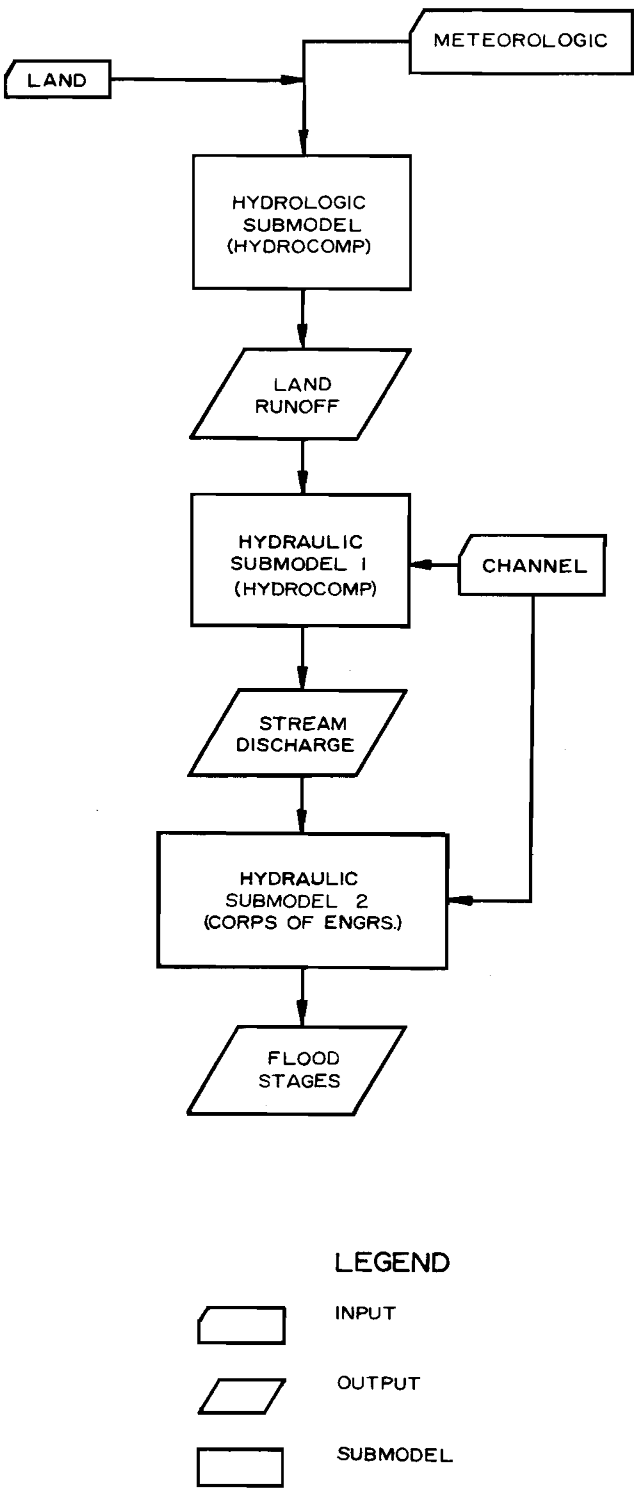
[1] *The hydrologic submodel used in the study is known as the "Hydrocomp Model." For further information concerning this model see: Hydrocomp, Inc., Hydrocomp Simulation Programming (HSP) Operations Manual, Fourth Edition, January 1976.*

[2] *The hydraulic submodel used in this study is known as "HEC-2, Water Surface Profile Model." For further information concerning this model see: U. S. Army Corps of Engineers, Hydrologic Engineering Center, "HEC-2, Water Surface Profiles," Computer Program 723-X6-L2020A, Users Manual, October 1973.*

Figure 1

HYDROLOGIC-HYDRAULIC MODEL APPLIED TO THE SUSSEX CREEK AND WILLOW SPRINGS CREEK SUBWATERSHEDS



Source: SEWRPC.

outside of those floodlands. The plan assumes that floodlands not yet occupied by urban uses will be retained in an essentially open, natural condition and used for recreation, agricultural, and other open space uses. This aspect of the year 2000 plan is critical, since widespread filling and development of floodlands upstream of the Village of Sussex may be expected to increase flood discharges and stages within the Village because of the attendant loss of floodwater conveyance and storage capacity.

After using the model to determine flood discharges, stages, and areas of inundation under existing and year 2000 plan conditions, the hydrologic-hydraulic model was used to identify bridges and culverts producing relatively large backwater effects and to analyze the reduction in flood stages that would result if the selected bridges were removed or reconstructed so as to have increased hydraulic capacity.

After completion of the above simulation model applications, the hydraulic submodel was used to delineate a regulatory floodway along Sussex Creek, the East and South Branches of Sussex Creek, and Willow Springs Creek through the Village of Sussex using the 100-year recurrence interval discharge under year 2000 plan land use conditions.

Chapter VI

FLOOD DISCHARGES, STAGES, AND THE NATURAL FLOODLANDS

INTRODUCTION

The purpose of this chapter is to present in tabular form the 10-, 25-, 50-, 100-, and 500-year recurrence interval flood discharges and stages under existing (1975) and planned year 2000 land use conditions and to present in graphic form the 10- and 100-year recurrence interval flood stages under planned year 2000 land use conditions. The natural floodplain commensurate with year 2000 land use conditions is also described, as is the hydraulic adequacy of river crossings. Discharge and stage data under existing (1975) land use conditions are presented to enable the Village of Sussex to qualify for the flood insurance program administered by the U. S. Department of Housing and Urban Development, while discharge and stage data under year 2000 planned land use conditions are presented for the preparation of sound floodland use regulations and community planning and development programs. All of this flood discharge, stage, and inundation information was developed using the hydrologic-hydraulic simulation model described in the preceding chapter of this report.

DISCHARGES AND STAGES

Peak flood discharge and peak flood stage information for the 10-, 25-, 50-, 100-, and 500-year recurrence interval flood events under existing (1975) and planned year 2000 land use conditions are presented in Tables 5 and 6, respectively. Discharge and stage data are presented for the Sussex Creek reach, extending from just downstream of CTH JF at Station 388,170 upstream to CTH J at Station 412,200; for the East Branch of Sussex Creek reach, extending from Station 400,820 at the Sussex Creek-East Branch of Sussex Creek confluence upstream to Station 404,510; and for the South Branch of Sussex Creek reach, extending from Station 409,100 at the Sussex Creek-South Branch confluence upstream to Main Street at Station 411,535. Large-scale topographic maps are available for accurately defining the channel-floodplain cross sections in these reaches.

Discharge data are also presented in Tables 5 and 6 for the 2.5-mile-long Willow Springs Creek reach extending from STH 74 at Station 0 upstream to Woodside Road at Station 17,470. Flood stages are shown in Tables 5 and 6 only for the 1.3-mile-long Willow Springs Creek reach—Station 6,980 to Station 13,580—for which large-scale topographic maps are available.

FLOOD STAGE PROFILES

Figures 2 and 3 present 10- and 100-year recurrence interval flood stage profiles under year 2000 plan land use conditions for Sussex Creek and the East and South Branches of Sussex Creek. Figure 4 presents the 10- and 100-year recurrence interval flood stage profiles under 2000 plan land use conditions for Willow Springs Creek. These profiles, which encompass the 4.6-mile-long Sussex Creek reach, the 0.7-mile-long East Branch of the Sussex Creek reach, the 0.5-mile-long South Branch of the Sussex Creek reach, and the 1.3-mile-long Willow Springs Creek reach, constitute a graphic representation of the flood stage data set forth in Table 6. In addition to providing an overall representation of the flood stages relative to familiar points of reference, such as the channel bottom and bridge deck surfaces, the profiles, because they are continuous, permit the determination of flood stages at any point along the stream channels.

NATURAL FLOODPLAIN

The natural floodplain as it could be expected to exist under year 2000 plan land use conditions was prepared using the flood stage data in Table 6, and the flood stage profiles in Figures 2, 3, and 4, and encompasses 4.6 miles of Sussex Creek extending from Station 388,170 (1.7 miles downstream of the southern corporate limits of Sussex) to Station 412,200 (0.4 mile upstream of the western corporate limits of Sussex), 0.7 mile of the East Branch of Sussex Creek extending from Station 400,820 to Station 404,510, and 0.5 mile of the South Branch of Sussex Creek from Station 409,100 to Station 411,535. The natural floodplain also includes the 1.3 miles of Willow Springs Creek extending from Station 6,980 (0.3 mile downstream of the eastern corporate limits of Sussex) to Station 13,580 (the northern corporate limits of Sussex).

Review of the natural floodplain indicates that 11 major structures within the Village of Sussex may be expected to be affected by overland flooding of Sussex Creek and the East Branch of Sussex Creek during a 100-year recurrence interval flood event. These findings are consistent with the results of the historic flood survey which, as discussed earlier in this report, indicated flood damage to structures for historic floods less severe than the 100-year recurrence interval condition.

HYDRAULIC ADEQUACY OF RIVER CROSSINGS

Examination of the flood stage profiles shown in Figures 2, 3, and 4 indicates that four bridges on Sussex Creek and two bridges on the East Branch of Sussex Creek produce relatively large backwater effects; that is, the regulatory flood stage immediately upstream of each of the bridges is approximately one to seven feet higher than it would be in the absence of the bridges. Proceeding in an upstream direction, these four bridges on Sussex Creek are: A private bridge at Station 397,620

Table 5

FLOOD DISCHARGES AND STAGES FOR SUSSEX CREEK, THE EAST BRANCH OF SUSSEX CREEK, THE SOUTH BRANCH OF SUSSEX CREEK, AND WILLOW SPRINGS CREEK IN AND NEAR THE VILLAGE OF SUSSEX UNDER EXISTING (1975) LAND USE CONDITIONS

Sussex Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
388170			214	849.5	274	849.8	323	850.0	375	850.2	511	850.3
388300	CTH JF Bridge	2	214	852.0	274	852.5	323	852.8	375	853.2	511	854.2
388350			214	852.4	274	852.9	323	853.3	375	853.7	511	854.8
388913			214	852.9	274	853.1	323	853.4	375	853.7	511	854.7
389475			214	858.4	274	858.6	323	858.7	375	858.8	511	858.8
389975			214	861.1	274	861.2	323	861.4	375	861.7	511	861.9
390500			214	865.0	274	865.2	323	865.3	375	865.5	511	866.3
391000			214	868.4	274	868.7	323	869.0	375	869.2	511	869.5
391800			214	871.3	274	871.5	323	871.6	375	871.7	511	872.0
391840	Private Bridge	4	214	874.0	274	874.6	323	875.1	375	875.4	511	875.7
391880			214	874.0	274	874.6	323	875.1	375	875.4	511	875.7
391970			214	874.1	274	874.7	323	875.1	375	875.4	511	875.7
392020	Private Bridge	6	214	875.3	274	875.5	323	875.5	375	875.6	511	875.8
392070			214	875.3	274	875.5	323	875.5	375	875.6	511	875.8
392590			214	875.3	274	875.5	323	875.6	375	875.6	511	875.9
393030			214	875.3	274	875.5	323	875.6	375	875.7	511	876.0
393100	CTH K Bridge	8	215	875.3	272	875.5	317	875.6	363	875.7	482	875.9
393170			215	875.4	272	875.6	317	875.7	363	875.8	482	876.2
393670			215	875.5	272	875.7	317	875.8	363	876.0	482	876.3
394170			215	875.9	272	876.2	317	876.3	363	876.5	482	876.9
394340			215	876.3	272	876.5	317	876.7	363	876.9	482	877.4
394540			215	876.7	272	877.0	317	877.2	363	877.4	482	877.9
394660			215	876.8	272	877.0	317	877.3	363	877.5	482	878.0
395160			215	877.6	272	877.8	317	878.1	363	878.3	482	878.8
395650			215	879.1	272	879.5	317	879.7	363	879.9	482	880.3
396200			215	882.5	272	882.9	317	883.2	363	883.5	482	884.2
396960	Downstream Sussex Village Limits		215	885.1	272	885.6	317	885.9	363	886.2	482	886.9
397560			215	886.5	272	886.9	317	887.2	363	887.4	482	888.0
397620	Private Bridge	12	215	886.8	272	887.2	317	887.5	363	887.9	482	889.4
397680			215	887.5	272	888.0	317	888.3	363	888.6	482	889.4
398250			215	888.1	272	888.6	317	888.9	363	889.1	482	889.8
398320	Clover Drive Bridge	14	215	888.8	272	890.1	317	890.4	363	890.6	482	891.0
398390			215	890.5	272	890.8	317	891.2	363	891.4	482	891.8
398900			215	890.6	272	890.9	317	891.2	363	891.5	482	891.9
399700			215	890.7	272	891.0	317	891.3	363	891.6	482	892.0
400240			215	892.2	272	892.4	317	892.5	363	892.6	482	892.9
400320	Silver Spring Drive Bridge	16	215	892.3	272	892.5	317	892.6	363	892.8	482	893.1
400400			215	892.4	272	892.8	317	893.0	363	893.2	482	893.7
400820	Confluence with the East Branch of Sussex Creek		203	894.8	249	895.0	283	895.1	318	895.3	400	895.8
401440			203	899.6	249	899.8	283	899.9	318	900.1	400	900.4
402020			203	906.3	249	906.5	283	906.7	318	906.8	400	907.0
402120	Silver Spring Drive Bridge	18	203	906.8	249	907.0	283	907.1	318	907.3	400	907.6
402220			203	908.2	249	908.5	283	908.7	318	908.9	400	909.2
402600			203	912.3	249	912.6	283	912.7	318	912.9	400	913.2
402630	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	20	203	913.4	249	913.6	283	913.7	318	913.9	400	914.2
402660			203	914.3	249	914.6	283	914.7	318	914.9	400	915.2
402830			203	915.7	249	915.9	283	916.0	318	916.2	400	916.7
402910	Main Street Bridge	22	203	917.7	249	918.1	283	918.5	318	918.7	400	919.9
402980			203	918.6	249	918.9	283	919.0	318	919.1	400	920.0
403030	Private Bridge	24	203	919.5	249	919.7	283	919.9	318	920.1	400	920.4
403060			203	919.5	249	919.7	283	919.9	318	920.1	400	920.5
403225			203	919.5	249	919.8	283	920.0	318	920.1	400	920.5
403240	Public Foot Bridge	26	203	919.8	249	920.1	283	920.3	318	920.5	400	920.8
403265			203	919.8	249	920.1	283	920.3	318	920.5	400	920.9
403760			203	921.3	249	921.6	283	921.7	318	921.9	400	922.2
403820	Old Mill Lane Bridge	28	203	925.7	249	926.1	283	926.4	318	926.7	400	926.9
403880			203	926.6	249	927.1	283	927.5	318	927.9	400	928.6
404350			203	926.6	249	927.1	283	927.5	318	927.9	400	928.7
404550			203	926.6	249	927.1	283	927.5	318	927.9	400	928.7

