

RACINE AREA SEWER AND WATER UTILITY PLANS COMPLETED

A set of coordinated sanitary sewerage and water supply system plans has been completed for the greater Racine area. The recommended plans are intended to serve as a guide to the long-range development of sewerage and water supply facilities within the Racine area by all levels and agencies of government concerned. The preparation of the plans was necessitated by, and the plans were designed to meet, the urban development being experienced, and anticipated to continue to be experienced, within the Racine area, particularly within the IH 94 corridor.

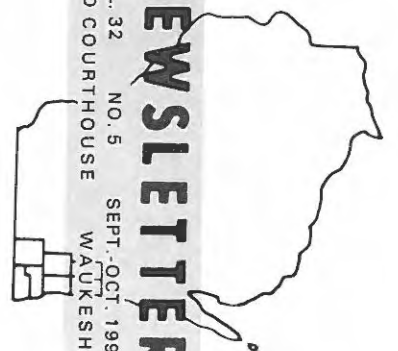
The utility planning area consists of all that part of Racine County extending from Lake Michigan to a distance two miles west of IH 94, as well as about 0.6 square mile within the Town of Somers "KR" Sewer Utility District in Kenosha County served by the City of Racine's wastewater treatment facility. In addition to the portion of the Town of Somers just noted, the planning area includes that area defined under the planning effort as the greater Racine area: all of the City of Racine, the Villages of Elmwood Park, North Bay, Sturtevant, and Wind Point, and the Towns of Caledonia and Mt. Pleasant, as well as portions of the Towns of Raymond and Yorkville. Excluding the portion of the Town of Somers noted above, the planning area encompasses about 125 square miles.

The entire issue of this Newsletter is devoted to a summary of the findings of the recently completed study of the Racine utility planning area and its needs for public water supply and sanitary sewerage. The study, under the direction of the Greater Racine Area Utility Advisory Committee, was carried out by the engineering firm of Alvord, Burdick & Howson, with assistance from Applied Technologies, Inc. The findings are documented in the report entitled A Coordinated Sanitary Sewer and Water Supply System Plan for the Greater Racine Area, published by the consultants.

SOUTHEASTERN WISCONSIN REGIONAL PLANNING COMMISSION

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RACINE AREA SEWER AND WATER UTILITY PLANS—continued

In February of 1989, the Racine County Executive requested the assistance of the Commission in preparing a Prospectus for the development of coordinated utility system plans for the Racine area. In response to this request, the Commission created a Technical Advisory and Intergovernmental Coordinating Committee to guide the preparation of the Prospectus. This Committee consisted of county and municipal elected and appointed officials and technical staff particularly knowledgeable in, and concerned about, utility system development in the area. The Prospectus was completed and approved by the Committee in March 1989.

This Committee was subsequently reconstituted as the Greater Racine Area Utility Planning Committee. The membership was selected by Racine County and by the local units of government concerned; its membership is set forth in the accompanying box. In September 1989 a contract governing the conduct of the work was entered into between the Commission and the County and local units concerned. Funding for the conduct of the work was provided by the County, the local units of government concerned, and the Wisconsin Department of Corrections, which Department became involved in the need for utility service through the location of a prison facility within the planning area.

After interviewing a number of consulting engineering firms, the Committee selected the Chicago firm of Alvord, Burdick & Howson, Engineers, to perform the desired planning work as that work was set forth in the Prospectus. A subagreement for selected elements of the planning and engineering work was completed between the firm of Alvord, Burdick & Howson, Engineers, and the Milwaukee-area firm of Applied Technologies, Inc. Work on the plan was initiated by the consultants in April 1990 and completed in September 1992.

The findings and recommendations of the planning work are contained in a report prepared by Alvord, Burdick & Howson entitled A Coordinated Sanitary Sewer and Water Supply System Plan for the Greater Racine Area. The report identifies the sanitary sewer and water supply needs of the planning area; proposes and evaluates alternative means of meeting those needs; recommends a coordinated set of design year 2010 sewerage and water supply system plans for the area; identifies and addresses the intergovernmental, administrative, legal, and fiscal issues inherent in the implementation of the system plans; and recommends an institutional structure for the implementation of those plans. The plan, as set forth in the report, is summarized below.

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

GREATER RACINE AREA UTILITY PLANNING COMMITTEE

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William Kiser	President, Raymond Heights Sanitary District
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Rex Parsons	Director of Public Works, Village of Sturtevant
John H. Veltus	President, Town of Mt. Pleasant Sewer Commission
Thomas H. White	General Manager, Water and
		Wastewater Utility, City of Racine

NOTE: It is noted with deepest regret that Mr. Alvin P. ("Pete") Nelson passed away on August 2, 1992. Mr. Nelson had been a very dedicated and insightful member of this Committee as well as of a number of other Commission advisory committees.

INVENTORY FINDINGS

The planning effort included extensive inventories and analyses of a variety of factors bearing on utility system development within the planning area. The findings of these inventories and analyses are summarized below.

Population, Economic Activity, and Land Use

Careful consideration was given in the planning effort to trends in population, employment, and land use development within the planning area. The data required to analyze these trends were made available to the consultants by the Regional Planning Commission for use in the planning effort.

The resident population of the greater Racine area totaled about 131,000 persons in 1985, somewhat less than the 136,000-person total in 1970. The population level was about 134,000 persons in 1990. The decline in resident population of the greater Racine area between 1970 and 1990 is due to the decrease in the population of the City of Racine from about 95,000 in 1970 to about 84,000 in 1990. In contrast, the population for the portion of the greater Racine area outside the City increased from about 41,000 in 1970 to about 50,000 in 1990. The number of households in the area, however, increased steadily, from about 40,500 in 1970, to 48,500 in 1985, and to 49,600 in 1990, reflecting the effects of a declining household size.

The number of jobs in the area has increased from about 56,300 jobs in 1970 to about 62,000 jobs in 1985 and to about 66,300 jobs in 1990. While this trend in employment appears positive, there has been a shift in the economic base of the area and an attendant loss of manufacturing jobs from 1990 through 1992. This loss of relatively well-paid manufacturing jobs has important implications for utility system development in the area, particularly with respect to economic development and job creation. This situation requires thoughtful long-range planning for the continued sound social and economic development of the area.

The planning effort also included careful inventories of the existing land uses and of the natural resource base of the planning area as well as the ability of that base to sustain urban development.

Urban lands, residential; commercial; industrial; transportation, communication, and utilities; governmental and institutional; and recreational, encompassed about 33.3 square miles, or about 27 percent of the 125-square-mile planning area, in 1970. These land uses increased by about five square miles, or about 16 percent, between 1970 and 1985, reaching a level of 38.6 square miles, or 31 percent of the planning area, in 1985. Urban land uses experiencing the largest increase during this time period were residential, which increased 3.0 square miles, or 18 percent; commercial, which increased 0.6 square mile, or 55 percent; and industrial, which increased 0.5 square mile, or 31 percent.

Available inventory data on the primary environmental corridors within the planning area were provided to the consultants by the Regional Planning

Commission. These corridors contain the best remaining elements of the natural resource base, including streams and lakes and associated shorelands and floodlands; wetlands; woodlands; wildlife habitat areas; areas of rugged terrain and high-relief topography; wet, poorly drained, and organic soils; remnant prairies; existing and potential park sites; sites of historic, cultural, and archaeological value; areas possessing scenic vistas or viewpoints; areas of groundwater recharge and discharge; and areas of scientific and educational value. The Regional Planning Commission has long recommended that these environmental corridors be preserved in essentially open, natural uses. The preservation of these corridors was therefore considered in the design of the alternative and recommended water supply and sewerage system plans and incorporated into the land use plan on which the utility system plans were based.

Map 1 shows the existing land uses within the planning area as of 1985, while Map 2 shows the location of the primary and secondary environmental corridors and isolated natural areas within the planning area.

Watershed Boundaries

As shown on Map 3, the planning area lies in four major watersheds: the Root River watershed, the Des Plaines River watershed, the Pike River watershed, and the watershed directly tributary to Lake Michigan via a number of small creeks and drainageways. The subcontinental divide which crosses the Southeastern Wisconsin Region from northwest to southeast and separates the Mississippi River drainage basin from the Great Lakes drainage basin traverses the planning area and has important implications for sewerage and water supply system planning for the area.

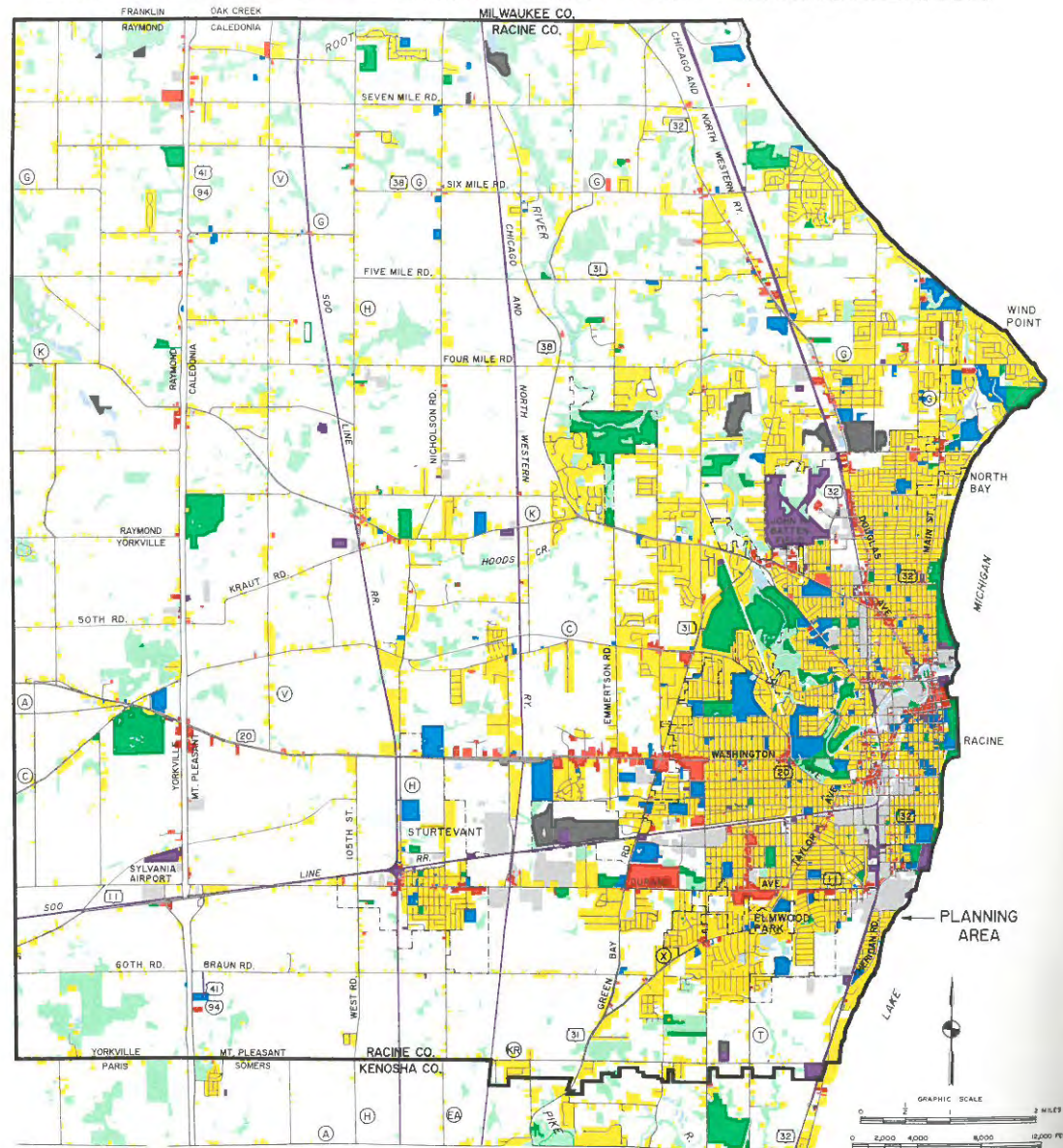
Soil Suitability and Groundwater Quality

Over 92 percent of the greater Racine area is covered by soils that are unsuitable for the use of conventional onsite sewage disposal systems; about 4 percent of the area is covered by soils which are of undetermined suitability, according to the current regulatory practice under Chapter IHLR 83 of the Wisconsin Administrative Code. These characteristics of the area have important implications for sewerage system planning.