Table 5 (continued)

Sussex Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
404900			203	927.6	249	928.0	283	928.3	318	928.5	400	929.2
405060			203	928.8	249	929.0	283	929.1	318	929.3	400	929.6
405110	Private Bridge	34	203	929.2	249	929.4	283	929.6	318	929.7	400	930.7
405170			203	929.5	249	929.8	283	930.1	318	930.6	400	930.9
405560			203	931.9	249	932.3	283	932.5	318	932.5	400	932.6
405610	Maple Avenue Bridge	36	203	932.4	249	932.7	283	932.9	318	933.0	400	933.3
405680			203	932.4	249	932.7	283	932.9	318	933.2	400	933.6
405900			203	935.2	249	935.6	283	935.9	318	936.1	400	936.6
406250			203	935.8	249	936.2	283	936.5	318	936.7	400	937.2
406300	Private Bridge	40	203	935.9	249	936.2	283	936.5	318	936.7	400	937.3
406350			203	935.9	249	936.3	283	936.5	318	936.7	400	937.3
406850			203	936.0	249	936.4	283	936.6	318	936.8	400	937.3
407400			203	936.1	249	936.4	283	936.7	318	936.9	400	937.4
407900			203	936.1	249	936.4	283	936.7	318	936.9	400	937.4
408450			203	936.1	249	936.4	283	936.7	318	936.9	400	937.4
409100	Confluence with the South Branch of Sussex Creek		203	936.4	249	936.7	283	936.8	318	937.0	400	937.5
409950	Upstream Sussex Village Limits		52	936.5	65	936.8	75	936.9	85	937.1	107	937.5
410350			52	936.6	65	936.8	75	937.0	85	937.1	107	937.6
410650			52	936.6	65	936.8	75	937.0	85	937.2	107	937.6
410750	Chicago and North Western Railroad Bridge	42	52	938.8	65	939.0	75	939.1	85	939.2	107	939.3
410800			52	938.9	65	939.1	75	939.2	85	939.3	107	939.6
411400			52	938.9	65	939.1	75	939.2	85	939.3	107	939.5
412100		44	52	939.7	65	939.8	75	939.9	85	940.0	107	940.2
412200	CTH J Bridge Upstream Limits of Large Scale Mapping		52	943.9	65	944.2	75	944.5	85	944.7	107	945.3

The East Branch of Sussex Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
400820	Confluence with Sussex Creek		27	894.8	31	895.0	34	895.1	37	895.3	42	895.8
401000	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	46	27	894.8	31	895.0	34	895.1	37	895.3	42	895.8
401050			27	894.9	31	895.1	34	895.2	37	895.4	42	895.8
401220			27	894.9	31	895.1	34	895.2	37	894.4	42	895.8
401775	Main Street Culvert	48	27	894.9	31	895.1	34	895.2	37	895.4	42	895.8
401825			27	894.9	31	895.1	34	895.2	37	895.4	42	895.8
402275			27	897.3	31	897.4	34	897.4	37	897.5	42	897.5
402345	Waukesha Avenue Bridge	50	27	897.5	31	897.6	34	897.7	37	897.7	42	897.8
402375			27	897.7	31	897.8	34	898.0	37	898.0	42	898.7
402380	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	52	27	898.9	31	899.1	34	899.3	37	899.6	42	899.6
402415			27	898.9	31	899.2	34	899.4	37	899.6	42	899.6
402980			27	905.9	31	905.9	34	905.9	37	905.9	42	905.9
403070	Chicago and North Western Railroad Bridge	54	27	907.0	31	907.1	34	907.2	37	907.3	42	907.4
403160			27	907.3	31	907.4	34	907.5	37	907.6	42	907.7
403290			27	907.4	31	907.4	34	907.5	37	907.6	42	907.7
403810			27	910.1	31	910.1	34	910.1	37	910.1	42	910.2
404510			27	914.4	31	914.4	34	914.5	37	914.5	42	914.5

Table 5 (continued)

The South Branch of Sussex Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
409100	Confluence with Sussex Creek		87	936.4	129	936.7	170	936.8	222	937.0	400	937.5
409440			87	936.4	129	936.6	170	936.8	222	937.4	400	937.4
410290			87	936.8	129	937.1	170	937.3	222	937.7	400	938.0
410340			87	936.8	129	937.1	170	937.3	222	937.7	400	938.0
410385	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	62	87	936.8	129	937.0	170	937.3	222	937.6	400	938.5
410425			87	937.2	129	937.6	170	938.0	222	938.4	400	939.7
410875			87	937.3	129	937.8	170	938.2	222	938.7	400	939.8
411365			87	937.6	129	938.1	170	938.6	222	939.0	400	940.0
411435	Main Street Bridge	64	87	937.8	129	938.4	170	938.9	222	939.4	400	941.8
411535	Upstream Sussex Village Limits, Upstream Limits of Large Scale Mapping		87	938.1	129	938.8	170	939.3	222	940.0	400	942.6

Willow Springs Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
0	STH 74 Bridge	2	69	--	78	--	84	--	89	--	101	--
420	St. James Parkway Bridge	4	69	--	78	--	84	--	89	--	101	--
2030	McLaughlin Road Bridge	6	69	--	78	--	84	--	89	--	101	--
2755	Private Bridge	8	69	--	78	--	84	--	89	--	101	--
5135	Private Bridge	10	69	--	78	--	84	--	89	--	101	--
6205	Chicago, Milwaukee, St. Paul, and Pacific Railroad	12	28	--	32	--	35	--	38	--	44	--
6980	Downstream Limits of Large Scale Mapping		28	906.1	32	906.1	35	906.2	38	906.2	44	906.3
7960			28	910.3	32	910.3	35	910.3	38	910.4	44	910.4
8710	Downstream Sussex Village Limits		28	912.3	32	912.3	35	912.3	38	912.4	44	912.4
9220			28	914.2	32	914.2	35	914.2	38	914.2	44	914.3
9700			28	916.8	32	917.6	35	917.6	38	917.6	44	918.0
10180			28	919.9	32	920.0	35	920.0	38	920.1	44	920.1
10250	Good Hope Road (CTH W) Bridge	14	28	920.1	32	920.2	35	920.3	38	920.3	44	920.5
10290			28	920.4	32	920.5	35	920.6	38	920.7	44	920.9
10810			28	921.0	32	921.1	35	921.1	38	921.2	44	921.3
11340			28	922.7	32	922.7	35	922.8	38	922.8	44	922.8
11900			28	926.4	32	926.5	35	926.5	38	926.5	44	926.6
12350			28	929.3	32	929.3	35	929.3	38	929.4	44	929.4
12790			28	934.4	32	934.4	35	934.5	38	934.5	44	934.6
12850	Soo Line Railroad Bridge	16	17	937.6	21	937.7	24	937.8	26	937.9	33	938.2
12900			17	937.8	21	938.0	24	938.2	26	938.2	33	938.5
13580	Upstream Limits of Large Scale Mapping Upstream of Sussex Village Limits		17	939.6	21	939.7	24	939.7	26	939.8	33	939.9
17470	Woodside Road Bridge	18	17	--	21	--	24	--	26	--	33	--

[a] Stationing in feet along the stream system reference to Wilmot Dam on the main stem of the Fox River in Kenosha County for Sussex Creek, the East Branch of Sussex Creek, and the South Branch of Sussex Creek. Stationing in feet along the stream system referenced to STH 74 for Willow Springs Creek.

[b] Stages corresponding to structures are immediately upstream of the structure.

Source: SEWRPC.

Table 6

FLOOD DISCHARGES AND STAGES FOR SUSSEX CREEK, THE EAST BRANCH OF SUSSEX CREEK, THE SOUTH BRANCH OF SUSSEX CREEK, AND WILLOW SPRINGS CREEK IN AND NEAR THE VILLAGE OF SUSSEX FOR YEAR 2000 PLANNED LAND USE CONDITIONS

Sussex Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
388170			517	850.3	614	850.3	685	850.4	754	850.4	910	950.5
388300	CTH JF Bridge	2	517	854.2	614	854.8	685	855.9	754	856.5	910	857.6
388350			517	854.8	614	855.4	685	855.9	754	856.5	910	857.6
388913			517	854.8	614	855.4	685	855.9	754	856.5	910	857.6
389475			517	858.9	614	859.1	685	859.2	754	859.3	910	859.4
389975			517	861.9	614	862.1	685	862.2	754	862.2	910	862.4
390500			517	866.3	614	866.7	685	866.9	754	867.1	910	867.4
391000			517	869.5	614	869.7	685	869.9	754	870.0	910	870.2
391800			517	872.0	614	872.1	685	872.2	754	872.3	910	872.5
391840	Private Bridge	4	517	875.8	614	875.8	685	875.8	754	876.0	910	876.1
391880			517	875.8	614	875.8	685	875.8	754	876.0	910	876.1
391970			517	875.8	614	875.8	685	875.9	754	876.0	910	876.2
392020	Private Bridge	6	517	875.8	614	875.8	685	875.9	754	876.0	910	876.2
392070			517	875.8	614	875.8	685	876.0	754	876.0	910	876.2
392590			517	875.9	614	875.9	685	876.0	754	876.2	910	876.4
393030			517	876.0	614	876.1	685	876.2	754	876.3	910	876.5
393100	CTH K Bridge	8	517	875.9	614	876.2	685	876.5	754	876.7	910	877.2
393170			517	876.2	614	876.6	685	876.8	754	877.1	910	877.7
393670			517	876.4	614	876.7	685	877.0	754	877.2	910	877.8
394170			517	877.0	614	877.4	685	877.6	754	877.8	910	878.3
394340			517	877.5	614	877.8	685	878.0	754	878.2	910	878.7
394540			517	878.0	614	878.4	685	878.6	754	878.8	910	879.3
394660			517	878.1	614	878.4	685	878.7	754	878.9	910	879.3
395160			517	878.9	614	879.2	685	879.5	754	879.7	910	880.1
395650			517	880.4	614	880.7	685	880.9	754	881.1	910	881.4
396200			517	884.3	614	884.7	685	885.0	754	885.2	910	885.7
396960	Downstream Sussex Village Limits		517	887.1	614	887.4	685	887.7	754	887.9	910	888.3
397560			517	888.1	614	888.4	685	888.6	754	888.8	910	889.1
397620	Private Bridge	12	517	889.6	614	890.2	685	890.4	754	890.6	910	890.8
397680			517	889.6	614	890.2	685	890.4	754	890.6	910	890.8
398250			517	889.9	614	890.4	685	890.6	754	890.7	910	891.0
398320	Clover Drive Bridge	14	517	891.7	614	891.8	685	891.9	754	892.0	910	892.2
398390			517	891.7	614	891.8	685	891.9	754	892.0	910	892.2
398900			517	891.7	614	891.9	685	891.9	754	892.0	910	892.3
399700			517	891.8	614	892.0	685	892.1	754	892.2	910	892.5
400240			517	893.0	614	893.2	685	893.3	754	893.4	910	893.6
400320	Silver Spring Drive Bridge	16	517	893.2	614	893.4	685	893.6	754	893.7	910	895.0
400400			517	893.9	614	894.4	685	894.6	754	894.8	910	895.3
400820	Confluence with the East Branch of Sussex Creek		424	895.9	507	896.3	568	896.5	627	896.7	763	897.1
401440			424	900.5	507	900.7	568	900.8	627	900.9	763	901.2
402020			424	907.1	507	907.4	568	907.5	627	907.7	763	908.0
402120	Silver Spring Drive Bridge	18	424	907.7	507	908.0	568	908.2	627	908.4	763	908.8
402220			424	909.3	507	909.6	568	909.8	627	910.2	763	910.7
402600			424	913.3	507	913.6	568	913.9	627	913.9	763	914.0
402630	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	20	424	914.3	507	914.6	568	914.8	627	914.9	763	915.2
402660			424	915.3	507	915.6	568	915.7	627	915.8	763	916.2
402830			424	916.9	507	917.3	568	917.7	627	918.0	763	918.6
402910	Main Street Bridge	22	424	920.1	507	921.1	568	921.3	627	921.6	763	922.1
402980			424	920.3	507	921.0	568	921.3	627	921.5	763	922.0
403030	Private Bridge	24	424	920.6	507	921.1	568	921.3	627	921.5	763	922.0
403060			424	920.7	507	921.3	568	921.6	627	921.8	763	922.4
403225			424	920.7	507	921.3	568	921.5	627	921.8	763	922.4
403240	Public Foot Bridge	26	424	921.0	507	921.4	568	921.6	627	921.8	763	922.9

Table 6 (continued)

Sussex Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
403265			424	921.1	507	921.6	568	921.9	627	922.2	763	923.6
403760			424	922.3	507	922.7	568	922.9	627	923.1	763	923.7
403820	Old Mill Lane Bridge	28	424	927.5	507	930.0	568	930.7	627	931.1	763	931.7
403880			424	929.0	507	930.0	568	930.7	627	931.1	763	931.7
404350			424	929.0	507	930.1	568	930.7	627	931.1	763	931.7
404550			424	929.0	507	930.1	568	930.7	627	931.1	763	931.7
404900			424	929.4	507	930.3	568	930.9	627	931.3	763	931.9
405060			424	929.8	507	930.5	568	931.0	627	931.4	763	932.0
405110	Private Bridge	34	424	930.8	507	931.3	568	931.5	627	931.7	763	932.2
405170			424	931.0	507	931.4	568	931.6	627	931.8	763	932.2
405560			424	932.7	507	932.9	568	933.1	627	933.3	763	934.2
405610	Maple Avenue Bridge	36	424	933.8	507	934.1	568	935.4	627	936.2	763	937.8
405680			424	934.4	507	935.2	568	935.7	627	936.5	763	937.8
405900			424	936.5	507	936.9	568	937.2	627	937.4	763	938.2
406250			424	937.2	507	937.6	568	937.9	627	938.2	763	938.7
406300	Private Bridge	40	424	937.2	507	937.6	568	937.9	627	938.2	763	938.8
406350			424	937.2	507	937.6	568	937.9	627	938.2	763	938.8
406850			424	937.3	507	937.7	568	938.0	627	938.2	763	938.8
407400			424	937.4	507	937.8	568	938.0	627	938.3	763	938.8
407900			424	937.4	507	937.8	568	938.0	627	938.3	763	938.8
408450			424	937.4	507	937.8	568	938.1	627	938.3	763	938.8
409100	Confluence with the South Branch of Sussex Creek		424	937.5	507	937.8	568	938.1	627	938.3	763	938.9
409950	Upstream Sussex Village Limits		52	937.5	65	937.9	75	938.2	85	938.4	107	938.9
410350			52	937.6	65	937.9	75	938.2	85	938.4	107	938.9
410650			52	937.6	65	937.9	75	938.2	85	938.4	107	938.9
410750	Chicago and North Western Railroad Bridge	42	52	938.8	65	939.0	75	939.1	85	939.2	107	939.3
410800			52	938.9	65	939.1	75	939.2	85	939.3	107	939.5
411400			52	938.9	65	939.1	75	939.2	85	939.3	107	939.5
412100			52	939.7	65	939.8	75	939.9	85	940.0	107	940.2
412200	CTH J Bridge Upstream Limits of Large Scale Mapping	44	52	943.9	65	944.2	75	944.5	85	944.7	107	945.3

The East Branch of Sussex Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
400820	Confluence with Sussex Creek		159	895.9	175	896.3	185	896.5	193	896.7	211	897.1
401000	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	46	159	896.0	175	896.6	185	896.8	193	897.1	211	897.7
401050			159	896.3	175	896.8	185	897.0	193	897.3	211	897.7
401220			159	896.2	175	896.7	185	897.0	193	897.2	211	897.7
401775	Main Street Culvert	48	159	897.2	175	899.8	185	900.0	193	900.1	211	900.1
401825			159	897.2	175	899.8	185	900.0	193	900.1	211	900.1
402275			159	898.3	175	899.8	185	900.0	193	900.1	211	900.1
402345	Waukesha Avenue Bridge	50	159	900.9	175	901.0	185	901.0	193	901.0	211	901.1
402375			159	900.9	175	901.0	185	901.0	193	901.0	211	901.1
402380	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	52	159	901.0	175	901.1	185	901.1	193	901.1	211	901.2
402415			159	901.0	175	901.1	185	901.1	193	901.1	211	901.2
402980			159	906.2	175	906.2	185	906.2	193	906.2	211	906.2
403070	Chicago and North Western Railroad Bridge	54	159	910.0	175	910.6	185	911.0	193	911.3	211	912.1
403160			159	910.6	175	911.1	185	911.5	193	911.8	211	912.6
403290			159	910.6	175	911.1	185	911.5	193	911.9	211	912.6
403810			159	910.6	175	911.2	185	911.5	193	911.9	211	912.6
404510			159	914.7	175	914.0	185	914.7	193	914.7	211	914.8

Table 6 (continued)

The South Branch of Sussex Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
409100	Confluence with Sussex Creek		87	937.5	129	937.8	170	938.1	222	938.3	400	938.9
409440			87	937.5	129	937.9	170	938.1	222	938.3	400	938.9
410290			87	937.5	129	937.9	170	938.2	222	938.4	400	939.0
410340			87	937.5	129	937.9	170	938.2	222	938.4	400	939.0
410385	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	62	87	937.5	129	937.9	170	938.2	222	938.2	400	938.7
410425			87	937.7	129	938.1	170	938.5	222	938.7	400	939.7
410875			87	937.7	129	938.2	170	938.6	222	938.9	400	939.8
411365			87	937.9	129	938.4	170	938.8	222	939.1	400	940.0
411435	Main Street Bridge	64	87	938.0	129	938.6	170	939.0	222	939.5	400	941.8
411535	Upstream Sussex Village Limits, Upstream Limits of Large Scale Mapping		87	938.2	129	938.9	170	939.5	222	940.1	400	942.6

Willow Springs Creek

Location			10-Year Recurrence Interval Flood Event		25-Year Recurrence Interval Flood Event		50-Year Recurrence Interval Flood Event		100-Year Recurrence Interval Flood Event		500-Year Recurrence Interval Flood Event	
River[a] Station	Structure Name or Other Location Identification	Structure Number	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)	Discharge (cfs)	Stage[b] (msl)
0	STH 74 Bridge	2	87	--	100	--	109	--	109	--	135	--
420	St. James Parkway Bridge	4	87	--	100	--	109	--	109	--	135	--
2030	McLaughlin Road Bridge	6	87	--	100	--	109	--	109	--	135	--
2755	Private Bridge	8	87	--	100	--	109	--	117	--	135	--
5135	Private Bridge	10	87	--	100	--	109	--	117	--	135	--
6205	Chicago, Milwaukee, St. Paul, and Pacific Railroad	12	56	--	62	--	66	--	69	--	76	--
6980	Downstream Limits of Large Scale Mapping		56	906.4	62	906.4	66	906.4	69	906.4	76	906.5
7960			56	910.5	62	910.6	66	910.6	69	910.6	76	910.6
8710	Downstream Sussex Village Limits		56	912.5	62	912.5	66	912.5	69	912.6	76	912.6
9220			56	914.3	62	914.3	66	914.3	69	914.3	76	914.4
9700			56	918.1	62	918.1	66	918.1	69	918.1	76	918.2
10180			56	920.1	62	920.2	66	920.3	69	920.3	76	920.3
10250	Good Hope Road (CTH W) Bridge	14	56	920.7	62	920.9	66	921.0	69	921.1	76	921.4
10290			56	921.2	62	921.4	66	921.6	69	921.7	76	921.9
10810			56	921.5	62	921.7	66	921.8	69	921.8	76	922.1
11340			56	922.9	62	922.9	66	923.0	69	923.0	76	923.3
11900			56	926.7	62	926.7	66	926.8	69	926.8	76	926.8
12350			56	929.5	62	929.6	66	929.6	69	929.6	76	929.7
12790			56	934.7	62	934.7	66	934.8	69	934.8	76	934.8
12850	Soo Line Railroad Bridge	16	17	937.6	21	937.7	24	937.9	26	937.9	33	938.2
12900			17	937.8	21	938.0	24	938.2	26	938.3	33	938.5
13580	Upstream Limits of Large Scale Mapping Upstream of Sussex Village Limits		17	939.6	21	939.7	24	939.7	26	939.8	33	939.9
17470	Woodside Road Bridge	18	17	--	21	--	24	--	26	--	33	--

[a] *Stationing in feet along the stream system reference to Wilmot Dam on the main stem of the Fox River in Kenosha County for Sussex Creek, the East Branch of Sussex Creek, and the South Branch of Sussex Creek. Stationing in feet along the stream system referenced to STH 74 for Willow Springs Creek.*

[b] *Stages corresponding to structures are immediately upstream of the structure.*

Source: SEWRPC.