The planning area is underlain by three separate aquifers. The shallow sand and gravel aquifer, while a potentially suitable source of water for individual wells serving limited rural development, does not have the consistent, sustainable yields needed for areawide municipal water supply development. In addition, this shallow aquifer is readily susceptible to pollution. Likewise, the

Map 1

EXISTING LAND USE IN THE GREATER RACINE UTILITY PLANNING AREA: 1985



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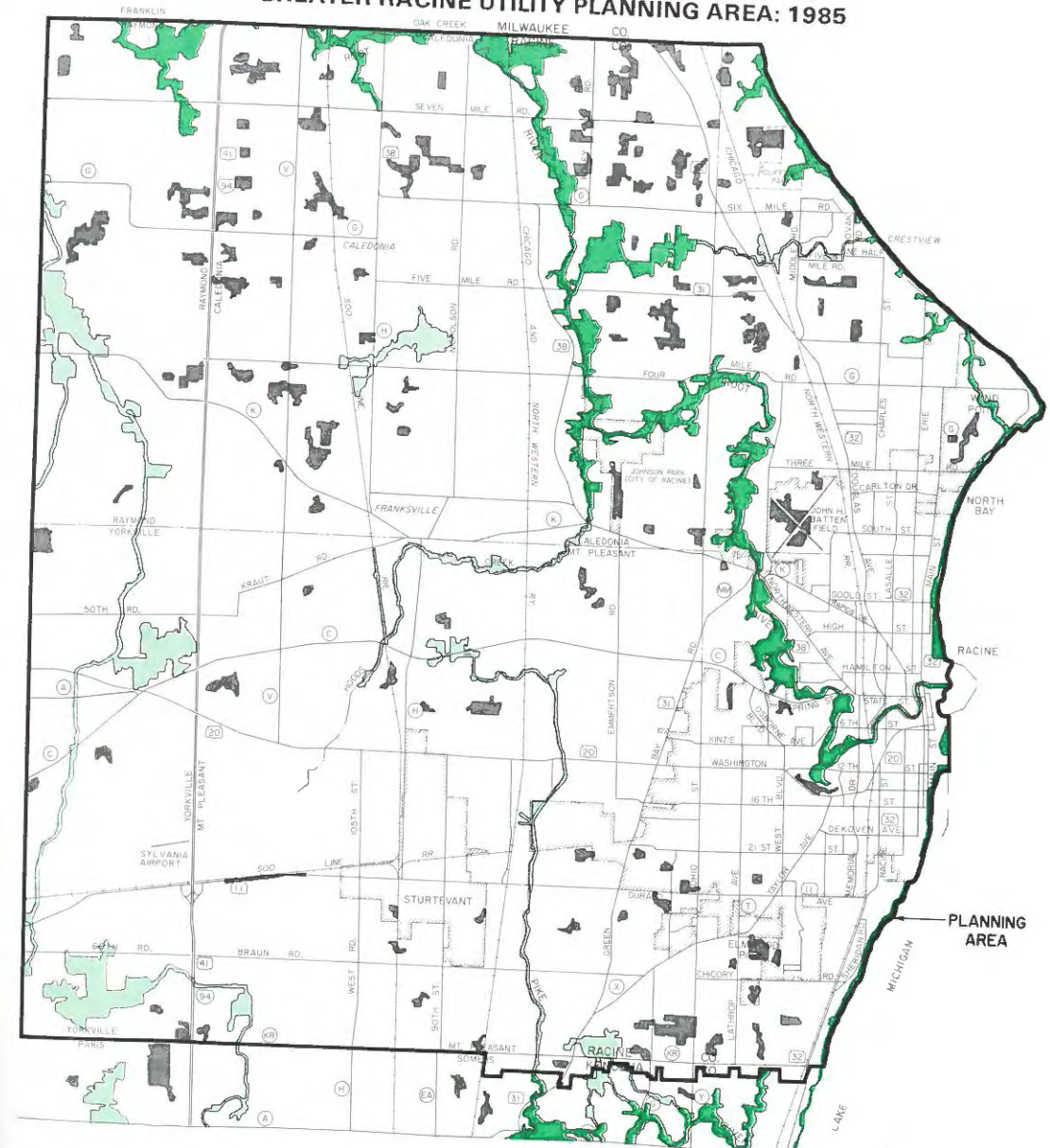
- | | | |
|--|--|---|
| RESIDENTIAL | TRANSPORTATION, COMMUNICATIONS, AND UTILITIES | WOODLANDS AND WETLANDS |
| COMMERCIAL | GOVERNMENTAL AND INSTITUTIONAL | SURFACE WATER |
| INDUSTRIAL | RECREATIONAL | AGRICULTURAL AND OTHER OPEN LANDS |
| EXTRACTIVE AND LANDFILL | | |

Source: SEWRPC.

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Map 2

ENVIRONMENTALLY SIGNIFICANT LANDS IN THE GREATER RACINE UTILITY PLANNING AREA: 1985



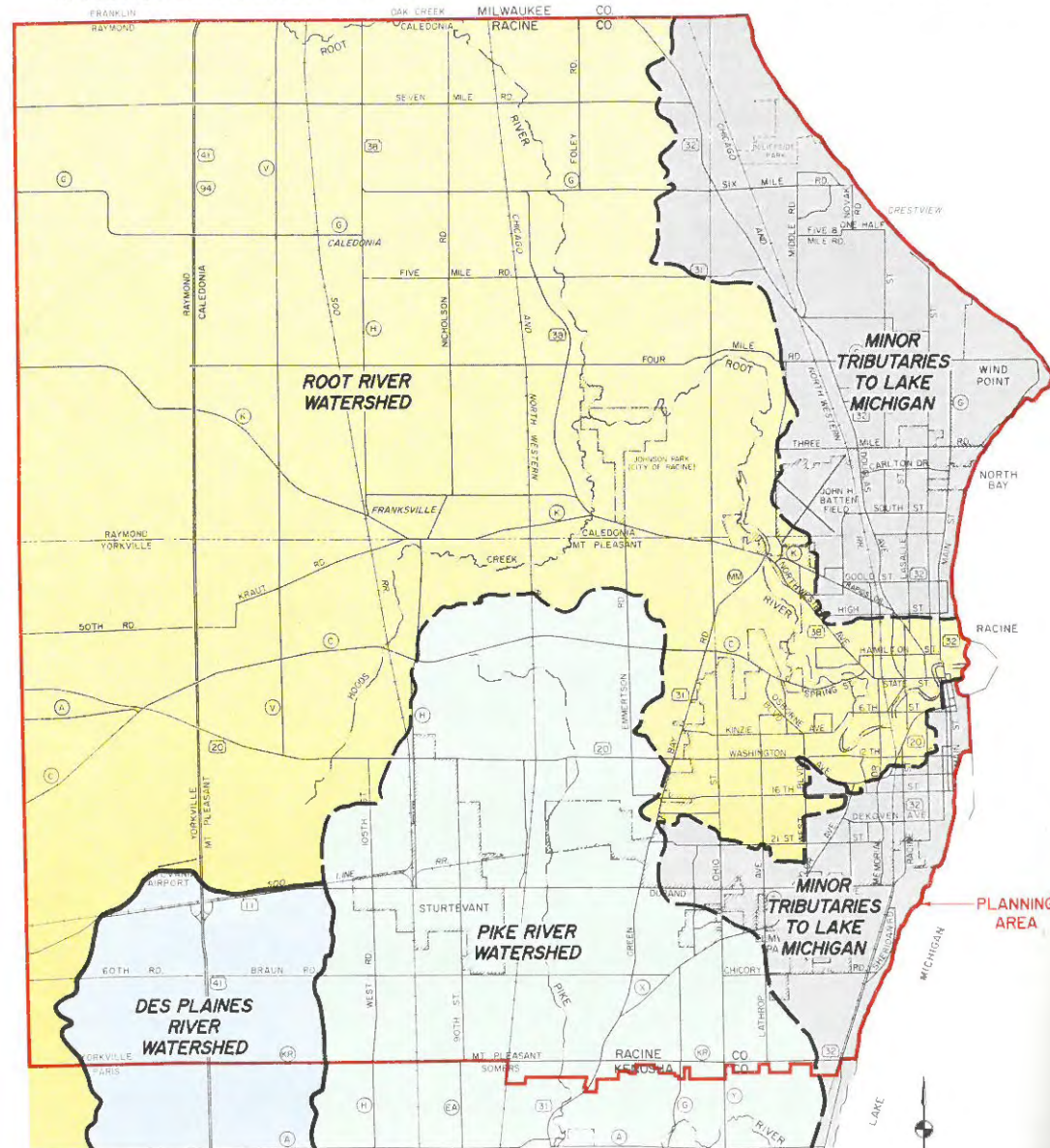
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- | |
|---|
| PRIMARY ENVIRONMENTAL CORRIDOR |
| SECONDARY ENVIRONMENTAL CORRIDOR |
| ISOLATED NATURAL AREA |

Source: SEWRPC.

Map 3

WATERSHED BOUNDARIES IN THE GREATER RACINE UTILITY PLANNING AREA



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- WATERSHED BOUNDARY
- SUBCONTINENTAL DIVIDE

Source: SEWRPC.

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

erratic yields and susceptibility to pollution of the shallow limestone aquifer which is interconnected with the sand and gravel aquifer render the limestone aquifer unsuitable as a reliable source for an areawide water supply system. The deep sandstone aquifer which underlies the area is separated from the interconnected shallow sand and gravel and limestone aquifers by a layer of relatively impervious shale. While a good source of large quantities of generally high-quality water, it has a history of providing water with high radium levels. Water from this aquifer must be treated to make it comparable in quality to Lake Michigan water.

Existing Sanitary Sewerage Facilities and Service Areas

The planning effort included inventories and assessments of the several sanitary sewerage systems existing within the planning area with respect to service area, trunk sewer configuration and capacity, sewage treatment plant location and capacity, and wastewater flows.

In 1991, two public sewage treatment facilities were in operation within the planning area: a large sewage treatment plant located on the Lake Michigan shoreline operated by the City of Racine Wastewater Utility and a much smaller sewage treatment plant located in the vicinity of IH 94 and STH 20 operated by the Yorkville Sewer Utility District No. 1. These two public sewage treatment plants and the tributary collection and conveyance systems together in 1985 served an area of about 33 square miles, or about 26 percent of the total planning area, and a resident population of about 122,500 persons, or about 93 percent of that population of the planning area. In addition, the Milwaukee Metropolitan Sewerage District South Shore sewage treatment plant, located on the Lake Michigan shore to the north and outside of the planning area, served an area of about 0.2 square mile and a resident population of about 900 persons residing within the Caddy Vista Sanitary District in the Town of Caledonia.

Table 1 provides a listing of the capacities and certain other basic characteristics of these public sewage treatment plants. Map 4 shows the major elements of the sewerage facilities and sewer service areas as these existed within the planning area in 1989.

Existing Water Supply Facilities and Service Areas

In 1989 there were seven public water supply utilities operating within the planning area: the large Racine Water Utility utilizing Lake Michigan as a source of supply and the smaller utilities known as the Caddy Vista Sanitary District, the Crestview Sanitary District, the North Park Sanitary District, the Sturtevant Water and Sewer Utility, the Town of Caledonia Water District No. 1,

Table 1
SELECTED CHARACTERISTICS OF EXISTING PUBLIC WASTEWATER TREATMENT FACILITIES IN THE GREATER RACINE UTILITY PLANNING AREA: 1989

Name of Public Sewage Treatment Plant	Estimated Total Area Served (square miles)	Estimated Total Population Served	Date of Original Construction and Major Modification(s)	Level of Treatment Provided	Disposal of Effluent	Design Capacity				
						Population ^a	Average Hydraulic (mgd)	Peak Hydraulic (mgd)	Average Organic (pounds BOD ₅ /day)	Average Organic Population Equivalent ^a
Racine Water and Wastewater Utilities	32.3	121,600 ^b	1938, 1967, 1977	Secondary, plus phosphorus removal	Lake Michigan	140,000	30.0	70.0	50,000	238,000
Milwaukee Metropolitan Sewerage District South Shore Sewage Treatment Plant	0.18	900	1969, 1974, 1988 ^c	Secondary, plus phosphorus removal	Lake Michigan	- ^d	150.0 ^c	400.0 ^{c,e}	265,000 ^c	1,262,000 ^c
Town of Yorkville Sewer Utility District No. 1	0.52	100	1965, 1982	Secondary	Unnamed Tributary of Hoods Creek	1,875	0.15	0.60	255	1,200

^aThe population design capacity for a given sewage treatment facility was obtained from plant operating personnel or directly from engineering reports prepared by the local unit of government operating the facility and reflects assumptions made by the design engineer. The population equivalent design capacity was estimated by dividing the design BOD₅ loading in pounds per day by an estimated per capita contribution of 0.21 pounds of BOD per day. If the design engineer assumed a different daily per capita contribution of BOD₅, the population equivalent design capacity shown will differ from the population design capacity shown in the table.

^bPopulation served based upon 1985 data. Does not include 0.60 square mile and 800 persons in the Town of Somers "KR" Sanitary District in Kenosha County who are served by the Racine sewerage system.

^cThe design capacities noted reflect an expansion and upgrading begun in 1988.