Figure 2

FLOOD STAGE PROFILES FOR SUSSEX CREEK IN AND NEAR THE VILLAGE OF SUSSEX UNDER YEAR 2000 PLAN LAND USE CONDITIONS

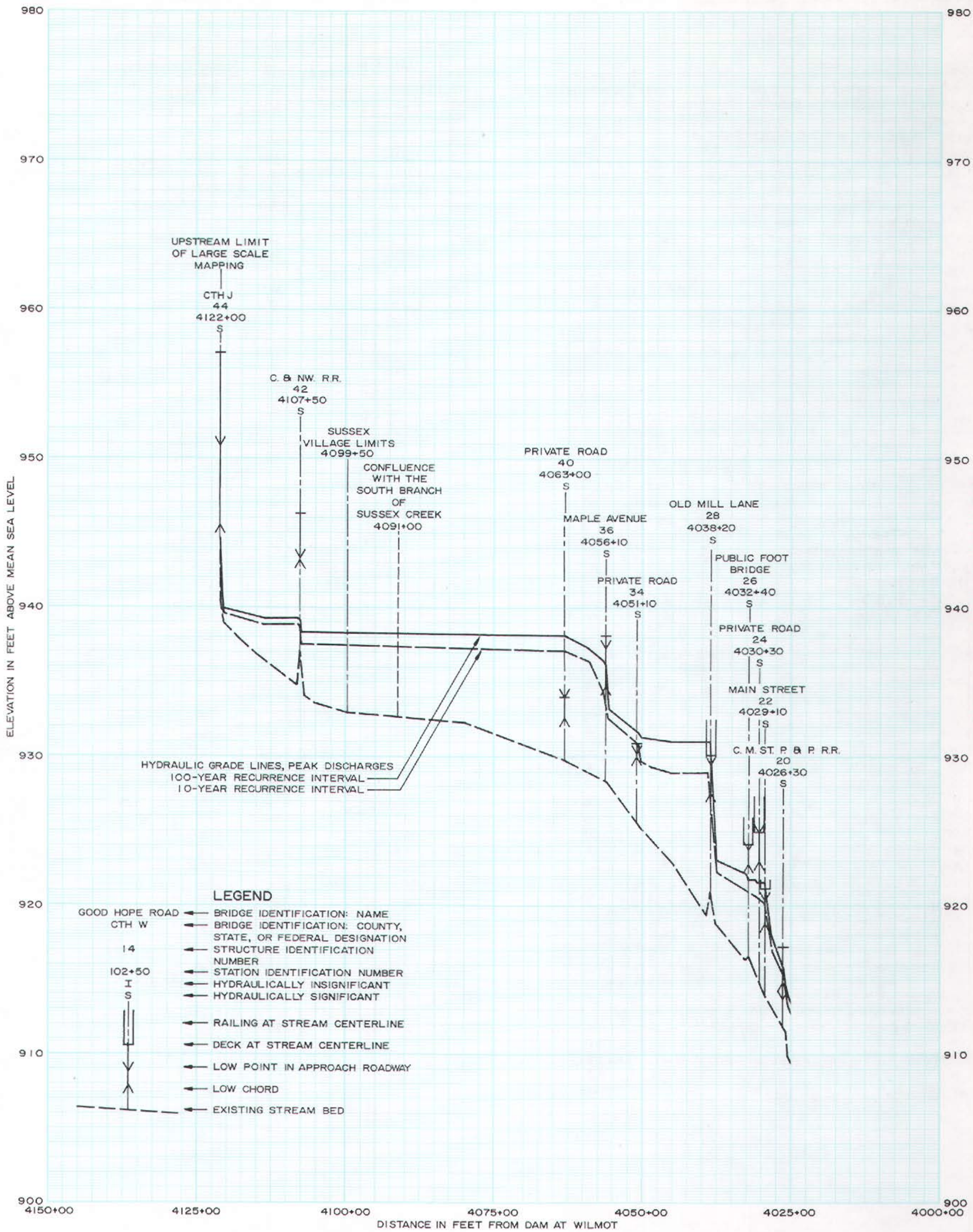
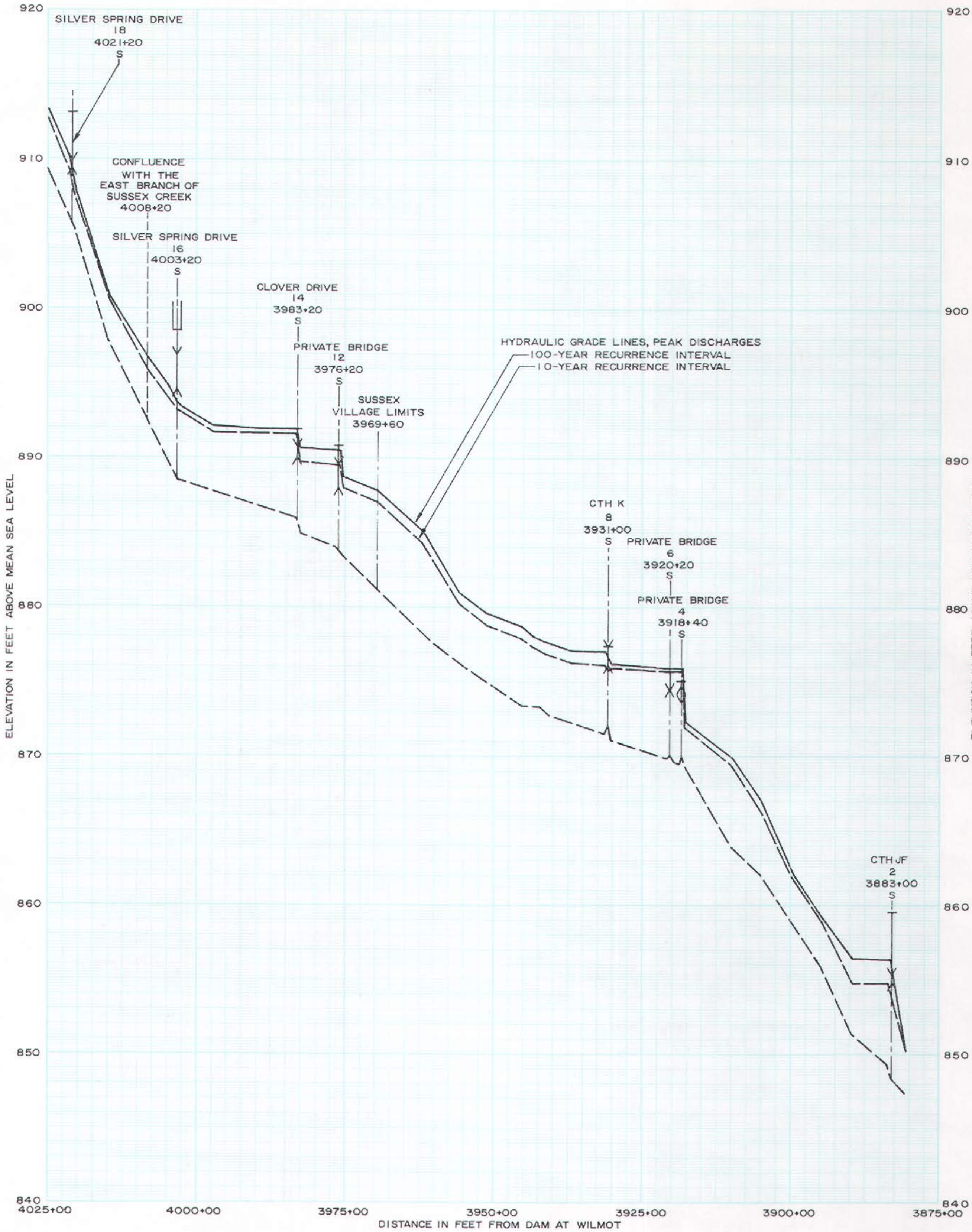


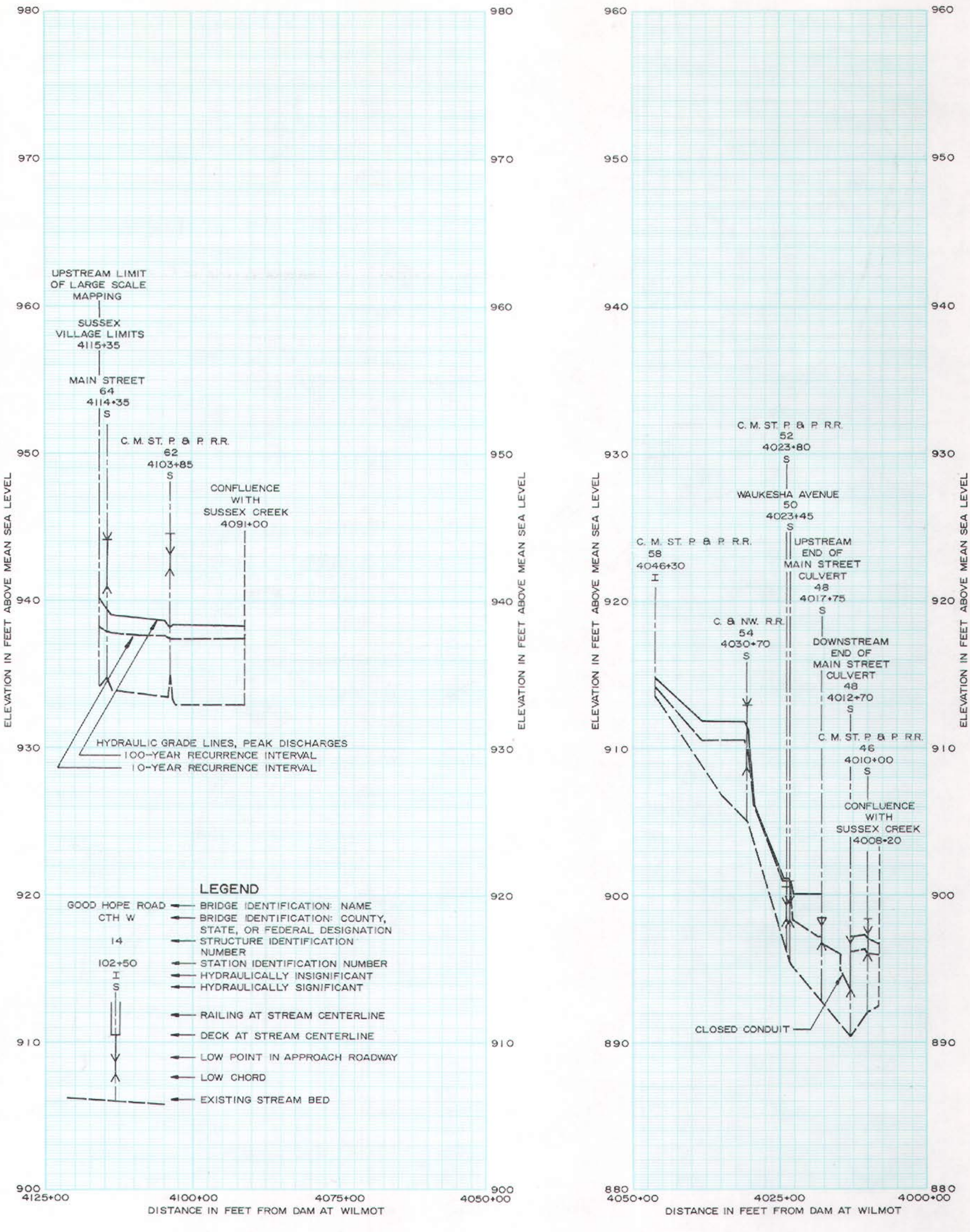
Figure 2 (continued)



Source: SEWRPC.

Figure 3

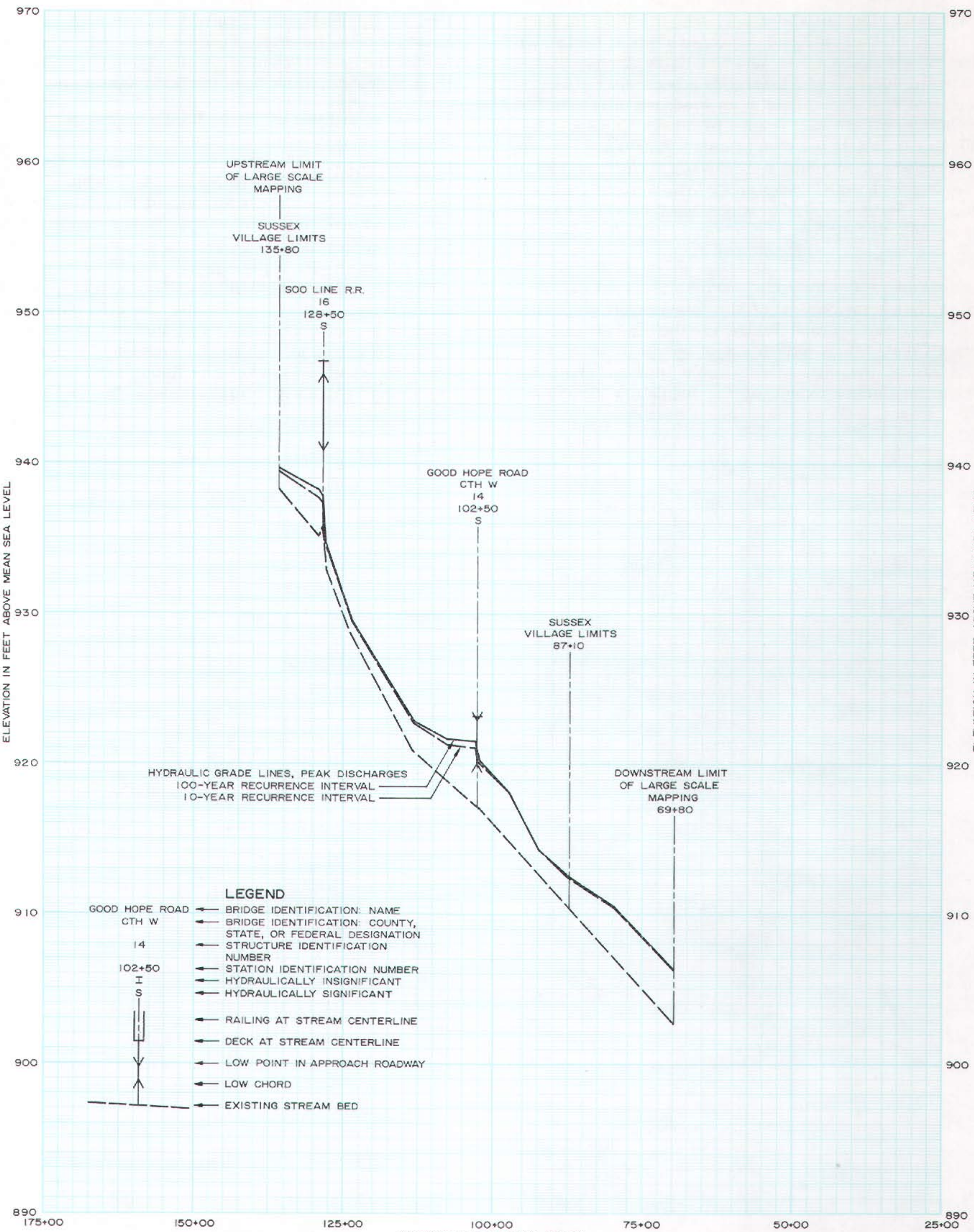
FLOOD STAGE PROFILES FOR THE EAST BRANCH OF SUSSEX CREEK AND THE SOUTH BRANCH OF SUSSEX CREEK IN THE VILLAGE OF SUSSEX UNDER YEAR 2000 PLAN LAND USE CONDITIONS



Source: SEWRPC.

Figure 4

FLOOD STAGE PROFILES FOR WILLOW SPRINGS CREEK IN AND NEAR THE VILLAGE OF SUSSEX UNDER YEAR 2000 PLAN LAND USE CONDITIONS



Source: SEWRPC.

which exhibits a backwater effect of about two feet; the Clover Drive bridge at Station 398,320 which exhibits a backwater effect of about one foot; the Old Mill Lane bridge at Station 403,820 which exhibits a backwater effect of about seven feet; and the Maple Avenue bridge at Station 405,610 which exhibits a backwater effect of about two feet. Proceeding in an upstream direction, the two bridges on the East Branch of Sussex Creek are: the Main Street culvert between Station 401,270 and Station 401,775 which exhibits a backwater effect of about three feet and the Chicago and North Western Railroad bridge at Station 403,070 which exhibits a backwater effect of about four feet.

Application of the hydrologic-hydraulic model indicates that while reconstruction of the four bridges on Sussex Creek and the railroad bridge on the East Branch of Sussex Creek would reduce stages by up to seven feet, such bridge reconstruction would not substantially reduce the lateral extent of the regulatory floodplain within the Village nor would it reduce the number of major structures lying within the floodplain. Reconstruction of the Main Street culvert on the East Branch of Sussex Creek, however, may be expected to markedly reduce the lateral extent of overland flooding and remove three major structures from the flood hazard area.

The above analysis of the hydraulic adequacy of bridges is not intended to be a comprehensive examination of alternative ways of reducing or eliminating flood problems within the Village of Sussex. A systematic analysis of alternative floodland management measures is beyond the stated and intended scope of this report. It was deemed appropriate to conduct a preliminary investigation of the hydraulic adequacy of bridges because the hydraulic data needed to identify potentially troublesome bridges and to determine the effect of altering them is a readily available byproduct of the hydrologic-hydraulic simulation which was conducted primarily for the purpose of delineating the floodplains, thereby providing the Village with useful supplementary information.

Chapter VII

THE REGULATORY FLOODLANDS

INTRODUCTION

Floodland regulations in an urban and urbanizing area, such as the Village of Sussex, are normally based on a two-district floodway-floodplain fringe approach because the two-district concept recognizes the quite different hydraulic function of, as well as the different flood hazard in, the floodway as opposed to the fringes or outer areas of the regulatory floodlands. The rational nature of the two-district approach enhances the likelihood of public acceptance in an urban area because it minimizes the number of existing structures that will be affected by the regulations. The regulatory floodplain is shown on Map 7. (This map has been placed in the pocket attached to the inside back cover of the report.)

THE FLOODWAY AND FLOODPLAIN FRINGE

A floodway was delineated for Sussex Creek, the East Branch of Sussex Creek, the South Branch of Sussex Creek, and Willow Springs Creek in and near the Village of Sussex in order to satisfy one of the stated objectives of this report: the determination of a floodway which, in combination with the delineated floodplain fringe, can form the basis for the preparation and adoption of floodland regulations that will meet minimum State requirements while carrying out the adopted comprehensive plan for the Fox River watershed. The floodway, which is shown on Map 7, was delineated for the 2.5-mile-long reach of Sussex Creek (Station 396,960 to Station 409,950), for the 0.7-mile-long reach of the East Branch of Sussex Creek (Station 400,820 to Station 404,510), for the 0.5 mile-long-reach of the South Branch of Sussex Creek (Station 409,100 to Station 411,535), and for the 1.3-mile-long reach of Willow Springs Creek (Station 6,980 to Station 13,580) for which large-scale topographic maps were available. The floodplain fringe, which lies adjacent to the floodway, also is shown on Map 7.

FLOODWAY DETERMINATION FACTORS

The floodplain of a river or creek is essentially a natural feature, the identification of which is accomplished by hydrologic-hydraulic analysis. Thus, the natural floodplains in or near the Village of Sussex are a unique feature of the riverine areas of the several creeks flowing through the Village, and are determined by the flow regime of the creeks and the adjacent topography. Its limits were determined by the technical methods described in earlier sections of this report.

In contrast, the floodway for a given reach of a creek is neither a natural nor a unique feature. There are many possible floodways that can be delineated to convey the regulatory, or 100-year recurrence interval discharge, with small, acceptable stage increases relative to the stages that would exist when the flood flow occupies the entire natural floodlands. The determination of floodway limits, therefore, involves a judicious blend of hydraulic and nonhydraulic factors, the net effect of which is to provide for the safe passage of major floods, while recognizing the problems and the development and development potential of the community in general, and of riverine area in particular. The most important of the hydraulic and nonhydraulic factors considered in the delineation of the Village of Sussex floodway are discussed below.

Hydraulic Considerations

Floodway limits were made smooth and continuous to reflect the expected flow pattern of the deeper, more rapidly moving portions of Sussex Creek, the East and South Branches of Sussex Creek, and Willow Springs Creek for floods up to and including the 100-year recurrence interval event. Smooth hydraulic transitions were provided wherever the floodway width undergoes large changes over short distances, such as in the vicinity of the Chicago and North Western Railroad Bridge at Station 403,070 where the East Branch of Sussex Creek, during flood stage, is constricted as it passes through the bridge waterway opening and abruptly expands to occupy the wide natural floodplain downstream of the structure.

The floodway determination procedure included computation of flood stage increases that could be expected to occur as a result of laterally constricting the regulatory flood discharges so as to confine it within the floodway limits rather than allowing the floodflow to occupy the entire width of the natural floodplain. Floodland regulations based on the two-district floodway-floodplain fringe approach must recognize the higher flood stages created by confining the floodflows to the floodway. Completion of the filling and urbanization of the floodplain fringe essentially destroys all of the conveyance and storage capacity of the natural floodplain fringe and forces the regulatory flood discharge to pass within the floodway limits. Chapter NR 116 of the Wisconsin Administrative Code specifies, as a general rule, the maximum allowable 100-year recurrence interval flood stage increase in urban areas as 0.5 foot attributable to a floodway delineation. The hydrologic-hydraulic simulation model was used to compute regulatory flood stages under floodway conditions and to assure that the stage increase limitation would be satisfied by the delineated floodways. Flood stage data presented in Table 7 indicate that the maximum stage increase associated with the recommended floodways is 0.4 foot, which occurs along the East Branch of Sussex Creek in the reach bounded on the upstream end by the Waukesha Avenue bridge and on the downstream end by the Main Street culvert.

Table 7

HYDRAULIC EFFECT OF THE SUSSEX CREEK, THE EAST BRANCH OF THE SUSSEX CREEK, THE SOUTH BRANCH OF THE SUSSEX CREEK, AND THE WILLOW SPRINGS CREEK FLOODWAYS IN THE VILLAGE OF SUSSEX UNDER YEAR 2000 PLAN LAND USE CONDITIONS

Sussex Creek

Location			Regulatory Flood Discharge (cubic feet per second)	Flood Stages Under Natural Floodplain Conditions[b] (feet above mean sea level)	Flood Stages Under Floodway Conditions[b] (feet above mean sea level)	Stage Increase Attributable to Floodway (feet)
River Station[a]	Structure Name or Other Location Identification	Structure Number				
396960	Downstream Sussex Village Limits		754	887.9	887.9	0.0
397560			754	888.8	888.8	0.0
397620	Private Bridge	12	754	890.6	890.5	-0.1
397680			754	890.6	890.6	0.0
398250			754	890.7	890.7	0.0
398320	Clover Drive Bridge	14	754	892.0	891.9	-0.1
398390			754	892.0	892.0	0.0
398900			754	892.0	892.0	0.0
399700			754	892.2	892.2	0.0
400240			754	893.4	893.4	0.0
400320	Silver Spring Drive Bridge	16	754	893.7	893.7	0.0
400400			754	894.8	894.8	0.0
400820	Confluence with the East Branch of Sussex Creek		627	896.7	897.0	0.3
401440			627	900.9	900.9	0.0
402020			627	907.7	907.7	0.0
402120	Silver Spring Drive Bridge	18	627	908.4	908.4	0.0
402220			627	910.2	910.2	0.0
402600			627	913.9	913.9	0.0
402630	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	20	627	914.9	914.9	0.0
402660			627	915.8	915.8	0.0
402830			627	918.0	918.0	0.0
402910	Main Street Bridge	22	627	921.6	921.6	0.0
402980			627	921.5	921.4	-0.1
403030	Private Bridge	24	627	921.5	921.6	0.1
403060			627	921.8	921.7	-0.1
403225			627	921.8	921.8	0.0
403240	Public Foot Bridge	26	627	921.8	921.8	0.0
403265			627	922.2	922.1	-0.1
403760			627	923.1	923.1	0.0
403820	Old Mill Lane Bridge	28	627	931.1	931.3	0.2
403880			627	931.1	931.1	0.0
404350			627	931.1	931.1	0.0
404550			627	931.1	931.1	0.0
404900			627	931.3	931.3	0.0
405060			627	931.4	931.4	0.0
405110	Private Bridge	34	627	931.7	931.7	0.0
405170			627	931.8	931.8	0.0
405560			627	933.3	933.3	0.0
405610	Maple Avenue Bridge	36	627	936.2	936.2	0.0
405680			627	936.5	936.5	0.0
405900			627	937.4	937.4	0.0
406250			627	938.2	938.2	0.0
406300	Private Bridge	40	627	938.2	938.2	0.0
406350			627	938.2	938.3	0.1
406850			627	938.2	938.3	0.1
407400			627	938.3	938.4	0.1
407900			627	938.3	938.4	0.1
408450			627	938.3	938.4	0.1
409100	Confluence with the South Branch of Sussex Creek		627	938.3	938.4	0.1
409950	Upstream Sussex Village Limits		85	938.4	938.5	0.1

Table 7 (continued)

East Branch of Sussex Creek

Location			Regulatory Flood Discharge (cubic feet per second)	Flood Stages Under Natural Floodplain Conditions[b] (feet above mean sea level)	Flood Stages Under Floodway Conditions[b] (feet above mean sea level)	Stage Increase Attributable to Floodway (feet)
River Station[a]	Structure Name or Other Location Identification	Structure Number				
400820	Confluence with Sussex Creek		193	896.7	897.0	0.3
401000	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	46	193	897.1	897.1	0.0
401050			193	897.3	897.5	0.2
401220			193	897.2	897.5	0.3
401775	Main Street Culvert	48	193	900.1	900.5	0.4
401825			193	900.1	900.5	0.4
402275			193	900.1	900.5	0.4
402345	Waukesha Avenue Bridge	50	193	901.0	901.0	0.0
402375			193	901.0	901.0	0.0
402380	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	52	193	901.1	901.1	0.0
402415			193	901.1	901.1	0.0
402980			193	906.2	906.2	0.0
403070	Chicago and North Western Railroad Bridge	54	193	911.3	911.4	0.1
403160			193	911.8	911.9	0.1
403290			193	911.8	911.9	0.1
403810			193	911.9	911.9	0.1
404510			193	914.7	914.7	0.0

South Branch of Sussex Creek

Location			Regulatory Flood Discharge (cubic feet per second)	Flood Stages Under Natural Floodplain Conditions[b] (feet above mean sea level)	Flood Stages Under Floodway Conditions[b] (feet above mean sea level)	Stage Increase Attributable to Floodway (feet)
River Station[a]	Structure Name or Other Location Identification	Structure Number				
409100	Confluence with Sussex Creek		222	938.3	938.4	0.1
409440			222	938.3	938.4	0.1
410290			222	938.4	938.4	0.0
410340			222	938.4	938.5	0.1
410385	Chicago, Milwaukee, St. Paul, and Pacific Railroad Bridge	62	222	938.2	938.3	0.1
410425			222	938.7	938.8	0.1
410875			222	938.9	938.9	0.0
411365			222	939.1	939.1	0.0
411435	Main Street Bridge	64	222	939.5	939.5	0.0
411535	Upstream Sussex Village Limits Upstream Limits of Large Scale Mapping		222	940.1	940.1	0.0

Table 7 (continued)

Willow Springs Creek

Location			Regulatory Flood Discharge (cubic feet per second)	Flood Stages Under Natural Floodplain Conditions[b] (feet above mean sea level)	Flood Stages Under Floodway Conditions[b] (feet above mean sea level)	Stage Increase Attributable to Floodway (feet)
River Station[a]	Structure Name or Other Location Identification	Structure Number				
8710	Downstream Limits Village of Sussex		69	912.6	912.6	0.0
9220			69	914.3	914.3	0.0
9700			69	918.1	918.1	0.0
10180			69	920.3	920.3	0.0
10250	Good Hope Road (CTH W) Bridge	14	69	921.1	921.1	0.0
10290			69	921.7	921.7	0.0
10810			69	921.8	921.8	0.0
11340			69	923.0	923.0	0.0
11900			69	926.8	926.8	0.0
12350			69	929.6	929.6	0.0
12790			69	934.8	934.8	0.0
12850	Soo Line Railroad Bridge	16	26	937.9	937.9	0.0
12900			26	938.3	938.3	0.0
13580	Upstream Limits of Large Scale Mapping Upstream Limits Village of Sussex		26	939.8	939.8	0.0

[a] *Stationing in feet along the stream system referenced to Wilmot Dam on the main stem of the Fox River in Kenosha County for Sussex Creek, the East Branch of Sussex Creek, and the South Branch of Sussex Creek. Stationing in feet along the stream system referenced to STH 74 for Willow Springs Creek.*

[b] *Stages corresponding to structures are immediately upstream of the structures.*

Source: SEWRPC.