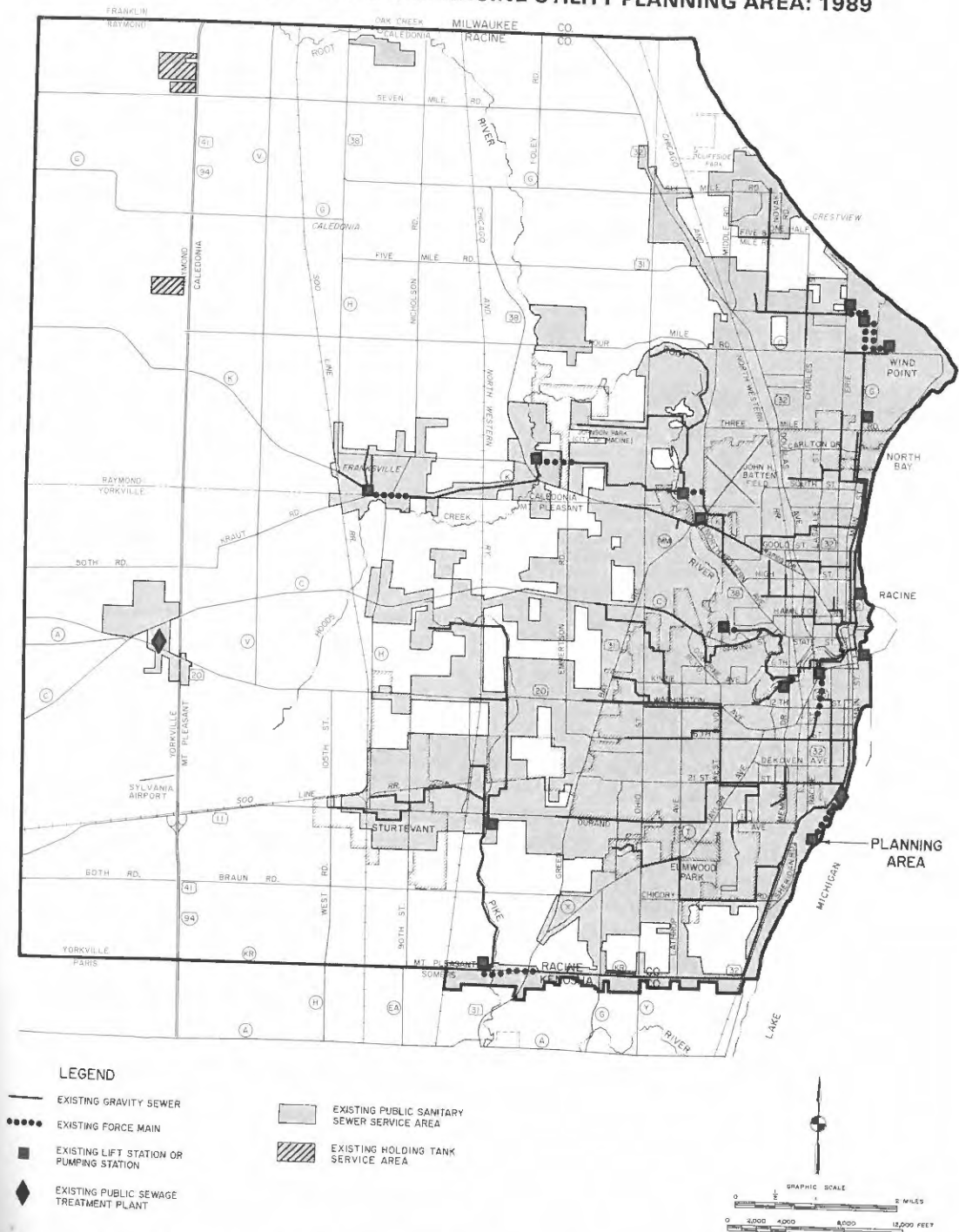
^dThe Milwaukee Metropolitan Sewerage District South Shore and Jones Island sewage treatment plants are designed to act in a parallel manner to serve a design population of 1,299,600. Some loadings can be directed to either facility, depending upon plan and conveyance capacity.

^eThe peak hydraulic design flow at the Milwaukee Metropolitan Sewerage District South Shore plant is 400 mgd, of which 250 mgd will be treated and 150 mgd will be stored and treated after the peak resides.

Source: Wisconsin Department of Natural Resources and SEWRPC.

and the Wind Point Water Utility. Of the six smaller water supply utilities, the Caddy Vista Sanitary District and the Crestview Sanitary District utilized groundwater drawn from the deep sandstone aquifer as a source of supply, while the North Park Sanitary District, the Sturtevant Water and Sewer Utility, and the Town of Caledonia Water District No. 1 each purchased water on a wholesale basis from the Racine Water Utility and distributed it to their respective customers on a retail basis. The Wind Point Water Utility purchased its water from the North Park Sanitary District on a wholesale basis and distributed that water to its customers on a retail basis. In addition, the City of Racine Water Utility provides retail water service to the Villages of North Bay and Elmwood Park and to portions of the Town of Mt. Pleasant. The three water utilities which serve as initial sources of water supply to the planning

Map 4
EXISTING SANITARY SEWER SERVICE AREA AND MAJOR SEWERAGE FACILITIES IN THE GREATER RACINE UTILITY PLANNING AREA: 1989



Source: Alvord, Burdick & Howson; Applied Technologies, Inc.; Racine Water and Wastewater Utilities; and SEWRPC.

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

area together in 1985 served a resident population of about 110,000 persons, or about 84 percent of the resident population of the planning area, and an area of about 24 square miles, or about 19 percent of the total planning area.

Table 2 provides a listing of the capacities and certain other selected characteristics of each public water supply system. Map 5 shows the public water supply systems and service areas as these existed within the planning area in 1989.

Existing Sewer and Water Service Agreements

Several intergovernmental agreements for the provision of sewer and water service currently exist within the planning area. These include: 1) an agreement between the Caddy Vista Sanitary District and the Milwaukee Metropolitan Sewerage District under which the Sewerage District processes sewage from the Caddy Vista Sanitary District; 2) an agreement between the Town of Somers "KR" Sewer Utility District and the Town of Mt. Pleasant Sewer Utility District No. 1 under which the sewage from the Somers "KR" District is allowed to enter the Mt. Pleasant sewer system at a trunk sewer connection; 3) an agreement between the Crestview Sanitary District and the North Park Sanitary District under which wastewater generated in the Crestview District is conveyed to the North Park District; 4) a series of agreements between the Racine Wastewater Utility and, respectively, the Colonial Heights Sanitary District, the North Park Sanitary District, the Town of Caledonia Sewer Utility District No. 1, the Town of Mt. Pleasant Sewer Utility District No. 1, and the Villages of Elmwood Park, North Bay, and Sturtevant under which the Racine Wastewater Utility processes sewage generated within each of the other sewerage districts; 5) an agreement between the Racine Water Utility and the Town of Caledonia Water District No. 1 under which the Town of Caledonia Water District No. 1 purchases water from the Racine Water Utility on a wholesale basis; 6) an agreement between the North Park Sanitary District and the Wind Point Water Utility under which the Wind Point Water Utility purchases water from the North Park Sanitary District on a wholesale basis; and 7) agreements between the Racine Water Utility and the Town of Mt. Pleasant Utility District No. 1 and the Villages of North Bay and Elmwood Park under which the Racine Water Utility provides water on a retail basis to the latter three communities. In addition, although written agreements under which the Racine Water Utility sold water on a wholesale basis to the Sturtevant Water and Sewer Utility and

Table 2

SELECTED CHARACTERISTICS OF EXISTING PUBLIC WATER SUPPLY, STORAGE, AND DISTRIBUTION FACILITIES IN THE GREATER RACINE UTILITY PLANNING AREA: 1989

Name of Public Water Utility	Estimated Total Area Served (square miles)	Estimated Population Served ^a	Total Supply Capacity (mgd)	Total Storage Capacity (gallons)	Total Miles of Water Distribution Main
Racine Water Utility	23.3 ^b	105,600 ^b	45.0	7,750,000	328.5 ^c
Sturtevant Water and Sewer Utility	. .b	. .b	--	350,000	16.5
Town of Caledonia Water Utility District No. 1	. .b	. .b	--	--	9.8
Crestview Sanitary District	0.6	3,800	1.30 ^d	100,000	14.8
Caddy Vista Sanitary District	0.2	900	0.65	--	2.7
North Park Sanitary District	. .b	. .b	--	--	27.7
Wind Point Water Utility	. .e	. .e	--	--	13.6

^aBased upon 1985 population data.

^bThe City of Racine Water Utility provides retail water service to the Villages of North Bay and Elmwood Park and to a portion of the Town of Mt. Pleasant and wholesale water service to the Village of Sturtevant, the North Park Sanitary District, and the Town of Caledonia Water Utility District No. 1. The area and population served presented in this table for the Racine Water Utility include the communities served on a wholesale and retail basis.

^cIncludes 6.7 miles of distribution main from the former South Lawn Sanitary District.

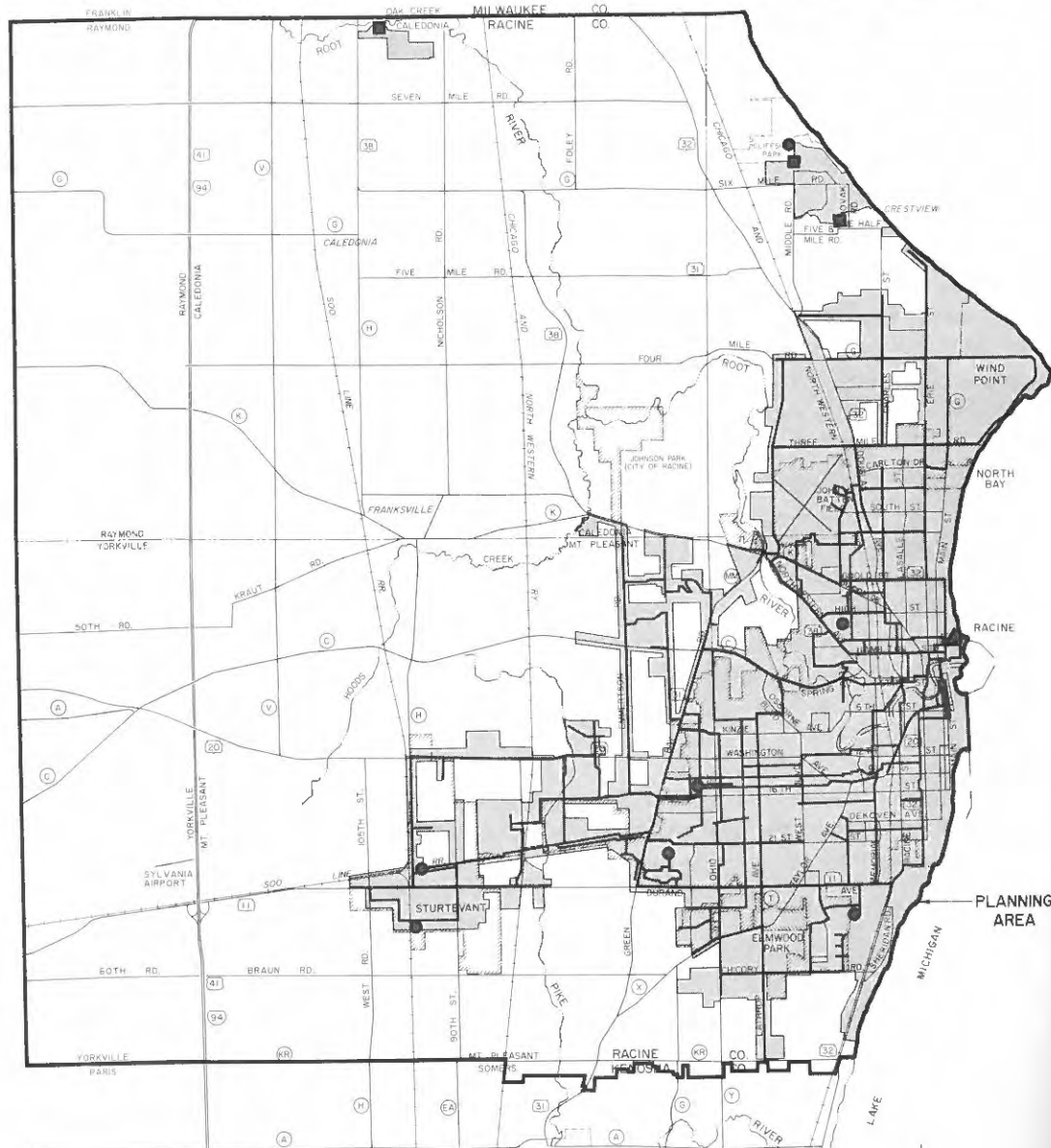
^dCapacity is 0.58 mgd, assuming well No. 1 is out of service.

^eSupplied with water by the North Park Sanitary District on a wholesale basis.

Source: Alvord, Burdick & Howson.

Map 5

EXISTING PUBLIC WATER SUPPLY SERVICE AREA AND MAJOR WATER SUPPLY FACILITIES IN THE GREATER RACINE UTILITY PLANNING AREA: 1989



LEGEND

— EXISTING WATER MAIN

● EXISTING STORAGE FACILITY

▲ EXISTING WATER TREATMENT PLANT

■ EXISTING WELL

EXISTING PUBLIC WATER UTILITY SERVICE AREA

Source: Alvord, Burdick & Howson; Racine Water and Wastewater Utilities; and SEWRPC.