Floodwater depth and velocity are two hydraulic characteristics that exhibit significant variation across floodlands during major flood events. Depths and velocities are generally greatest in and near the channel area, decreasing across the natural floodplain with increased distance from the channel. The floodway is intended to encompass those floodland areas that may be expected to exhibit floodwater depths at velocities of such magnitude as to constitute a threat not only to floodland structures and facilities but, more importantly, to human safety. If structures, primarily private residences, exist or are allowed to be placed in areas having large floodwater depths and high velocities, the potential danger to human life is greatly increased since structure inhabitants and others seeking ingress to and egress from the structures, including rescue parties, may be swept off their feet when they attempt to move to and from structures during flood events. Velocities of four feet per second in combination with floodwater depths of three to four feet, for example, develop dynamic forces sufficient to sweep persons off their feet. An attempt was made to identify the probable location of such danger zones so that they could be included within the confines of the delineated floodways.

Due cognizance must be given during and after the floodway selection process to the maintenance of lateral drainageways so as to prevent the development of storm water drainage problems along the drainage courses affected. Any development that is to be permitted in the floodplain fringe must be executed in such a manner as not to diminish the carrying capacity of the drainage courses lying within or passing through those areas.

Nonhydraulic Considerations

An attempt was made to minimize the number and value of existing structures that would be located within the floodway zone. Recommended floodland regulations would make such structures nonconforming uses, with the intent that they be eventually removed from the floodway. The floodway, as delineated and shown on Map 7, does not encompass any of the 11 major structures located within the limits of the 100-year recurrence interval floodplain within the Village nor does it encompass the proposed Village of Sussex municipal sewage treatment plant.

Existing and committed land uses in the regulatory floodplain constitute another nonhydraulic factor considered in the floodway determination. The floodways were delineated to incorporate to the maximum extent practicable riverine areas already in open space uses, such as the park lands along Sussex Creek south of W. Silver Spring Drive and certain outdoor storage areas inasmuch as such uses are compatible with periodic inundation. Placement of these types of riverine land within the confines of the floodway facilitates the exclusion from the floodway of other, more developed areas.

Another nonhydraulic factor considered in the floodway delineation process was the equal degree of encroachment concept. Whenever hydraulically acceptable and otherwise feasible, the floodway was positioned within the natural floodplains so as to encroach an approximately equal amount on both sides of the natural floodplain. In this way, the land use restrictions associated with the floodway more equitably impact the landowners on both sides of the stream.

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Chapter VIII

FLOODLAND REGULATIONS

INTRODUCTION

The floodway and floodplain data developed under this study have been incorporated into suggested draft floodland zoning regulations for the Village of Sussex. These regulations are set forth in full in Appendix B. The regulations not only embody sound land use planning and regulatory concepts, but have also been designed to ensure that the Village of Sussex meets all minimum floodplain management requirements set forth by the Wisconsin Department of Natural Resources in Chapter NR 116 of the Wisconsin Administrative Code. In addition, the regulations should ensure that the Village of Sussex will ultimately meet all floodplain management requirements under the federal flood insurance program operated by the U. S. Department of Housing and Urban Development. The draft regulations set forth in Appendix B should be reviewed and approved by the Village Attorney before adoption.

PROPOSED REGULATORY APPROACH

The suggested draft floodland regulations for the Village of Sussex divide the delineated 100-year recurrence interval floodlands of Sussex Creek, the East Branch of Sussex Creek, the South Branch of Sussex Creek, and Willow Springs Creek through the Village into three distinct regulatory areas:

1. The floodway, which has been placed into a suggested F-1 Floodway District.

2. The undeveloped floodplain fringe, which has been placed into a suggested C-1 Conservancy District.

3. The developed floodplain fringe, which has been placed into a suggested FFO Floodplain Fringe Overlay District.

The boundaries of the proposed floodland districts are identified on Map 7.

If adopted, the proposed regulations would place all lands within the delineated floodways into the F-1 Floodway District, and thus would change the basic zoning of these lands from the current zoning—e.g., residential, commercial, or industrial—to the proposed F-1 Floodway District zoning. The proposed regulations for the F-1 Floodway District seek to preserve the floodwater conveyance capacity of the floodway and, hence, the essentially open character of the lands in the floodway, and thus prohibit filling and building within the District. Exceptions to the filling and building prohibition are listed, including utilities, water measurement and control devices, and bridges.

The floodplain fringe land designed for placement in the proposed C-1 Conservancy District lie adjacent to the floodway outside of the highly developed portions of the Village. The proposed regulations for this District also prohibit filling and building, except for structures related to utilities, highways and bridges, and outdoor recreation uses.

The remaining floodplain fringe lands are recommended to be placed in the FFO Floodplain Fringe Overlay District. These lands are located largely in the highly developed, central area of the Village and are already intensively developed. The proposed regulations for this Overlay District provide that, with respect to future development, the lands in question be filled to an elevation of at least two feet above the elevation of the 100-year recurrence interval flood, or that appropriate floodproofing measures be taken to eliminate potential flood damage. The basic uses allowed in the District would remain unchanged, being determined by the underlying basic zoning district.

As noted above, the enactment of the proposed floodland zoning regulations by the Village of Sussex will serve to assure that the Village meets all applicable federal and state floodplain management standards and will serve to carry out the floodland management recommendations set forth in the adopted comprehensive plan for the Fox River watershed. Enactment of the proposed zoning regulations will represent an important step toward development of a sound riverine area land use policy by the Village, and thus will serve as an important contribution to the subsequent preparation of detailed plans for the use of the riverine areas and contiguous lands within the Village.

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Chapter IX

SUMMARY

The purpose of this report is to present floodland information for Sussex Creek and its major tributaries and for Willow Springs Creek within and near the Village of Sussex, Waukesha County, Wisconsin, so that Village officials and concerned citizens can better make decisions concerning sound floodland uses. The data are designed to permit the Village to adopt sound floodland zoning regulations and to meet State standards with respect thereto; to meet federal flood insurance regulations; and to facilitate various local planning and engineering efforts. This report was prepared by the Southeastern Wisconsin Regional Planning Commission at the request of the Village of Sussex, and is intended to refine, detail, and extend floodland management recommendations set forth in SEWRPC Planning Report No. 12, A Comprehensive Plan for the Fox River Watershed.

Sussex Creek, which is a headwater tributary of the Fox River watershed, originates northwest of the Village of Sussex and flows in a generally southeasterly direction through the Village to join the Fox River below the Village. The East Branch of Sussex Creek is a 0.7 mile long intermittent stream which originates in the northern central portion of the Village of Sussex and flows in a generally southwesterly direction before joining the Sussex Creek at Station 400,820. The South Branch of Sussex Creek is a 0.5 mile long intermittent stream which originates west of the Village of Sussex and flows in a generally easterly direction to the southern Village limits after which it flows in a generally northerly direction to join Sussex Creek at Station 409,100. Willow Springs Creek, which is another headwater tributary of the Fox River watershed, originates north of the Village of Sussex and flows in a generally southeasterly direction to and through the Village to join the Fox River below the Village.

The Sussex Creek subwatershed is defined as that 9.39 square mile area tributary to the Sussex Creek at the CTH JF crossing. Rural land uses are dominant in the Sussex Creek subwatershed, accounting for about 79 percent of the subwatershed area in 1975. As of 1975, the Village of Sussex encompassed an area about 2.6 square miles and had a resident population of 4,112 people. Sussex may be expected to grow to a population of almost 6,900 people by the year 2000.

The Willow Springs Creek subwatershed is defined as that 2.22 square mile area tributary to the Willow Springs Creek at the CTH V crossing. Rural land uses are dominant in the Willow Springs Creek subwatershed, accounting for about 69 percent of the subwatershed area in 1975.

An inventory of historic flood data and information indicated that the Village of Sussex has since 1940 experienced several floods which have caused minor damage and disruption within the Village, the most serious being the April 1973 flood. That flood had an estimated recurrence interval of 40 years, or a chance of occurrence in any given year of 2.5 percent. The principal types of problems associated with historic flooding are minor overland flooding and isolated basement and street flooding.

Inasmuch as the flood characteristics of Sussex Creek, the East Branch of Sussex Creek, the South Branch of Sussex Creek, and Willow Springs Creek are the principal concern of this report, a detailed inventory was conducted of Sussex Creek and Willow Springs Creek subwatersheds' hydrologic-hydraulic systems. The inventory of hydrologic elements of the systems included the collection and collation of definitive data on meteorological conditions, runoff, soils, and land use and the delineation of subbasins. Hydraulic data collected and collated under the inventory phase of the project included stream channel profiles, floodland cross sections and roughness coefficients, and bridge and culvert descriptions.

The hydrologic-hydraulic system data were required to apply as hydrologic-hydraulic simulation model, a digital computer program, that was used to simulate the flow regime of the stream system. This model consists of a hydrologic-submodel that generates flow from the land to the stream system; a hydraulic submodel which routes those flows down through the stream system, and another hydraulic submodel which determines the stages associated with discharges of specified recurrence interval.

The hydrologic-hydraulic simulation model was used to determine selected 10- through 500-year recurrence interval flood discharges and stages under existing (1975) and planned (2000) land use conditions. These flood hazard data were developed for the 4.6-mile-long reach of Sussex Creek, the 0.7-mile-long reach of the East Branch of Sussex Creek, the 0.5-mile-long reach of the South Branch of Sussex Creek, and the 1.3-mile-long reach of Willow Springs Creek in and near the Village of Sussex for which large-scale topographic maps were available as of 1976. The hydrologic-hydraulic inventory and analyses were conducted to readily permit extension of the detailed flood hazard information upstream and downstream of Sussex as new riverine area large-scale topographic maps become available.

The hydrologic-hydraulic simulation model was also used to identify bridges producing major backwater effects and to determine the likely impact of altering those bridges on flood stages and the lateral extent of the floodplain. It was concluded that alteration or replacement of the Main Street culvert between Station 401,270 and Station 401,775 on the East Branch of Sussex Creek could significantly reduce the 100-year recurrence interval flood stages and the associated floodplain under year 2000 plan conditions immediately upstream of the culvert.

The hydrologic-hydraulic simulation model also was used in the delineation of a floodway and corresponding floodplain fringe area for Sussex Creek, the East Branch of Sussex Creek, the South Branch of Sussex Creek, and the Willow Springs Creek. Delineation of the floodway involved consideration of hydraulic factors, such as smooth transitions and allowable stage increases, as well as nonhydraulic factors, such as existing land use and the number of structures in the floodway.

Floodway-floodplain fringe data which, in effect, define the area subject to floodland zoning regulations as required by the State of Wisconsin were used to prepare new draft floodland regulations for the Village of Sussex. These floodland regulations meet the minimum requirements established by the Wisconsin Department of Natural Resources and also reflect sound riverine area land use planning concepts. The publication in this report of 10- through 500-year recurrence interval flood discharge and stage information will enable the Village of Sussex to meet the requirements of the regular flood insurance program administered by the U. S. Department of Housing and Urban Development. Finally, the floodland data available in this report will be useful to the Village for detailed local land use planning and engineering applications.

APPENDICES

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Appendix A

GLOSSARY OF TERMS

Channel—The linear, continuous, low-lying area normally occupied by a river or stream.

Floodlands, Natural—The area encompassed by the channel plus the natural floodplain.

Floodlands, Regulatory—The area encompassed by the floodway, including the channel and the floodplain fringe. In the absence of a floodway, the regulatory floodlands are identical to the natural floodlands.

Floodplain Fringe—That portion or the regulatory floodplain lying outside of the floodway. Floodwater depths and velocities are small in this regulatory area relative to the floodway, and therefore in a developed urban area further development may be permitted although restricted and regulated to minimize flood damage. Because the regulatory floodway may result in increases in the stage of the regulatory flood relative to that which would occur under natural conditions, the floodplain fringe may include at its edges areas that would not be subject to inundation under natural conditions, but would be subject to inundation under regulatory floodway conditions.

Floodplain, Natural—Wide, flat to gently sloping area contiguous with and usually lying on both sides of the channel. The floodplain, which is normally bounded on its outer edges by higher topography, is formed over a long period of time by the river. A river may be expected to overflow its channel banks and occupy some portion of its floodplains on the average of once every two years. How much of the natural floodplain will be occupied by any given flood will depend upon the severity of that flood and, more particularly, upon its elevation or stage. Thus, an infinite number of outer limits of the natural floodplain may be delineated, each related to a specified flood recurrence interval. The Southeastern Wisconsin Regional Planning Commission recommends, therefore, that the natural floodplains of a river or stream be more specifically defined as those corresponding to a flood having a recurrence interval of 100 years.

Flood Stage Profile—A graph of peak water surface elevation as a function of position along a river or stream. The profile usually corresponds either to a flood event of specified recurrence interval or to a historic flood event. The channel bottom, as well as bridges, culverts, and dams, are also normally depicted on the flood stage profile.

Floodway—A designated portion of the regulatory floodlands that will safely convey the regulatory flood discharge with small, acceptable upstream and downstream stage increases, generally limited in Wisconsin to 0.5 foot. The floodway, which includes the channel, is that portion of the floodlands not suited for human habitation. All fill, structures, and other development that would impair floodwater conveyance by adversely increasing flood stages or velocities, or would itself be subject to flood damage, should be prohibited in the floodway.

Hydraulics—Study of the physical behavior of water as it flows within stream channels and associated natural floodlands; under and over bridges, culverts, and dams; and through lakes and other impoundments.

Hydrology—Study of the physical behavior and amount of water from its occurrence as precipitation to its entry into streams, lakes, and other impoundments or its return to the atmosphere via evapotranspiration.

Regulatory (100-Year) Flood—The 100-year recurrence interval flood event, that is, the flood event that would be reached or exceeded once on the average of every 100 years, or stated differently, would have a 1 percent chance of being reached or exceeded in any given year. According to State of Wisconsin law, all counties, cities, and villages are required to adopt regulations for land subject to inundation by the regulatory flood.

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Appendix B

PROPOSED FLOODLAND ZONING REGULATIONS FOR THE VILLAGE OF SUSSEX, WAUKESHA COUNTY

Pursuant to a 1973 agreement with the Village of Sussex, the staff of the Southeastern Wisconsin Regional Planning Commission has provided resident planning services on a regular basis to the Village. As a part of its resident planning commitment, the Commission staff has been preparing a comprehensive revision and recodification of the Village of Sussex Zoning Ordinance. The Village Plan Commission has reviewed several drafts of the revised ordinance and that project is nearing completion. The following floodland zoning provisions, prepared by the Commission staff for review by the Village Attorney, are referenced to and suggested as changes to the September 1976 draft of the revised zoning ordinance currently being reviewed by the Village Plan Commission.

1. Repeal and recreate Section 1.1 to read as follows:

   1.1 AUTHORITY

   These regulations are adopted under the authority granted by Sections 61.35, 62.23(7), and 87.30(2) of the Wisconsin Statutes. Therefore, the Village Board of the Village of Sussex do ordain as follows:

2. Repeal and recreate Section 1.3 to read as follows:

   1.3 INTENT

   It is the general intent of this Ordinance to regulate and restrict the use of all structures, lands, and waters; regulate and restrict lot coverage, population distribution and density, and the size and location of all structures so as to: lessen congestion in and promote the safety and efficiency of the streets and highways; secure safety from fire, flooding, panic, and other dangers; provide adequate light, air, sanitation, and drainage; prevent overcrowding; avoid undue population concentration; facilitate the adequate provision of public facilities and utilities; stabilize and protect property values; further the appropriate use of land and conservation of natural resources; preserve and promote the beauty of the community; and implement the community's comprehensive plan or plan components. In addition, the floodland zoning regulations set forth in this Ordinance have been adopted to prevent and control erosion, sedimentation, and other pollution of surface waters; to further the maintenance of safe and healthful water conditions and prevent flood damage to persons and property; and to minimize expenditures for flood relief and flood control projects. To this end, it is further intended to provide for the administration and enforcement of this Ordinance and to provide penalties for its violation.

3. Renumber Sections 1.7, 1.8, and 1.9 to be 1.8, 1.9, and 1.10, respectively.

4. Create Section 1.7 to read as follows:

   1.7 WARNING AND DISCLAIMER OF LIABILITY

   The degree of flood protection provided by the Ordinance is considered reasonable for regulatory purposes and is based on engineering experience and scientific methods of study. On rare occasions, larger floods may occur or the flood height may be increased by man-made or natural causes such as ice jams or bridge openings restricted by debris. Therefore, this Ordinance does not imply that areas outside of the delineated floodplain or land uses permitted within the floodplain will be totally free from flooding and associated flood damages. Nor shall this Ordinance create a liability on the part of or a cause of action against the Village of Sussex or any office or employee thereof for any flood damages that may result from reliance on this Ordinance.

5. Repeal and recreate Section 2.5 to read as follows:

   2.5 OCCUPANCY PERMIT REQUIRED

   No vacant land shall be occupied or used; and no building or premises shall be erected, altered, moved, or create change in use; and no nonconforming use shall be maintained, renewed, changed, or extended until an occupancy permit shall have been issued by the Building Inspector. Such permit shall show that the building or premises or part thereof is in compliance with the provisions of this Ordinance. Such permit shall be applied for at the time of occupancy of any land and/or building.

No undeveloped land within the floodland districts shall be occupied or used, and no structure hereafter erected, altered, or moved shall be occupied until the applicant submits to the Building Inspector a certification by a registered professional engineer or land surveyor that the floodplain regulations set forth in this Ordinance have been fully complied with.

Application for an occupancy permit shall be made in the same manner as for a building permit pursuant to Section 2.3 of this Ordinance.

6. Repeal and recreate Section 4.1 to read as follows:

4.1 ESTABLISHMENT

For the purpose of this Ordinance, the Village of Sussex is hereby divided into twelve (12) basic use districts and one (1) overlay district as follows:

A-1	Agricultural District
R-1	Single-Family Residential District
R-2	Single-Family Residential District
R-3	Two-Family Residential District
R-4	Multifamily Residential District
B-1	Neighborhood Business District
B-2	Community Business District
M-1	Industrial District
M-2	Heavy Industrial District
P-1	Park District
C-1	Conservancy District
F-1	Floodway District
FFO	Floodplain Fringe Overlay District

Boundaries of these Districts are hereby established as shown on the maps entitled "Zoning Map—Village of Sussex, Wisconsin," dated ________________________, and "Supplementary Floodland Zoning Map—Village of Sussex, Wisconsin," dated ________________________, both maps which accompany and are herein made a part of this Ordinance. Such boundaries shall be construed to follow: corporate limits; U. S. Public Land Survey lines; lot or property lines; centerlines of streets, highways, alleys, easements, and railroad rights-of-way or such lines extended; unless otherwise noted on the Zoning Map. The boundaries of the F-1 Floodway District shall be determined by use of the scale contained on the Supplementary Floodland Zoning Map. The boundaries of the C-1 Conservancy District and the FFO Floodplain Fringe Overlay District shall be determined by the floodland limits shown on the Supplementary Floodland Zoning Map. Where a conflict exists between the floodland limits as shown on the map and actual field conditions, the elevations from the 100-year recurrence interval flood profile under floodway conditions shall be the governing factor in locating the regulatory floodland limits.

Vacation of public streets and alleys shall cause the land vacated to be automatically placed in the same district as the abutting side to which the vacated land reverts.

Annexations to or consolidations with the Village subsequent to the effective date of this Ordinance shall be placed in the A-1 Agricultural District, unless the annexation ordinance temporarily places the land in another district. Within one (1) year, the Village Plan Commission shall evaluate and recommend a permanent classification to the Village Board. Annexations or consolidations containing floodlands shall be placed in the following districts:

a) All floodways shall be placed in the F-1 Floodway District.

b) All other floodlands shall be placed in the C-1 Conservancy District.

7. Repeal and recreate Section 4.2 to read as follows:

4.2 ZONING MAP

A certified copy of the Zoning Map, together with the supplementary Floodland Zoning Map shall be adopted and approved with the text as part of this Ordinance and shall bear upon its face the attestation of the Village President and Village Clerk and shall be available to the public in the office of the Village Clerk.

Changes, thereafter, to the general zoning districts shall not be effective until entered and attested on the certified copy. Changes in the floodland districts shall not become effective until approved by the Wisconsin Department of Natural Resources (DNR).

8. Repeal and recreate Section 4.12 to read as follows:

4.12 C-1 CONSERVANCY DISTRICT

The C-1 conservancy district is intended to be used to prevent disruption of valuable natural or man-made resources and to protect watercourses, including the shorelands of navigable waters, and areas that are not adequately drained, or which are subject to periodic flooding, where development would result in hazards to health or safety, or would deplete or destroy natural resources or be otherwise incompatible with the public welfare.

Permitted Uses

--Fishing
--Hunting
--Preservation of scenic, historic, and scientific areas
--Public fish hatcheries
--Soil and water conservation
--Sustained yield forestry
--Stream bank and lakeshore protection
--Water retention and wildlife preserves
--Harvesting of wild crops, such as marsh hay, ferns, moss, berries, tree fruits, and tree seeds
--Public parks

Conditional Uses

--See Section 6.10

Dumping and Filling Prohibited

--Lands lying within the conservancy district shall not be used for dumping or be filled, except as authorized to permit establishment of approved bulkhead lines or to accommodate bridge approaches. Normal earth grading activities to permit utilization of the lands for open space, outdoor recreation, yard, parking, and similar uses are permitted.

Dangerous Materials Storage Prohibited

--Lands lying within the conservancy district shall not be used for the storage of materials that are buoyant, flammable, explosive, or injurious to human, animal, or plant life.

9. Create Section 4.13 to read as follows:

4.13 F-1 FLOODWAY DISTRICT

The F-1 floodway district is intended to be used to protect people and property from flood damage by prohibiting the erection of structures that would impede the flow of water during periodic flooding. Permitting use of the floodway would increase damages in the broader floodplain by increasing flood stages.

Permitted Uses

--Drainage
--Movement of Floodwater
--Navigation
--Stream Bank Protection
--Water Measurement and Control Facilities
--Any of the following uses provided that they are permitted uses in the district immediately adjacent to the floodway; and further provided that such use shall not involve the erecting or placing of a structure:

Grazing
Horticulture
Open Parking and Loading Areas
Open Markets
Open Recreational Uses, such as Parks, Sport Fields, Benches, Bathing, Hunting, Fishing, Rinks, Golfcourses, and Driving Ranges
Outdoor Plant Nurseries
Pasturing
Sod Farms
Truck Farming
Utilities
Viticulture
Wildcrop Harvesting
Wildlife Preserves

Conditional Uses

--See Section 6.10

Dumping and Filling Prohibited

--Lands lying within the floodway district shall not be used for dumping or be filled, except as authorized to permit establishment of approved bulkhead lines or to accommodate bridge approaches. Normal earth grading activities to permit utilization of the lands for open space, outdoor recreation, yard, parking, and similar uses are permitted.

Dangerous Materials Storage Prohibited

--Lands lying within the floodway district shall not be used for the storage of materials that are buoyant, flammable, explosive, or injurious to human, animal, or plant life.

10. Create Section 4.14 to read as follows:

4.14 FFO FLOODPLAIN FRINGE OVERLAY DISTRICT

The FFO floodplain fringe overlay district is intended to provide for and encourage the most appropriate use of land and water in areas subject to periodic flooding and to minimize flood damage to people and property.