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

to the North Park Sanitary District have expired, the Racine Water Utility continues to sell water on a wholesale basis to the Utility and District under the terms of the agreements.

Existing Problems and Constraints

Several problems and constraints exist with regard to the present sewerage and water supply systems within the planning area. The previously noted subcontinental divide separates about six square miles of the planning area from the remaining 119 square miles of the planning area tributary to Lake Michigan. This has implications for any sewerage and water supply system planning and development in the area.

Certain legal restrictions and limitations regarding the diversion of water across this divide must be considered in any utility planning for the Racine area. Traditional common-law riparian doctrine essentially forbids the transfer of water between watersheds. Nevertheless, interbasin diversions have taken place in the Great Lakes region, although not without difficulty. Any future diversion of Lake Michigan water will require State of Wisconsin approval and will involve comment and review by all of the other Great Lakes states. In addition, Canada may become involved in any such diversions. Approval of any permanent diversion is unlikely. In addition to the problems pertaining to interbasin diversion, there have been diverse, and at times conflicting, viewpoints among the various local units of government concerned regarding the best means of providing essential sewer and water supply services to the planning area.

There is also a need to provide water supply and sanitary sewer service in a timely manner to areas of new urban development, and thereby to promote the continued sound economic development of the area. This need is especially critical with regard to the IH 94 corridor area. Because of the number of water and sewer utility districts in the area and the location of the IH 94 corridor within four units of local government within the greater Racine area, coordinated, cooperative areawide utility system planning is essential.

The construction of public water supply and sanitary sewer facilities within the area has not kept pace with the rapid urbanization of the area. This has contributed to the use of onsite soil absorption sewage disposal systems and holding tanks. Many of the conventional onsite systems in use are 30 to 45 years old and cannot meet current standards because of the use of drain tiles to transport wastewater to drainageways or are otherwise technically failing because of the widespread incidence of impervious soils and high groundwater

levels in the area. As previously noted, most of the area is covered by soils that are unsuitable for the use of conventional onsite sewage disposal systems. Only a limited number of mound systems intended to replace failing septic tank-soil absorption systems have been approved in the area each year. The increasing use of holding tanks, mainly in areas of commercial and industrial development, adds to the problem of ineffective sewage disposal in an area undergoing urban development.

In addition, groundwater quality problems, particularly those relating to the radium content of water drawn from the deep sandstone aquifer, also make the provision of Lake Michigan water to the entire area attractive. Neither existing, nor anticipated future, water demands in the communities presently relying on groundwater supplies can be reliably met solely by the existing water supplies. Moreover, given the needs of industrial and commercial development and the constraints on the interbasin diversion of water, the development of water supply facilities in the area must be coordinated with the development of sanitary sewerage facilities.

ANTICIPATED FUTURE CONDITIONS IN THE PLANNING AREA

Population, economic activity, and land use forecasts were prepared and used in the development of anticipated future sanitary sewer and water system flows and demands and, in turn, to develop anticipated future sewerage and water supply facility requirements within the planning area.

Population and Housing Unit Forecasts

Forecasts of probable future resident population and household levels within the planning area were prepared by the Regional Planning Commission for use in the planning effort. The population and household forecasts were essential to the preparation of forecasts of sewage flows and water supply demands. Two future scenarios were considered in this respect: 1) an intermediate-growth centralized development scenario to the plan design year 2010 and 2) a high-growth decentralized development scenario to the plan design year 2010. The latter assumes a higher population growth rate and greater land use decentralization than the former. In addition, a third scenario was postulated for analytical purposes. That scenario was termed an "ultimate development" scenario and was intended by the consultants to represent potential development conditions within the planning area by the year 2030.

Under the intermediate-growth centralized development scenario, the resident population of the greater Racine area was projected to continue to remain

relatively stable at about 132,000 persons through the year 2010. The number of households was projected to increase from about 49,600 in 1990 to about 54,000 by the year 2010, an increase of about 9 percent.

Under the high-growth decentralized scenario, the resident population of the greater Racine area was projected to increase to about 168,000 persons, or by about 25 percent, by the year 2010. The number of households was projected to increase to about 62,500 by the year 2010, an increase of about 26 percent.

Under the "ultimate development" scenario, the resident population of the greater Racine area was projected to increase to about 215,000 persons by the year 2030, or by about 60 percent. The number of households was projected to increase to about 78,000 by the year 2030, an increase of about 57 percent.

Economic Activity Forecasts

Forecasts of probable future economic activity levels, expressed both in terms of total employment levels and also by distribution of employment by industrial category, were also prepared by the Regional Planning Commission for use in the planning effort in forecasting sewage flows and water supply demands, including particularly domestic, commercial, industrial, and institutional needs.

Under the intermediate-growth centralized scenario, total employment within the greater Racine area was projected to increase from the 1990 level of about 66,300 jobs to about 74,300 jobs, or by about 12 percent, by the year 2010. Under the high-growth decentralized scenario, the total number of jobs within the planning area was projected to increase to about 92,700, or by about 40 percent, by the year 2010. Under the "ultimate development" scenario, the total number of jobs within the planning area was projected to increase to about 159,000, or by about 140 percent, by the year 2030.

Table 3 sets forth the levels of resident population, households, and employment within the greater Racine area as of 1970, 1985, 1990, and as projected under the three alternative futures scenarios.

Land Use Demand Forecasts

For use in the planning effort, the Regional Planning Commission also prepared projections of future land use within the greater Racine area under the three growth scenarios, resulting in projected increases in land devoted to urban use, including recreational lands, from about 38.6 square miles in 1985 to about 43.6 square miles in 2010, an increase of about 13 percent; to 50.7 square miles, an

Table 3

LEVELS OF RESIDENT POPULATION, HOUSEHOLDS, AND
EMPLOYMENT WITHIN THE GREATER RACINE AREA: 1970,
1990, AND 2010 ALTERNATIVE AND 2030 ULTIMATE PLANS

Category	1970	1985	1990	2010 Intermediate- Growth Centralized Plan	2010 High-Growth Decentralized Plan	2030 Ultimate Plan
Population	136,000	130,800	134,200	132,000	168,040	215,000
Households	40,500	48,500	49,600	54,000	62,500	78,000
Employment	56,300	62,100	66,300	74,300	92,700	159,000

Source: SEWRPC.

increase of about 31 percent; and to 68.3 square miles, an increase of about 77 percent under, respectively, the intermediate-growth centralized, the high-growth decentralized, and the "ultimate development" scenarios.

Table 4 sets forth land uses within the greater Racine area as of 1985 under the three alternative future conditions. Map 6 shows the development patterns associated with each of the three alternative futures.

Development of Anticipated Future Sanitary Sewer and Water Supply System Flows

Estimates of both future sewage flows and future water flows were developed on the basis of careful consideration of historic sewage and water flows; anticipated resident population, household, and economic activity levels and attendant land use development patterns; and upon likely rates of clear-water infiltration and inflow to sewerage facilities and leakage from water supply facilities.

To determine the adequacy of the existing sewage conveyance systems, the existing system of trunk sewers was identified and analyzed. The wastewater peak flows estimated for 1989, as measured at metering points, were compared with the full capacity of the existing sewers, computed on the basis of sewer diameter and slope. Records of wastewater flows for the years 1985 through 1990, as recorded by the various communities, utility districts, and utilities involved, were also obtained and analyzed. Sewage flow rates were divided into three components: 1) residential-institutional-commercial, 2) industrial, and 3) clear water infiltration and inflow. Anticipated future wastewater flows were based on population forecasts and planned increases in industrial acreage for

Table 4

GENERALIZED LAND USES IN ACRES WITHIN THE GREATER RACINE
AREA: 1985, 2010 INTERMEDIATE-GROWTH CENTRALIZED, 2010 HIGH-GROWTH
DECENTRALIZED, AND 2030 ULTIMATE DEVELOPMENT LAND USE PLANS

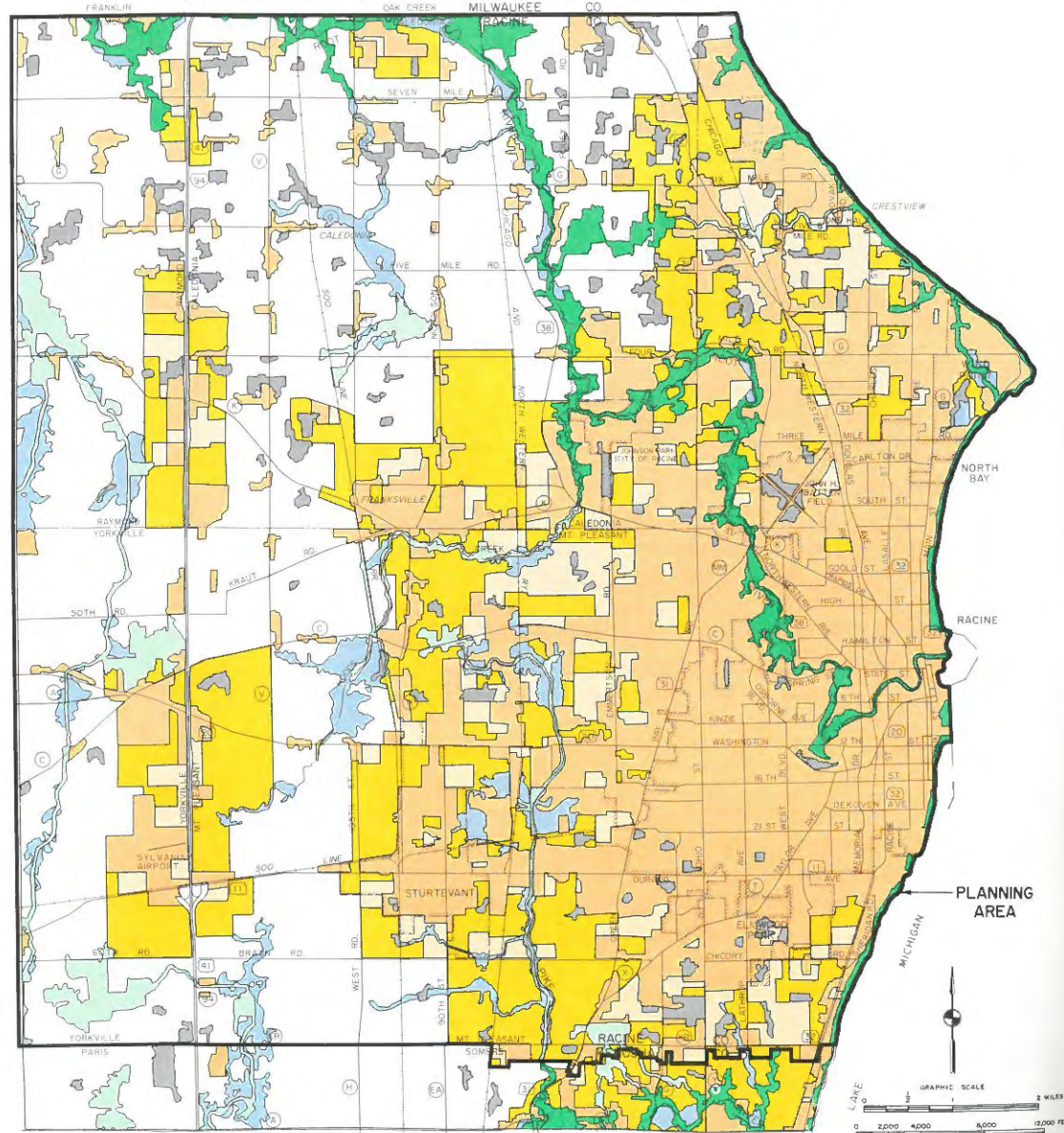
Category	1985	2010 Intermediate- Growth Plan	2010 High-Growth Plan	2030 Ultimate Plan
Residential	12,449	14,032	16,594	20,986
Commercial	1,083	1,280	1,620	2,870
Industrial	1,351	1,845	2,520	6,385
Transportation, Communication, and Utilities	6,607	7,209	8,011	9,433
Governmental and Institutional	1,419	1,456	1,540	1,696
Agricultural and Other Unused Open Lands	48,976	45,834	41,295	30,133
Wetlands and Woodlands	5,253	5,249	5,196	5,118
Landfill, Dumps and Extractive	457	445	445	445
Water	593	593	593	593
Recreational	1,812	2,057	2,186	2,341
Total	80,000	80,000	80,000	80,000

Source: SEWRPC.

the study area. The future flows based upon the year 2010 intermediate-growth centralized development scenario were used initially for the purposes of evaluating various alternative sewerage system plans. Consideration, however, was also given to future design flows estimated under the year 2010 high-growth decentralized land use conditions and under 2030 "ultimate development" land use conditions. Table 5 shows the wastewater design criteria developed for use in the system planning effort. The existing sewerage system components were evaluated with respect to design objectives and standards formulated as part of the planning work. These design objectives and standards, set forth in the

Map 6

**ANTICIPATED DEVELOPMENT IN THE GREATER RACINE UTILITY PLANNING AREA:
2010 INTERMEDIATE-GROWTH CENTRALIZED, 2010 HIGH-GROWTH
DECENTRALIZED, AND 2030 ULTIMATE DEVELOPMENT PLANS**



LEGEND

 PLANNED URBAN DEVELOPMENT - INTERMEDIATE GROWTH CENTRALIZED LAND USE PLAN: 2010	 PRIMARY ENVIRONMENTAL CORRIDOR	 FLOODPLAINS BEYOND ENVIRONMENTAL CORRIDORS
 ADDITIONAL PLANNED URBAN DEVELOPMENT BEYOND INTERMEDIATE GROWTH PLAN - HIGH GROWTH DECENTRALIZED LAND USE PLAN: 2010	 SECONDARY ENVIRONMENTAL CORRIDOR	 OTHER AGRICULTURAL AND OPEN LANDS
 ADDITIONAL PLANNED URBAN DEVELOPMENT BEYOND HIGH GROWTH PLAN - ULTIMATE DEVELOPMENT PLAN	 ISOLATED NATURAL AREA	

Source: SEWRPC.