Permitted Uses

--Any use of land, except structures, that is permitted in the underlying basic use district. Examples of such use would be croplands in an agricultural district; required yards in a residential district; or parking or loading areas in a commercial or industrial district; provided that inundation depths for parking and loading areas do not exceed two feet or that such areas are not subjected to flood velocities greater than four feet per second upon the occurrence of a 100-year recurrence interval flood.

Conditional Uses

--See Section 6.10

11. Repeal and recreate Section 6.2 to read as follows:

6.2 APPLICATION

Applications for conditional use permits shall be made in duplicate to the Building Inspector on forms furnished by the Building Inspector and shall include the following:

Names and Addresses of the applicant, owner of the site, architect, professional engineer, contractor, and all opposite and abutting property owners of record.

Description of the Subject Site by lot, block, and recorded subdivision or by metes and bounds; address of the subject site; type of structure; proposed operation or use of the structure or site; number of employees; and the zoning district within which the subject site is located. For floodland conditional uses, such description shall also include information that is necessary for the Plan Commission to determine whether the proposed development will hamper flood flows, impair floodplain storage capacity, or cause danger to human or animal life. This additional information may include plans, certified by a registered professional engineer or land surveyor, showing elevations or contours of the ground; fill or storage elevations; first floor elevations of structures; size, location, and spatial arrangement of all existing and proposed structures on the site; location and elevation of streets, water supply, and sanitary facilities; photographs showing existing land uses and vegetation upstream and downstream; soil types and other pertinent information.

Plat of Survey prepared by a registered land surveyor showing all of the information required under Section 2.3 for a Building Permit and, in addition, the following: mean and historic high water lines and floodlands on or within forty (40) feet of the subject premises, and existing and proposed landscaping.

Additional Information as may be required by the Village Plan Commission, Village Engineer, Building Inspector, or Plumbing Inspector.

12. Repeal and recreate Section 6.3 to read as follows:

6.3 REVIEW AND APPROVAL

The Village Plan Commission shall review the site, existing and proposed structures, architectural plans, neighboring uses, parking areas, driveway locations, highway access, traffic generation and circulation, drainage, sewerage and water systems, and the proposed operation.

Conditions such as landscaping, architectural design, type of construction, floodproofing, anchoring of structures, construction commencement and completion dates, sureties, lighting, fencing, planting screens, operational control, hours of operation, improved traffic circulation, deed restrictions, highway access restrictions, increased yards, or parking requirements may be required by the Village Plan Commission upon its finding that these are necessary to fulfill the purpose and intent of this Ordinance.

Compliance with all other provisions of this Ordinance, such as lot width and area, yards, height, parking, loading, traffic, and highway access shall be required of all conditional uses. Variances shall only be granted as provided in Article XII.

13. Create Section 6.10 to read as follows:

6.10 FLOODLAND USES

The following uses are conditional uses and may be permitted as specified:

Open Space and Related Uses in the F-1 Floodway District may be permitted for the following uses provided that the applicant shall show that such use or improvement will not impede drainage, will not cause ponding, will not obstruct the floodway, will not increase flood flow velocities, will not increase the flood stage, and will not retard the movement of floodwaters. When permitted, all structures shall be floodproofed and constructed so as not to catch or collect debris nor be damaged by floodwaters. Certification of floodproofing shall be made to the Building Inspector and shall consist of a plan or document certified by a registered professional engineer that the floodproofing measures are consistent with the flood velocities, forces, depths, and other factors associated with the 100-year recurrence interval flood.

a) Navigational structures

b) Public water measing and control facilities

c) Bridges and approaches

d) Marinas

e) Utilities

f) Park and recreational areas, not including structures

g) Parking lots and loading areas accessory to permitted uses in adjacent districts, not including new or used vehicle sales or storage areas.

h) Filling as authorized by the Wisconsin Department of Natural Resources to permit the establishment of approved bulkhead lines.

i) Other open space uses consistent with the purpose and intent of the district and compatible with uses in adjacent districts, not including structures.

Accessory Structures in the C-1 Conservancy District provided that all structures, when permitted, shall be floodproofed and constructed so as not to catch or collect debris nor be damaged by floodwaters. Certification of floodproofing shall be made to the Building Inspector and shall consist of a plan or document certified by a registered professional engineer that the floodproofing measures are consistent with the flood velocities, forces, depths, and other factors associated with the 100-year recurrence interval flood.

Residential Structures in the FFO Floodplain Fringe Overlay District provided that the structure is permitted in the underlying basic use district, and provided that such floodplain fringe areas shall be filled to an elevation at least two feet above the elevation of the 100-year recurrence interval flood. Such fill shall extend for at least fifteen (15) feet beyond the limits of the structure placed thereon and shall be contiguous to lands outside the floodplain where the depth and duration of flood waters are sufficient to cause rescue and relief problems. The finished surface of the first flood (or basement floor, if habitable) shall be constructed or placed at an elevation that is at least two feet above the elevation of the 100-year recurrence interval flood. No habitable floor shall be permitted below the flood protection elevation cited above.

Commercial, Industrial and Other Non-Residential Structures in the FFO Floodplain Fringe Overlay District provided that the structure is permitted in the underlying district and provided that the fill requirements for residential structures in the FFO district are complied with. However, when the intent and purpose of this Ordinance cannot be fulfilled by filling the floodplain fringe due to existing and committed development, and when the Village Plan Commission has made a finding to this effect, all new structures and all additions to existing structures in the Floodplain Fringe Overlay District shall be floodproofed to a point two (2) feet above the elevation of the 100-year recurrence interval flood. Certification of floodproofing shall be made to the Building Inspector and shall consist of a plan or document certified by a registered professional engineer that the floodproofing measures are consistent with the flood velocities, forces, depths, and other factors associated with the 100-year recurrence interval flood level for the particular stream reach.

Removal of Lands from the FFO Floodplain Fringe Overlay District as shown on the Supplementary Floodland Zoning Map shall not be made unless it can be shown that the area has been filled to an elevation at least two (2) feet above the elevation of the 100-year recurrence interval flood and is contiguous to lands lying outside of the floodlands.

Maintenance of Drainageways. No filling or development in the FFO Floodplain Fringe Overlay District shall adversely affect the channels, floodways, or shorelands of any tributary of the Sussex Creek, Sussex Creek-East Branch, Sussex Creek-South Branch, Willow Springs Creek, drainage ditches, or other lands lying outside the floodlands.

Notice to DNR. The Village Plan Commission shall transmit a copy of each application for a conditional floodland use to the Wisconsin Department of Natural Resources (DNR) for review and comment. Final action on the application shall not be taken for thirty (30) days or until the DNR has made its recommendation, whichever comes first. A copy of all decisions relating to conditional uses in floodland districts shall be transmitted to the DNR within ten (10) days of the effective date of such decision.

14. Create Section 10.6 to read as follows:

10.6 FLOODLAND NONCONFORMING USES

Floodland nonconforming uses repaired or altered under the nonconforming use provisions of this code shall provide for floodproofing to those portions of the structures involved in such repair or alteration. Certification of floodproofing shall be made to the Building Inspector and shall consist of a plan or document certified by a registered professional engineer that the floodproofing measures are consistent with the flood velocities, forces, depths, and other factors associated with the 100-year recurrence interval flood.

15. Renumber Sections 12.5, 12.6, 12.7, 12.8, and 12.9 to be 12.6, 12.7, 12.8, 12.9, and 12.10, respectively.

16. Create Section 12.5 to read as follows:

12.5 POWERS LIMITED IN FLOODLAND DISTRICTS

The Zoning Board of Appeals shall not grant a variance or issue any order where:

a) Filling and development contrary to the purpose and intent of the F-1 Floodway District and the C-1 Conservancy District would result.

b) A change in the boundaries of the F-1 Floodway District, C-1 Conservancy District, or the FFO Floodplain Fringe Overlay District would result.

c) A lower degree of flood protection than a point two (2) feet above the 100-year recurrence interval flood for the particular area would result.

d) Any action contrary to the provisions of the Wisconsin Statutes or the Wisconsin Administrative Code would result.

17. Create Section 12.11 to read as follows:

12.11 NOTICE TO DNR

The Zoning Board of Appeals shall transmit a copy of each application for a variance to floodland regulations to the Wisconsin Department of Natural Resources (DNR) for review and comment. Final action on the application shall not be taken for thirty (30) days or until the DNR has made its recommendation, whichever comes first. A copy of all decisions relating to variances to floodland regulations shall be transmitted to the DNR within ten (10) days of the effective date of such decision.

18. Create Section 13.8 to read as follows:

13.8 NOTICE TO DNR

A copy of all notices for amendments or rezoning in the floodland districts shall be transmitted to the Wisconsin Department of Natural Resources. No amendments to the floodland district boundaries or regulations shall become effective until approved by the Wisconsin Department of Natural Resources.

19. Repeal the definition of DISTRICT as it appears in Section 15.

20. Add the following definitions in appropriate alphabetical order to Section 15:

CHANNEL.

Those floodlands normally occupied by a stream, lake bed, or other body of water under average annual high-water flow conditions while confined within generally well-established banks.

DISTRICT, BASIC.

A part or parts of the Village for which the regulations of this Ordinance governing the use and location of land and buildings are uniform (such as the Residential, Commercial, and Industrial District classifications).

DISTRICT, OVERLAY.

Overlay districts provide for the possibility of superimposing certain additional requirements upon a basic zoning district without disturbing the requirements of the basic district. In the instance of conflicting requirements, the more strict of the conflicting requirements shall apply.

FLOOD.

A temporary rise in streamflow or stage in lake level that results in water overtopping the banks and inundating areas adjacent to the stream channel or lake bed.

FLOOD PROFILE.

A graph showing the relationship of the floodwater surface elevation of a flood event of a specified recurrence interval to the stream bed and other significant natural and man-made features along a stream.

FLOOD STAGE.

The elevation of the floodwater surface above an officially established datum plane, which is Mean Sea Level, 1929 Adjustment, on the Supplementary Floodland Zoning Map.

FLOODLANDS.

Those lands included within the floodplain fringe and floodway.

FLOODPLAIN FRINGE.

Those floodlands, excluding the floodway, subject to inundation by the 100-year recurrence interval flood.

FLOODPROOFING.

Measures designed to prevent and reduce flood damage for those uses which cannot be removed from, or which, of necessity, must be erected on floodlands, ranging from structural modifications through installation of special equipment or materials to operation and management safeguards, such as the following: reinforcing of basement walls; underpinning of floors; permanent sealing of all exterior openings; use of masonry construction; erection of permanent watertight bulkheads, shutters, and doors; treatment of exposed timbers; elevation of flood-vulnerable utilities; use of waterproof cement; adequate fuse protection; anchoring of buoyant tanks; sealing of basement walls; installation of sump pumps; placement of automatic swing check valves; installation of seal-tight windows and doors; installation of wire-reinforced glass; location and elevation of valuable items; waterproofing, disconnecting, elevation, or removal of all electrical equipment; avoidance of the use of flood-vulnerable areas; temporary removal or waterproofing of merchandise; postponement of orders or rescheduling of freight shipments; operation of emergency pump equipment; closing of backwater sewer valve; placement of plugs and floor drain pipes; placement of movable watertight bulkheads; counter flooding, erection of sand bag levees; and the shoring of weak walls or other structures. Floodproofing of structures shall be extended at least to a point two (2) feet above the elevation of the 100-year recurrence interval flood.

FLOODWAY.

Those floodlands, including the channel, required to carry and discharge the 100-year recurrence interval flood.

HIGH WATER ELEVATIONS.

The average annual high water level of a pond, stream, lake, flowage, or wetland referred to an established datum plane or, where such information is not available, the elevation of the line up to which the presence of the water is so continuous as to leave a distinct mark by erosion, change in, or destruction of, vegetation or other easily recognized topographic, geologic, or vegetative characteristics.

REACH.

A longitudinal segment of a stream generally including those floodlands wherein flood stages are primarily and commonly controlled by the same man-made or natural obstructions to flow.

STORAGE CAPACITY.

The volume of space available above an area of floodplain fringe land for the temporary storage of flood water.

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

BASE MAP COMPILED FROM VILLAGE OF SUSSEX MAPS, DATE OF PHOTOGRAPHY, NOVEMBER 18, 1974, DATE OF MAPPING, WINTER 1974-75, AND REGIONAL PLANNING BAY FREEWAY MAPS, DATE OF PHOTOGRAPHY APRIL, 1967, DATE OF MAPPING, SPRING OF 1968.

SUPPLEMENTARY FLOODLAND ZONING MAP

VILLAGE OF SUSSEX

WAUKESHA COUNTY WISCONSIN

DRAWN: RONALD H. HEINEN	DATE: FEBRUARY 1977
REVISED:	DATE:
SCALE: 1" = 400' (COMPILATION SCALE: 1" = 200')	