Table 5

**SUMMARY OF DESIGN WASTEWATER CHARACTERISTICS
FOR THE GREATER RACINE UTILITY PLANNING AREA**

Condition	Design Hydraulic Loadings			
	Sewerage System		Treatment Plants	
	Average Flow (mgd)	Peak-Hour Flow (mgd)	Average Flow (mgd)	Peak-Hour Flow (mgd)
Existing	24.5	77.8	24.5	77.8
2010 Intermediate-Growth Centralized Plan	29.3	121.6	26.4	89.7
2010 High-Growth Decentralized Plan	34.5	133.9	33.0	112.2
2030 Ultimate Plan	49.9	163.4	48.2	163.7

Design Treatment Plant Influent Characteristics	
Parameter	Concentration (mg/l)
BOD ₅	110.0
Total Suspended Solids	150.0
Total Phosphorus	3.2
Total Kjeldahl Nitrogen	25.0

Source: Alvord, Burdick & Howson and Applied Technologies, Inc.

report, seek the provision of conveyance capacity adequate for peak hourly flows within the sewerage system and sewage treatment levels which are consistent with adopted water quality objectives and standards.

Anticipated future water demands were projected using essentially the same basic techniques used for estimating future sewage flows. However, final forecast water demands for the study area were calculated by averaging forecasts obtained using four different methods which related demand to different combinations of factors, including existing service area loadings, resident population, user classification, and land use. The spatial distribution patterns for expected future water demands in the unserved areas of the study area were forecast on the basis of planned land use. Table 6 sets forth the water demand forecasts.

Table 6

**SUMMARY OF FORECAST WATER DEMANDS IN
THE GREATER RACINE UTILITY PLANNING AREA**

Basis of Forecast	Average Day Demands (mgd)			Maximum Day Demands (mgd)			Maximum Hour Demands (mgd)		
	2010 Intermediate- Growth Plan	2010 High-Growth Plan	2030 Ultimate Plan	2010 Intermediate- Growth Plan	2010 High-Growth Plan	2030 Ultimate Plan	2010 Intermediate- Growth Plan	2010 High-Growth Plan	2030 Ultimate Plan
1. Racine Water Utility Service Area Population on a General Per Capita Basis	29.59	37.81	48.44	48.82	62.39	79.93	62.49	79.86	102.31
2. City of Racine Service Area Population on a General Per Capita Basis ^a	30.78	39.32	50.38	50.78	64.88	83.12	66.02	84.35	108.05
3. Racine Water Utility Service Area on a Water Use Classification Per Capita Basis	27.89	34.06	42.04	46.02	56.20	69.37	58.91	71.94	88.79
4. Entire Study Area on a Population Per Capita and a Land Use Acreage Basis	32.25	39.81	67.49	53.21	65.69	111.36	69.17	85.40	144.77
Average	30.13	37.75	52.09	49.71	62.29	85.95	64.15	80.39	110.98
Rounded	30	38	52	50	62	86	64	80	111

^aIncludes the Villages of Elmwood Park and North Bay and portions of the Town of Mt. Pleasant.

Source: Alvord, Burdick & Howson.

The existing water supply, storage, and distribution systems were evaluated with respect to design objectives and standards formulated as a part of the planning work. These design objectives and standards seek an adequate source capacity, peak-hour storage, fire-flow requirements and emergency supply, minimum and maximum pressures, velocities, and head losses.

DEVELOPMENT OF THE RECOMMENDED SANITARY SEWERAGE SYSTEM PLAN

Several alternatives for providing sanitary sewer service to the planning area were prepared and evaluated, using the year 2010 intermediate-growth centralized land use plan as the basis for the initial configuration and sizing of the alternatives. The four alternatives analyzed in detail may be summarized as follows:

Alternative A: New Corridor Sewage Treatment Plant and District Sewer Extensions

Under the new corridor sewage treatment plant and district sewer extension alternative, a new sewage treatment plant would be built to serve new

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

conveyance facilities to be constructed in the western portion of the study area. This "corridor" sewage treatment plant would be located along STH 20 about one mile east of IH 94 and would replace the existing Yorkville sewage treatment plant, which would be abandoned once the new facility became operational. District sewer extensions would be constructed for the North Park Sanitary District, Caledonia Sewer Utility District, and Mt. Pleasant Sewer Utility District sewer systems. These extensions would be served by the Racine Wastewater Utility sewage treatment plant, which would also continue to serve the sewered areas it now serves. Under this and the other three alternatives, the Racine sewage treatment plant would be modified to meet new Wisconsin Department of Natural Resources limitations on residual chlorine and to remedy current deficiencies in sludge handling and disposal. In addition, all of the alternatives envision that the Milwaukee Metropolitan Sewerage District would continue to process sewage from the Caddy Vista Sanitary District. The plan report contains a detailed description and analysis of this and other alternatives.

Alternative B: New Corridor Sewage Treatment Plant and New Trunk Sewer System

Under the new corridor sewage treatment plant and new trunk sewer system alternative, a new "corridor" sewage treatment plant would be built to serve both the area now served by the Yorkville sewage treatment plant and the currently unsewered portions of the study area. New conveyance facilities, including new trunk sewers, would be built to serve the unsewered portions of the study area. The Yorkville sewage treatment plant would be abandoned after the new facility became operational. Sewage from the area now served by the Racine Wastewater Utility sewage treatment plant would continue to be conveyed to and treated at that plant, which would be modified as under Alternative A.

Alternative C: Racine Regional Sewage Treatment Plant with District Sewer Extensions

Under the Racine regional sewage treatment plant and district sewer extension alternative, the Racine Wastewater Utility sewage treatment plant would accept sewage from the entire greater Racine area, except the Caddy Vista Sanitary District, making the plant a regional sewage treatment facility. New conveyance facilities would be built, including district sewer extensions in the North Park Sanitary District, the Caledonia Sewer Utility District, and the Mt. Pleasant Sewer Utility District. The new conveyance facilities to be built under this alternative would also include a trunk sewer system in the western portion of

the study area. The Yorkville sewage treatment plant would be abandoned and its conveyance facilities would be connected to the regional trunk sewer system. While no major expansion of the Racine sewage treatment plant would be required under this alternative, the facility would be modified as under Alternative A.

Alternative D: Racine Regional Sewage Treatment Plant and New Trunk Sewer System

Under the Racine regional sewage treatment plant and new trunk sewer system alternative, the Racine Wastewater Utility sewage treatment plant would, as under Alternative C, accept sewage from the entire greater Racine area, except the Caddy Vista Sanitary District, thus making the plant a regional sewage treatment facility. However, the new conveyance facilities to be built under this alternative would convey all sewage from the presently unsewered portions of the study area to the Racine sewage treatment plant via the present Mt. Pleasant Sewer Utility District sewerage system. The Yorkville sewage treatment plant would be abandoned and its conveyance facilities would be connected to the regional trunk sewer system. While no major expansion of the Racine sewage treatment plant would be required under this alternative, the facility would be modified as under Alternative A.

Selection of a Recommended Sewerage System

Table 7 provides information on the costs of the four sewerage system alternatives which were investigated in detail under the planning effort. In addition to cost, the four alternatives were ranked and evaluated in terms of nonmonetary criteria, including 1) environmental impacts, such as impacts on water quality, effects on wetlands, floodplains, and other environmentally significant lands, 2) social and economic impacts, including impacts on public health, land use, and implementability, and 3) technical considerations, including ease of operation during and after construction, reliability, and flexibility. Since the cost difference between Alternative C, which was found to have the lowest cost among the four alternatives, and Alternative D, the next lowest, was only about 1 percent on a total present-worth basis, nonmonetary criteria were also considered in selecting a recommended plan. On the basis of nonmonetary criteria, Alternative C was ranked as the more desirable of the two alternatives, particularly with respect to the manner in which this alternative facilitated the continued expansion of the trunk sewer systems within individual sanitary districts instead of requiring the construction of a new trunk sewer system routed to the southern portion of the study area. In

Table 7

MONETARY COST SUMMARY OF SEWERAGE SYSTEM ALTERNATIVES FOR THE GREATER RACINE UTILITY PLANNING AREA: 1990-2010

Alternative	Total Capital Cost	Annual Operation and Maintenance Cost	Total Present Worth ^a
A-New Corridor Sewage Treatment Plant/District Sewer Extensions	\$76,157,000	\$5,054,000	\$156,648,000
B-New Corridor Sewage Treatment Plant/New Trunk Sewer System	\$74,851,000	\$5,124,000	\$156,576,000
C-Racine Regional Sewage Treatment Plant/District Sewer Extensions	\$74,493,000	\$4,702,000	\$146,920,000
D-Racine Regional Sewage Treatment Plant/New Trunk Sewer System	\$72,491,000	\$4,709,000	\$147,057,000

^aPresent-worth costs were developed using a 50-year analysis period and a 6 percent interest rate.

Source: Alvord, Burdick & Howson and Applied Technologies, Inc.

addition, Alternative C has fewer pumping stations than Alternative D, thus reducing needed operation and maintenance costs and increasing overall reliability. Thus, Alternative C, the Racine regional sewage treatment plant and district sewer extension plan, was selected for refinement as the recommended sewerage system plan. This alternative was also further analyzed under the year 2010 high-growth decentralized land use and the year 2030 "ultimate development" land use development scenarios, with the former scenario approximating the most optimistic 20-year growth projections and the latter approximating the long-term facility needs and the 40-year growth condition for the planning area as set forth in the facility planning requirements of the Wisconsin Department of Natural Resources.

The adoption of the Racine regional sewage treatment plant and district sewer extension alternative would eliminate any need for obtaining approvals for the diversion of surface water from the Lake Michigan basin, because any water supplied from east of the subcontinental divide would be returned via the sewerage system. Centralization of wastewater treatment at the Racine sewage treatment plant would also allow abandonment of the smaller Yorkville plant,

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

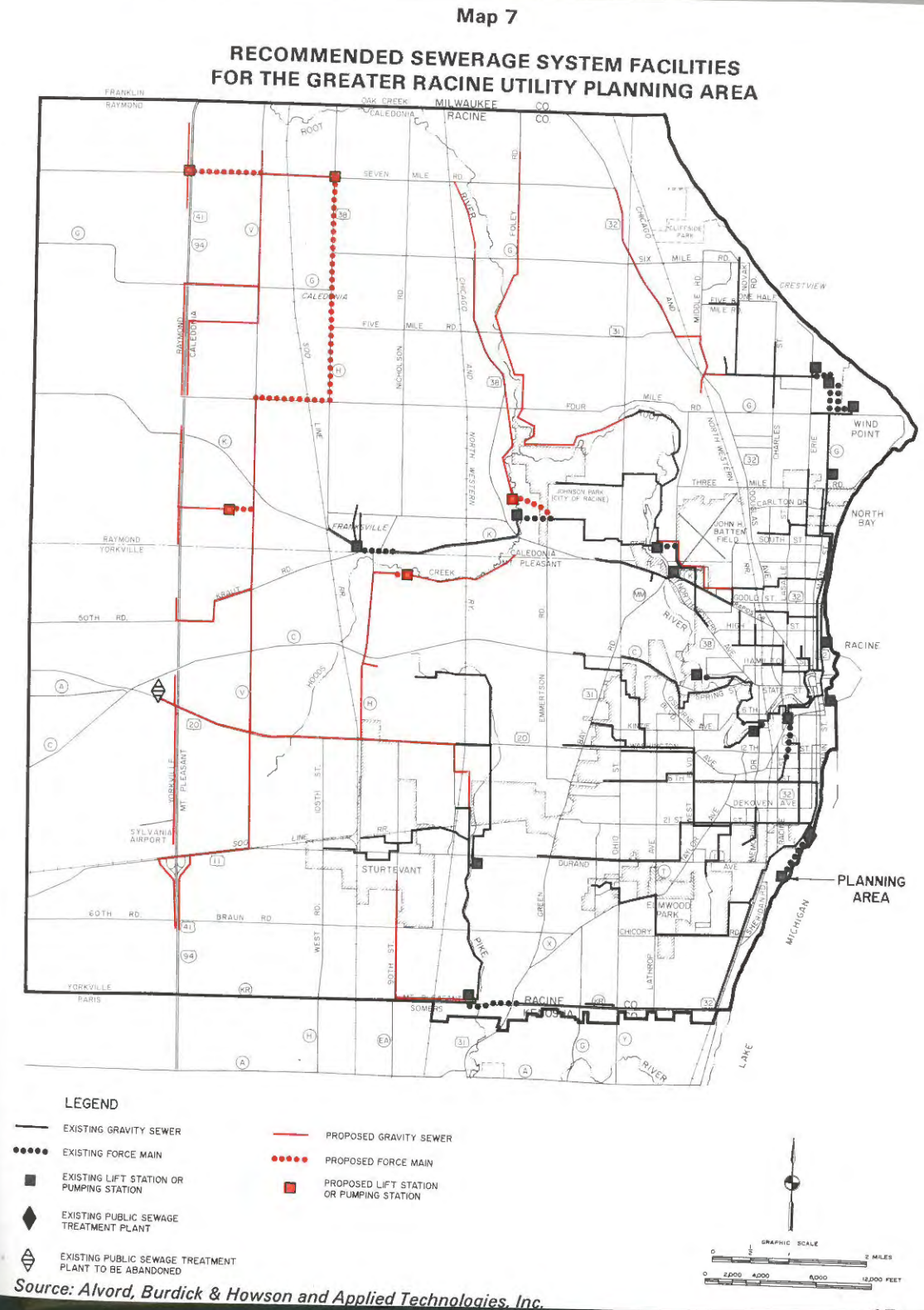
thus eliminating the discharge of treated wastewater effluent to a tributary of Hoods Creek and then the Root River and eliminating the duplication of resources needed to maintain two treatment facilities within the planning area.

Prior to actual refinement of the selected alternative, the possible provision of sewer service to the northwestern portion of the study area by the Milwaukee Metropolitan Sewerage District was evaluated. While the capital cost difference between this option and the provision of sewer service to the entire study area by the Racine Wastewater Utility proved to be less than 1 percent, nonmonetary considerations, primarily the difficulty of implementation given the policies of that District, led to the elimination of this option from further consideration. The Milwaukee Metropolitan Sewerage District, however, would continue to provide sewer service to the Caddy Vista Sanitary District under the recommended alternative.

The refinement process for the recommended alternative included evaluation of the physical requirements and capital cost differences involved with facilities designed for the high-growth decentralized and "ultimate development" land use development scenarios as well as for the intermediate-growth centralized scenario. The analyses also considered the sizing of facilities for the high-growth and "ultimate" development conditions by comparison of the cost of each component under each of the development conditions and by assessment of the ease with which a given facility, once built, could later be expanded if actual development conditions proved different from those originally anticipated.

Under the recommended sewerage system plan, the Racine sewage treatment facility would be upgraded and expanded through a combination of primary and secondary treatment units to treat adequately peak hourly flows of up to 112 million gallons per day. The construction cost of the needed improvements for the sewage treatment facility was estimated at about \$11.2 million. The construction cost of the sewer system and sewer system improvements recommended under the plan was estimated at about \$83.9 million, making the total estimated construction cost of the recommended sewerage system plan about \$95.1 million. Annual operation and maintenance costs for the needed sewage treatment and conveyance facilities were estimated at about \$4.7 million.

Map 7 shows the recommended sewerage system plan.



THE DEVELOPMENT OF THE RECOMMENDED WATER SUPPLY SYSTEM PLAN

Several alternative system plans for providing water service to the planning area were also prepared and evaluated using the 2010 intermediate-growth centralized land use plan as the basis for the initial configuration and sizing of the alternatives. These alternatives may be summarized as follows:

Alternative 1: Racine Water Utility as Sole Source of Supply

Under this alternative, the Racine Water Utility would provide the entire planning area with potable water from Lake Michigan. The present treatment plant would be upgraded and its capacity would be increased to meet the maximum daily capacity of 50 million gallons per day required under the intermediate-growth centralized development land use plan. In addition, major transmission, distribution, storage, and pumping facilities were included in this alternative to provide adequate pressures in, and, as well, to extend water supply services to the entire planned service area. For the purposes of this and the other alternatives considered, the greater Racine area was divided into a "low service area" to which water would be pumped from the Racine water treatment plant and conveyed directly through transmission mains, a "high service area" for which water must be repumped or boosted to serve ground elevations above 680 National Geodetic Vertical Datum 1929 adjustment (NGVD), and a "west service area" for which water must be repumped from the high service area to serve ground elevations above 740 NGVD.

Alternative 2: Groundwater Utilization and Lake Michigan Water from the Racine Water Utility

Under the groundwater utilization and Lake Michigan water alternative, the deep sandstone aquifer would be used to supply water to outlying portions of the greater Racine area, including the Caddy Vista Sanitary District and the Crestview Sanitary District, both of which currently utilize groundwater as a source of supply, as well as most of the IH 94 corridor, except for the Village of Sturtevant, which currently receives its water supply from the Racine Water Utility. For planning purposes, the IH 94 corridor was defined as that part of Racine County extending from two miles west to four miles east of IH 94. The remainder of the area would be supplied with Lake Michigan water from the Racine Water Utility, which would continue to supply its present service areas and expand into adjacent portions of the greater Racine area which would not be supplied with groundwater. The groundwater supply system would include

a system of new wells with treatment plants, new treatment plants at existing wells, and new facilities for transmission, distribution, and storage. Groundwater would be treated to comply with the federal Safe Drinking Water Act and to render it comparable in quality to the Lake Michigan water supplied to the remainder of the area. The Racine Water Utility treatment plant would be upgraded as recommended under Alternative 1, except for the installation of a high-lift pump recommended under that alternative. Additional transmission, distribution, storage, and pumping facilities would also be included for the Racine Water Utility service area under this alternative.

Alternative 3: Lake Michigan Water Supply from the Oak Creek Water and Sewer Utility and the Racine Water Utility

Under this alternative, the Oak Creek Water and Sewer Utility would supply Lake Michigan water to the Crestview Sanitary District and to the portion of the study area north of Six Mile Road. The Racine Water Utility would supply Lake Michigan water to the remainder of the greater Racine area, including its present service area. The Oak Creek water treatment plant would be expanded to accommodate an additional maximum day demand of 2.35 million gallons from the greater Racine area. It would also be necessary to rehabilitate and improve the Racine treatment plant in a manner similar to that envisioned under Alternative 1. New transmission, storage, and distribution facilities will be needed in both service areas. In the area to be served by the Racine Water Utility, new booster pumping facilities will be needed to provide adequate pressures as well as to extend water supply service to the entire planned water service area.

Alternative 4: Bulk Water Supply from the Racine Water Utility

Under the bulk water supply alternative, the Racine Water Utility would continue to serve its existing service area and adjoining areas, including the Crestview Sanitary District. The Towns of Caledonia, Mt. Pleasant, Raymond, and Yorkville would be provided with bulk water supplies from the Racine Water Utility for their respective supply areas, as defined under this alternative. Water would be delivered to reservoirs at wholesale take-off points, from which the individual communities would convey the water to their respective distribution systems. The Racine Water Utility treatment plant would also be rehabilitated and improved in a manner similar to that envisioned under Alternative 1. A grid system of major water distribution mains and other facilities would be constructed to serve local water users. In addition, new transmission facilities, booster pumping stations, and storage facilities, including a series of reservoirs, would be required under this alternative.

Table 8

**COST SUMMARY OF WATER SUPPLY ALTERNATIVES FOR
THE GREATER RACINE UTILITY PLANNING AREA: 1990-2010**

Alternative	Estimated Probable Costs		
	Construction Cost	Annual Operation and Maintenance Cost	Total Present Worth ^a
1-Racine Water Utility as Sole Source of Supply	\$ 88,980,000	\$2,361,000	\$126,190,000
2-Groundwater Utilization and Lake Michigan Water from the Racine Water Utility	\$102,250,000	\$2,854,000	\$147,230,000
3-Lake Michigan Water Supply from the Oak Creek Water and Sewer Utility and the Racine Water Utility	\$ 91,590,000	\$2,565,000	\$132,020,000
4-Bulk Water Supply from the Racine Water Utility	\$ 99,790,000	\$2,338,000	\$136,630,000

^aPresent worth based upon a 6 percent interest rate over a 50-year analysis period.

Source: Alvord, Burdick & Howson.

Selection of a Recommended Water Supply System

Table 8 provides data on the costs of the water supply system alternatives considered in detail under the planning effort. Alternative 1, the alternative involving the Racine Water Utility as the sole source of supply for the planning area, was selected for refinement as the recommended water supply system plan based upon cost, reliability of supply, and other nonmonetary considerations. That alternative was then refined by further analysis under the year 2010 high-growth decentralized land use alternative and the year 2030 "ultimate development" land use scenario. The analyses included evaluation of the cost differences involved in constructing facilities designed for the high-growth decentralized and "ultimate development" land use scenarios as well as the intermediate-growth centralized scenario. The analyses also considered the sizing of facilities for the high-growth and "ultimate" development conditions by comparison of the cost for each component under each of the development conditions and by assessment of the degree of ease with which a given facility, once built, could later be expanded if actual development conditions proved different from those originally anticipated.

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

Under the recommended water supply system plan, the Racine Water Utility treatment plant would be upgraded and rehabilitated at an estimated cost of about \$2.9 million. If actual future development conditions so require, the capacity of the plant could readily be further expanded in stages to meet capacity requirements beyond those currently anticipated. The estimated cost of constructing the recommended water transmission mains and appurtenances, including pressure booster pumping stations, standpipes, elevated storage tanks, and distribution mains, was estimated at about \$104.3 million, making the total estimated construction cost of the recommended water supply system plan about \$107.2 million. Annual operation and maintenance costs were estimated at about \$2.4 million.

Map 8 shows the recommended water supply system plan.

PLAN IMPLEMENTATION

The report contains an analysis of various funding options for, and the fiscal implications of, implementing the recommended sewerage and water supply system plans, a review of the institutional options for plan implementation, and recommended measures for plan adoption and implementation. The planning report was supplemented in this respect by a Commission Staff Memorandum requested, reviewed, and approved by the Advisory Committee. The Memorandum was intended to promote agreement on the implementation recommendations by providing additional information needed to resolve issues raised during the Committee plan review. The following material is derived from that follow-up memorandum, as well as from the study report.

The Issue of Water Diversion

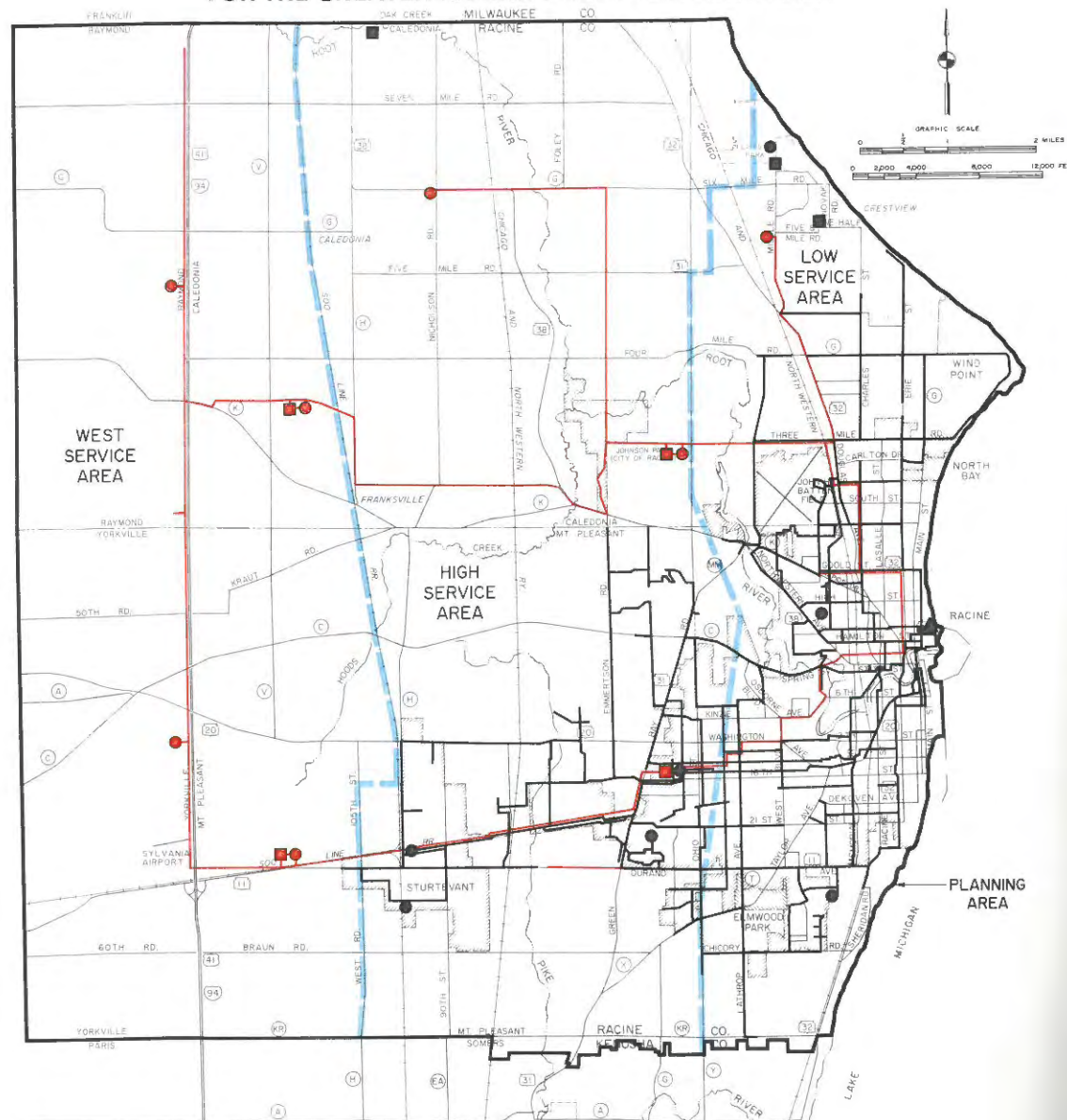
One of the major issues requiring attention in the planning effort was that of interbasin diversion. As already noted, the issue of diversion across the subcontinental divide from the Lake Michigan basin to the Mississippi River basin is governed by state and federal law and by international compact. Since the recommended system plans envision that any water taken from Lake Michigan would be returned to it via the sewerage system, implementation would not involve any diversion issues.

Institutional Options for Implementation

Several institutional options for implementing the recommended sewerage and water supply system plans were considered: 1) continuation of the existing

Map 8

RECOMMENDED WATER SUPPLY SYSTEM FACILITIES
FOR THE GREATER RACINE UTILITY PLANNING AREA



LEGEND

EXISTING WATER MAIN

EXISTING STORAGE FACILITY

EXISTING WATER TREATMENT PLANT

EXISTING WELL TO BE ABANDONED

PROPOSED WATER MAIN

PROPOSED STORAGE FACILITY

PROPOSED PUMPING STATION

BOUNDARY OF LOW, HIGH, AND WEST SERVICE AREAS

NOTE: DURING THE PLANNING PERIOD THE CADDY VISTA AND CRESTVIEW SANITARY DISTRICTS WERE CONNECTED TO THE CITY OF OAK CREEK WATER SUPPLY SYSTEM

Source: Alvord, Burdick & Howson and Applied Technologies, Inc.

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

special-purpose sewerage and water supply units of government within the study area and related continuation of existing intergovernmental contractual arrangements pursuant to Section 66.30 of the Wisconsin Statutes, 2) absorption of the existing special-purpose units of government by the general-purpose units of government concerned, and 3) the creation of an areawide authority to provide sewerage and water supply services to the entire study area.

Table 9 summarizes the advantages and disadvantages of each of these institutional arrangements.

Important implementation issues raised during the study related to the equitable treatment of residents of the City of Racine with regard to costs and representation in the formation and governance of an areawide authority. In order to address these issues, a separate subcommittee of the Utility Study Committee was formed which developed additional information and recommendations subsequently approved by the full Committee.

In order to address the issue of cost equity for the City of Racine in the formation of an areawide authority, two means were examined by which the cost impact on City of Racine users could be reduced under the areawide authority alternative. These are: 1) increasing the purchase price of the existing facilities to be acquired by the areawide authority and 2) providing an additional source of funds in the form of impact fees or assessments for the construction of new facilities which are designed to service new land use development. Several estimates of the household costs for sewer and water services within each of the communities in the study area under the areawide authority option were developed and compared to the user costs under continuation of an intergovernmental contract arrangement for services. Table 10 provides a comparison of one set of cost estimates under an areawide authority with cost estimates under the most favorable of the contract options developed in the study report. These estimates are based on the assumption that the areawide authority would purchase the City of Racine facilities at a cost of \$31.0 million for the existing sewerage facilities and \$36.3 million for the existing water supply facilities, and would purchase the Town of Mt. Pleasant sewerage facilities at a cost of \$2.8 million, as set forth in the study report. Under this assumption, the household cost within the City would be higher under the areawide authority than under the contract option.

The costs to residents of the City of Racine under the areawide authority option could be reduced by increasing the purchase price of the City's facilities to a level which would hold the per household costs to residents of the City of Racine at

Table 9

COMPARISON OF INSTITUTIONAL OPTIONS FOR THE GREATER RACINE AREA UTILITY STUDY

Option 1—Continuation of Existing Special-Purpose Units of Government	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Provided for under existing legislation. No enabling legislation needed • Contract agreements can be modified for new entities or expansion of existing entities • Provides for distribution of development costs to areas where services are needed • System is understood by entities • Wisconsin Public Service Commission and water rate requirements are in place • Provides for high level of local control 	<ul style="list-style-type: none"> • New contract agreements for a water supply have been difficult to negotiate. Delays plan implementation • Generally accepted that system is not workable particularly for water supply • High operation and maintenance cost due to duplication of staff and activities • Wide variations in unit cost of water and sewerage services on an areawide basis • Lack of centralized control for implementation of the selected plans • Inability of some local units of government to raise initial capital costs for system development
Option 2—Consolidation of Special-Purpose Units of Government	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Similar to Option 1 • Improves economies of scale over Option 1 due to fewer units and larger unit base • Local entities pay for services to their respective areas • Development costs are allocated over a larger user base • Allows for a more coordinated action within general-purpose units of government 	<ul style="list-style-type: none"> • Similar to Option 1 • Reduces the range of impact in unit cost of services • Local opposition may develop to consolidation
Option 3—Creation of Areawide Authority	
Advantages	Disadvantages
<ul style="list-style-type: none"> • Creates centralized and coordinated control of utility systems • Minimizes political influence on utility system development • Improves economies of scale • Ability to finance facilities is improved • Less variation in cost of service between areas • Coordinated effort to plan and implement improvements 	<ul style="list-style-type: none"> • Need for enabling legislation • Need for intergovernmental agreements • Valuation of assets and contributions transfer is difficult • Establishment of details for organization, staff, premises, and rates is difficult • Potential increase in financial burden for areas already served • Potential local opposition to consolidation

Source: Alvord, Burdick & Howson; Applied Technologies, Inc.; and SEWRPC.

Table 10

ESTIMATED PROBABLE ANNUAL PER HOUSEHOLD COSTS OF PLAN IMPLEMENTATION BY CIVIL DIVISION IN THE GREATER RACINE UTILITY PLANNING AREA

Civil Division	Estimated Probable Annual Cost per Household					
	Contract Option			Areawide Authority Option		
	Water	Sewer	Total	Water	Sewer	Total
City of Racine	\$ 50	\$ 130	\$ 180	\$62	\$147	\$209
Village of Sturtevant	141	166	307	91	247	338
Village of Wind Point	100	331	431	91	279	370
Town of Caledonia	145	331	476	91	342	433
Town of Mt. Pleasant	160	241	401	91	277	368
Town of Raymond	196	857	1,053	91	634	725
Town of Yorkville	160	1,142	1,302	91	701	792

NOTE: The costs set forth in this table are not directly comparable to current costs for service, since the costs are for the major regional facilities and do not include consideration of local sewer and water system capital and operation and maintenance costs.

Source: Alvord, Burdick & Howson.

the same level as under the contract option. If the purchase price of the needed City of Racine water supply facilities were increased from \$36.3 million to about \$77.0 million and the purchase price of the needed City of Racine sewerage facilities were increased from \$31.0 million to about \$50.0 million, the per household costs in the study area under the two options being considered would be as set forth in Table 11. Under this assumption, the increase in purchase price would result in an increase in the per household cost in the other communities under the areawide authority option, while making the costs for the City of Racine the same under the areawide authority as under the contract option.

The costs to the residents of the City of Racine could also be reduced under the areawide authority option by having the authority recover a portion of the capital cost for new facilities from impact fees or assessments on new development. Under the assumption that impact fees and assessments would be used to recover 25 percent of the cost of needed new areawide facilities and

Table 11

**ESTIMATED PROBABLE ANNUAL PER HOUSEHOLD
COSTS OF PLAN IMPLEMENTATION BY CIVIL DIVISION
ASSUMING INCREASED PURCHASE PRICE FOR EXISTING CITY OF
RACINE FACILITIES IN THE GREATER RACINE UTILITY PLANNING AREA**

Civil Division	Estimated Probable Annual Cost per Household					
	Contract Option			Areawide Authority Option		
	Water	Sewer	Total	Water	Sewer	Total
City of Racine	\$ 50	\$ 130	\$ 180	\$ 50	\$130	\$180
Village of Sturtevant	141	241	382	111	266	377
Village of Wind Point	100	331	431	111	298	409
Town of Caledonia	145	331	476	111	361	472
Town of Mt. Pleasant	160	328	488	111	296	407
Town of Raymond	196	857	1,053	111	653	764
Town of Yorkville	160	1,142	1,302	111	720	831

NOTE: The costs set forth in this table are not directly comparable to current costs for service, since the costs are for the major regional facilities and do not include consideration of local sewer and water system capital and operation and maintenance costs.

Source: SEWRPC.

that the purchase price for the needed existing facilities, \$77 million and \$50 million for the water supply and sewage system facilities, respectively, the costs per household would approximate those presented in Table 12.

As can be seen, the per household costs under these assumptions are less for the City of Racine users under the areawide authority option than under the contract option. Thus, it was concluded that the costs under the areawide authority option could be made equitable for the residents of the City by the purchase price and capital recovery fees agreed upon in the negotiation process entailed in establishing an areawide authority.

In order to address the issue of an equitable governance for the areawide authority, the Advisory Committee set forth a potential governance structure for consideration as a point of departure in the negotiation process. That

Table 12

**ESTIMATED PROBABLE ANNUAL PER HOUSEHOLD
COSTS OF PLAN IMPLEMENTATION BY CIVIL DIVISION
ASSUMING USE OF IMPACT FEES AND ASSESSMENTS ON NEW
DEVELOPMENT IN THE GREATER RACINE UTILITY PLANNING AREA**

Civil Division	Estimated Probable Annual Cost per Household					
	Contract Option			Areawide Authority Option		
	Water	Sewer	Total	Water	Sewer	Total
City of Racine	\$ 50	\$ 130	\$ 180	\$ 43	\$116	\$159
Village of Sturtevant	141	241	382	104	252	356
Village of Wind Point	100	331	431	104	284	388
Town of Caledonia	145	331	476	104	347	451
Town of Mt. Pleasant	160	328	488	104	282	386
Town of Raymond	196	857	1,053	104	639	743
Town of Yorkville	160	1,142	1,302	104	706	810

NOTE: The costs set forth in this table are not directly comparable to current costs for service, since the costs are for the major regional facilities and do not include consideration of local sewer and water system capital and operation and maintenance costs.

Source: SEWRPC.

structure could consist of a nine-member board with four members appointed by the Racine County Executive, four members appointed by the City of Racine, and one member appointed jointly by the eight other members. The appointments would be for staggered three- or five-year terms. Such a governance structure would provide reasonable protection to the City. After expiration of an initial 10-year plan implementation period, all members of the board would be appointed by the County Executive.

The Recommended Institutional Option

Based upon the findings of the fiscal impact analysis and consideration of the other advantages and disadvantages of the alternative institutional arrangements, the Advisory Committee recommended the creation of an areawide sewer and water authority as the most effective and equitable approach to implementing the recommended sewerage and water supply system plans. Such

an authority would own and operate all of the major, that is, areawide, sewerage and water supply facilities in the planning area. This would include the sewage treatment plant, major trunk sewers, including gravity sewers, pumping stations, and force mains, the water treatment plant and water storage, pumping, and major transmission mains. The authority would be able to enter into intergovernmental agreements for the provision of services on a retail as well as wholesale basis and could establish rates and charges for services to customers.

The study consultants also recommended that the City of Racine Water and Wastewater Utilities take the lead role in the formation of the areawide authority. Recognizing that it will take some time to form the areawide authority, the study consultants recommended a staged approach to the creation of the authority, including the formation of an intergovernmental committee to coordinate and promote the implementation process. This committee should be specifically distinguished from a negotiating committee, which might also be formed during the implementation process, since the intended functions of the coordinating committee do not include any tasks related to negotiations concerning the acquisition of the Racine City facilities by the authority. Until the areawide authority is actually formed, there will be a need to continue utility operations under the current intermunicipal cooperative contract arrangements in the interim.

The timing of the formation of the recommended areawide authority is an important consideration. This importance arises in part from the value of the existing facilities. Over time, as implementation of the recommended facilities proceeds and newly developed areas are connected, the value of the existing Racine City facilities will diminish. The timing of the formation of the recommended areawide authority is also important, since such an authority is needed as a mechanism for extending services in an efficient and timely way to areas attractive to economic development. If the areawide authority can be put in place in a relatively short time, the potential need for other means of implementing the plan, such as the use of countywide sales or property taxes as a revenue source, can be avoided.

With these timing considerations in mind, it is recommended that the areawide authority be formed within a three-year period ending in late 1995.

RECOMMENDED AMENDMENTS TO THE REGIONAL WATER QUALITY MANAGEMENT PLAN

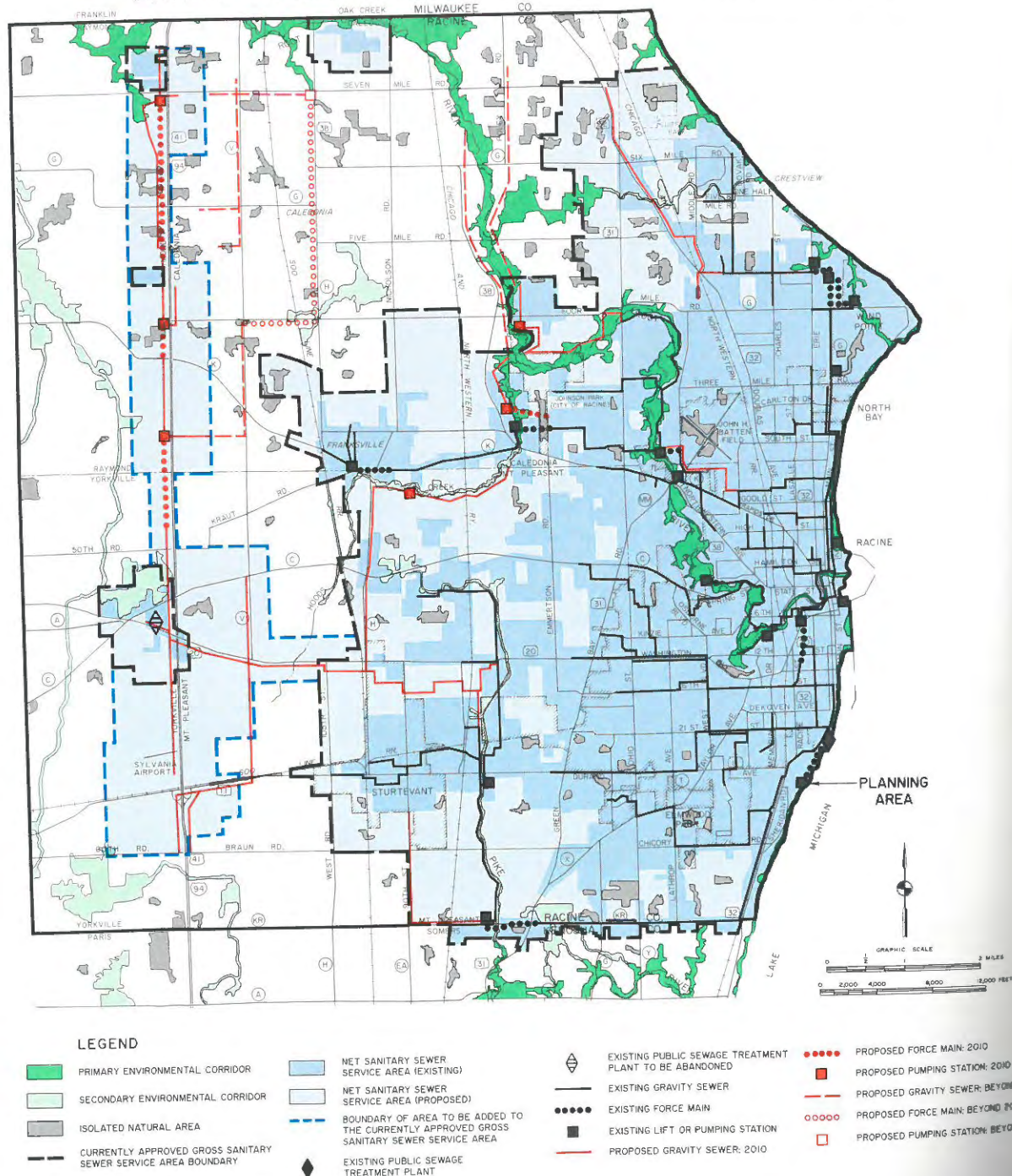
On the basis of the proposals contained in the recommended sewerage system plan, it is recommended that the Regional Planning Commission formally amend its regional water quality management plan in the following respects:

- Sewer service areas set forth in the adopted regional water quality management plan should be modified to conform with those set forth under the recommended Racine area sanitary sewerage system plan (see Map 9).
- The Racine Wastewater Utility sewage treatment plant should be designated as the sole public sewage treatment plant to serve the planning area and the regional water quality management plan should incorporate the abandonment of the Yorkville public sewage treatment plant.
- The alignment and configuration of trunk sewers set forth under the regional water quality management plan should be modified to conform to the trunk sewer alignment and configuration proposed to serve the area over a 20-year period, as shown on Map 9. It should be noted that the trunk sewer system to be included in the amendment to the regional plan, as shown on Map 9, varies from the recommended long-term plan shown on Map 7. The long-term plan developed in the study report was designed to serve all development in the study area including existing low density enclaves of urban land. The trunk sewer system recommended to be included in the regional plan amendment shown on Map 9 includes a refined sewerage system segregated into a 20-year service area trunk sewer system designed to serve areas expected to develop in 20 years and a long-term system designed to ultimately serve additional existing and potential future urban areas in the area. The total costs of the trunk sewer system shown on Maps 7 and 9 are nearly identical.

CONCLUDING COMMENTS

The recommended plan for sanitary sewer and water supply service for the greater Racine area is designed to meet both the present and probable future needs of this important urbanizing area in a cost-effective manner. The recommended systems would accommodate population and economic activity levels which may be expected within the Racine area through at least the year

RECOMMENDED MODIFICATIONS TO THE SEWER SERVICE AREA SET FORTH IN THE ADOPTED REGIONAL WATER QUALITY MANAGEMENT PLAN



Source: Alvord, Burdick & Howson; Applied Technologies, Inc.; and SEWRPC.

RACINE AREA SEWER AND WATER UTILITY PLANS—continued

2010. Many of the recommended facilities, if constructed, may be expected to continue to serve the communities involved well beyond that year. Since many key sewerage and water supply facilities have a service life of 50 to 100 years, the plan, to the extent practicable, recommends that those facilities be sized for the high-growth, and, in some cases, "ultimate" levels of potential future growth in resident population and employment.

The recommended formation of an areawide sewer and water authority to implement the system plans within the area provides the communities concerned with a major opportunity for the resolution of common problems through intergovernmental cooperation. The timely provision of uniform sewer and water supply service at more uniform rates under such an authority will help all communities within the planning area both in easing existing debt burdens and in terms of attracting desirable forms of economic development.

QUESTION BOX

HOW DOES THE RECENT CONNECTION OF THE CRESTVIEW SANITARY DISTRICT TO THE OAK CREEK WATER UTILITY AFFECT THE GREATER RACINE AREA WATER SUPPLY SYSTEM PLAN?

As the greater Racine area utility system planning effort was nearing completion, the Crestview Sanitary District in the Town of Caledonia made a decision to purchase water from the City of Oak Creek Water Utility rather than from the City of Racine Water Utility in the manner recommended in the new Racine area utility system plan. Upon learning of that decision, the Greater Racine Area Utility Planning Committee reconsidered its initial recommendation relative to serving the Crestview Sanitary District and adjacent lands in the Town of Caledonia and determined not to change the basic structure of the areawide system plan despite the Crestview District's decision. The following provides background on this matter and summarizes the basis for the Committee's determination not to change the areawide system plan.

The Crestview Sanitary District is a special-purpose unit of government that encompasses a small portion of the Town of Caledonia, about 0.6 of a square mile, lying on the shoreline of Lake Michigan north of the Village of Wind Point and south of the City of Oak Creek. The District was created to provide sanitary

QUESTION BOX—continued

sewer and water supply services to a residential subdivision. Since 1955, the District has obtained its water supply from groundwater wells. During 1987, the Crestview Sanitary District entered into a compliance agreement with the Wisconsin Department of Natural Resources to resolve a problem involving an excess level of radium in the water supply.

The consultant to the Greater Racine Area Utility Advisory Committee examined a number of alternative ways to resolve water supply problems in the northern portion of the Racine planning area that includes the Village of Wind Point, the Crestview Sanitary District, the North Park Sanitary District, and other portions of the Town of Caledonia. Those problems include not only the radium contamination in the Crestview Sanitary District, but also the periodic low pressure and pressure variation problems in that portion of the Town of Caledonia lying south of the Crestview Sanitary District and in the adjacent Village of Wind Point, as well as the need to extend water supply services to developed and developing portions of the Town of Caledonia to the west and south of the Crestview Sanitary District. Those alternatives included connecting not only the Crestview Sanitary District, but adjacent areas in the Town of Caledonia, to the Oak Creek water supply system, as well as the connection of the entire area to the Racine system.

An evaluation of the alternatives resulted in a finding by the Committee that the most cost-effective way to resolve these water supply problems would be to construct a new 16-inch water transmission main connected to the Racine system from a point near the intersection of Three Mile Road and Douglas Avenue northward along Douglas Avenue for a distance of about 2.7 miles, to a point near the intersection of Douglas Avenue and Middle Road, with a connection to an elevated storage facility to be located in that vicinity. In addition, a branch transmission main would be constructed north along Middle Road from Douglas Avenue to the Crestview Sanitary District. The latter extension would enable Crestview to discontinue use of the contaminated groundwater supply and to purchase water from the City of Racine Utility. This configuration of new facilities was found to be less costly than any other alternative; and for that reason was selected for adoption by the Committee.

As the Committee was conducting its work, the Crestview Sanitary District proceeded on an independent course to evaluate, in geographic isolation, its alternatives. That effort also examined connections of the Crestview Sanitary District to the Racine and to the Oak Creek water supply systems. The finding

QUESTION BOX—continued

of the District's engineer was similar to the findings made by the areawide Committee, namely, that it would be more cost-effective for the District to connect to the Racine system. The District, however, determined to pursue implementation of the Oak Creek connection alternative. The District proceeded to seek a grant from the Wisconsin Department of Natural Resources in support of the construction of a transmission main from the Oak Creek system to the Crestview area and, further, to seek Wisconsin Public Service Commission approval of that course of action.

Over the objections of the Greater Racine Area Utility Planning Committee, the state grant was approved by the Department of Natural Resources; in March 1992 the Public Service Commission, also over the objections of the Planning Committee, approved the District's request to construct the Oak Creek connection transmission main. In its position statements on this matter, the Greater Racine Area Planning Utility Committee pointed to the findings of the cost-effectiveness analyses that had been completed and to the fact that the communities in the Racine area would have to build essentially the same northerly extension of water transmission mains and storage facilities to serve other portions of the planning area even if Crestview were to be served by Oak Creek. The Committee argued that the state grant would be better spent in support of the Committee's recommended facilities, which would resolve the Crestview radium contamination problem. Upon approval by the state agencies, however, Crestview proceeded with the construction project and the connection has since been made.

Given the foregoing, the Committee reexamined its water supply system plan to determine if any changes should be made in light of the adverse decision. The Committee found that there would be no significant difference in the alignment and sizing of the major transmission and storage facilities required to serve the eastern Caledonia-Wind Point area whether or not Crestview remained permanently connected to the Oak Creek system. The major new storage facility required south of Crestview will still be required, as will the transmission main in Douglas Avenue, assuming water is to be supplied to the remainder of the area from the City of Racine system. The only changes expected would be the reduction of one pipe size in the transmission main in Douglas Avenue and Three Mile Road and the elimination of the branch transmission main from the storage facility on Middle Road into Crestview to serve that District. The cost difference expected for the reduced sizing is less than 1 percent of the total plan cost. The other major recommended water supply components to serve the areas north and northwest of the City of Racine will be unchanged in any case. Accordingly, the Committee determined to make no changes to its water supply system plan recommendations.

Quotable Quote. . .

"There is a fundamental conflict in metropolitan areas between unity in the economic sphere and diversity in the social and political sphere. It is difficult to devise adequate systems for the delivery of metropolitan services and, at the same time, maintain a multiplicity of separate political institutions. This conflict is in reality the metropolitan problem. Americans are coming to understand the nature of metropolitan conflict and to perceive the limits of agreement. There has accordingly been a move away from metropolitan governments towards cooperative, area-wide solutions. Cooperative action is always weak, incremental, limited and inadequate. But it is the only option."

J. Barry Cullingworth
Urban Resources
Winter 1987

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