REGIONAL WATER SUPPLY PLAN FOR SOUTHEASTERN WISCONSIN

NEWSLETTER 3 DECEMBER 2008

This newsletter is the third in a series of newsletters reporting progress in the regional water supply planning program. The first newsletter provided an overview of the scope and content of the planning program, the planning area, the water supply planning objectives and their attendant standards formulated to guide the design and evaluation of alternative and recommended water supply plans, trends in regional water use, and existing sources of water supply. The second newsletter provided regional economic, demographic, and water use forecasts, and described planned land use development to the year 2035, and presented the findings and conclusions of an evaluation of potential effectiveness of water conservation measures; findings and conclusions of a study of water supply law; and the conceptual water supply plan alternatives initially proposed for consideration and evaluation.

This newsletter presents:

- a description of the initial water supply plan alternatives developed for consideration and evaluation;
- the findings and conclusions of a comparative evaluation of these alternatives with respect to the water supply planning objectives;
- a description of a preliminary recommended plan incorporating the best components of the initial water supply plan alternatives for further consideration; and
- information regarding opportunities to provide comments on the preliminary recommended plan.

CONSIDERATION OF ALTERNATIVE REGIONAL WATER SUPPLY PLANS

As part of the planning process, a number of problems and issues related to water supply within the Region were identified and characterized. Examples of these problems and issues include the available quantity of groundwater, the sustainability of groundwater sources, groundwater quality, underutilization of existing Lake Michigan water treatment plant capacities, impacts of land use development on groundwater recharge, and the ability of existing water supply system infrastructure to meet existing and forecast water demands. Four

STUDY PUBLIC INFORMATIONAL MEETINGS

A series of public information meetings has been scheduled to be held throughout the Region in January and early February 2009. The purpose of these meetings is to brief residents of the Region on the preliminary recommended regional water supply plan and to provide an opportunity for comment. The table below provides information on the dates and locations of the upcoming meetings. Persons may choose to attend any of the meetings they find most convenient. Staff will be available in an "open house" format from 5:00 p.m. to 7:00 p.m. to individually answer questions and provide information about the regional water supply plan. A brief presentation of the plan will be made by study staff at 6:00 p.m. Written comments may be submitted throughout the meetings, including via dictation to a court reporter.

Persons with special needs are asked to contact the Commission offices a minimum of 72 hours in advance so that appropriate arrangements can be made. Contact information may be found on the back page of this newsletter. The comment period on the preliminary recommended plan extends through February 9, 2009, with comments accepted via U.S. mail, fax, and email.

Date	Location
January 12, 2009	HeartLove Place, Bethel/ Enpowerment Rooms 3229 N. Dr. Martin Luther King, Jr. Drive Milwaukee
January 13, 2009	United Community Center Conference Rooms 1 and 2 1028 S. 9th Street, Milwaukee
January 14, 2009	Wauwatosa Public Library Firefly Room 7635 W. North Avenue, Wauwatosa
January 20, 2009	Rotary Building Frame Park 1150 Baxter Street, Waukesha
January 21, 2009	Washington County Fair Park Pavilion Room 112 3000 County Highway PV, Town of Polk
January 22, 2009	Government Center Room 214 100 W. Walworth Street, Elkhorn
January 26, 2009	Ozaukee County Administration Center Auditorium 121 W. Main Street Port Washington
January 29, 2009	Kenosha County Office Building Hearing Room 19600 75th Street, Bristol
February 2, 2009	Ives Grove Office Complex Auditorium 14200 Washington Avenue, Sturtevant

Following these meetings, a record of public comments will be assembled and provided to the Regional Water Supply Advisory Committee and to the Commission for deliberations in preparing a recommended plan.

Table 1

SELECTED CHARACTERISTICS OF ALTERNATIVE REGIONAL WATER SUPPLY PLANS

Alternative Plan	New Components	2035 Groundwater Pumpage Amounts	2035 Lake Michigan Supply Amount
Alternative Plan 1: Design Year 2035 Forecast Conditions Under Existing Trends and Committed Actions	110 wells (eight deep, 102 shallow) 77 storage tanks 17 radium treatment systems 2 water plant expansions	106 mgd, an increase from 77 mgd in 2005 67 mgd from shallow aquifer, an increase from 42 mgd in 2005 39 mgd from deep aquifer, an increase from 35 mgd in 2005	214 mgd, an increase from 206 mgd in 2005
Alternative Plan 2: Design Year 2035 Forecast Conditions With Limited Expansions of Lake Michigan and Shallow Groundwater Aquifer Supplies	138 wells (all shallow) 98 storage tanks 2 water treatment plant expansions 6 Lake Michigan supply connections	93 mgd, of which 72 mgd is from the shallow aquifer and 21 mgd is from the deep aquifer	227 mgd
Alternative Plan 3: Design Year 2035 Forecast Conditions with Groundwater Recharge Enhancement	138 wells (all shallow) 98 storage tanks 2 water treatment plant expansions 6 Lake Michigan supply connections 83 rainfall infiltration sites 4 wastewater treatment infiltration system 9 deep aquifer injection wells	93 mgd, of which 72 mgd is from the shallow aquifer and 21 mgd is from the deep aquifer	227 mgd, plus 9 mgd used for deep aquifer recharge
Alternative Plan 4: Further Expansion of Lake Michigan Supply	102 wells (all shallow) 91 storage tanks 2 to 4 water treatment plant expansions or new water treatment plant development, depending upon the subalternative selected 16 Lake Michigan supply connections 2 or 3 water treatment plant expansions, depending upon the subalternative selected Lake Michigan return flow component	65 mgd, of which 50 mgd is from the shallow aquifer and 15 mgd is from the deep aquifer	255 mgd

Source: SEWRPC.

alternative regional water supply plans were developed and considered to address these problems and issues and to meet the water supply objectives and supporting standards. Selected characteristics of these alternative plans are presented in Table 1.

Alternative Plan 1—Continuation of Existing Sources of Water Supply

This alternative plan, as shown on Map 1, would maintain the existing sources of water supply utilized by the Region's water utilities: groundwater for those now using groundwater and Lake Michigan water for those now using Lake Michigan water. For those groundwater-based utilities largely dependent upon the deep aquifer experiencing water quality problems, treatment of the deep aquifer groundwater was assumed. In the Kenosha area, Lake Michigan water would continue to be provided west of the subcontinental divide by the City of Kenosha Water Utility to portions of the Village of Pleasant Prairie, the Town of Somers, and the Town of Bristol, as well as portions of the City itself, recognizing longstanding inter-municipal agreements, investment in Lake Michigan water supply infrastructure, and provision for return flow already in place.

Alternative Plan 2—Limited Expansion of Lake Michigan and Shallow Groundwater Aquifer Supplies

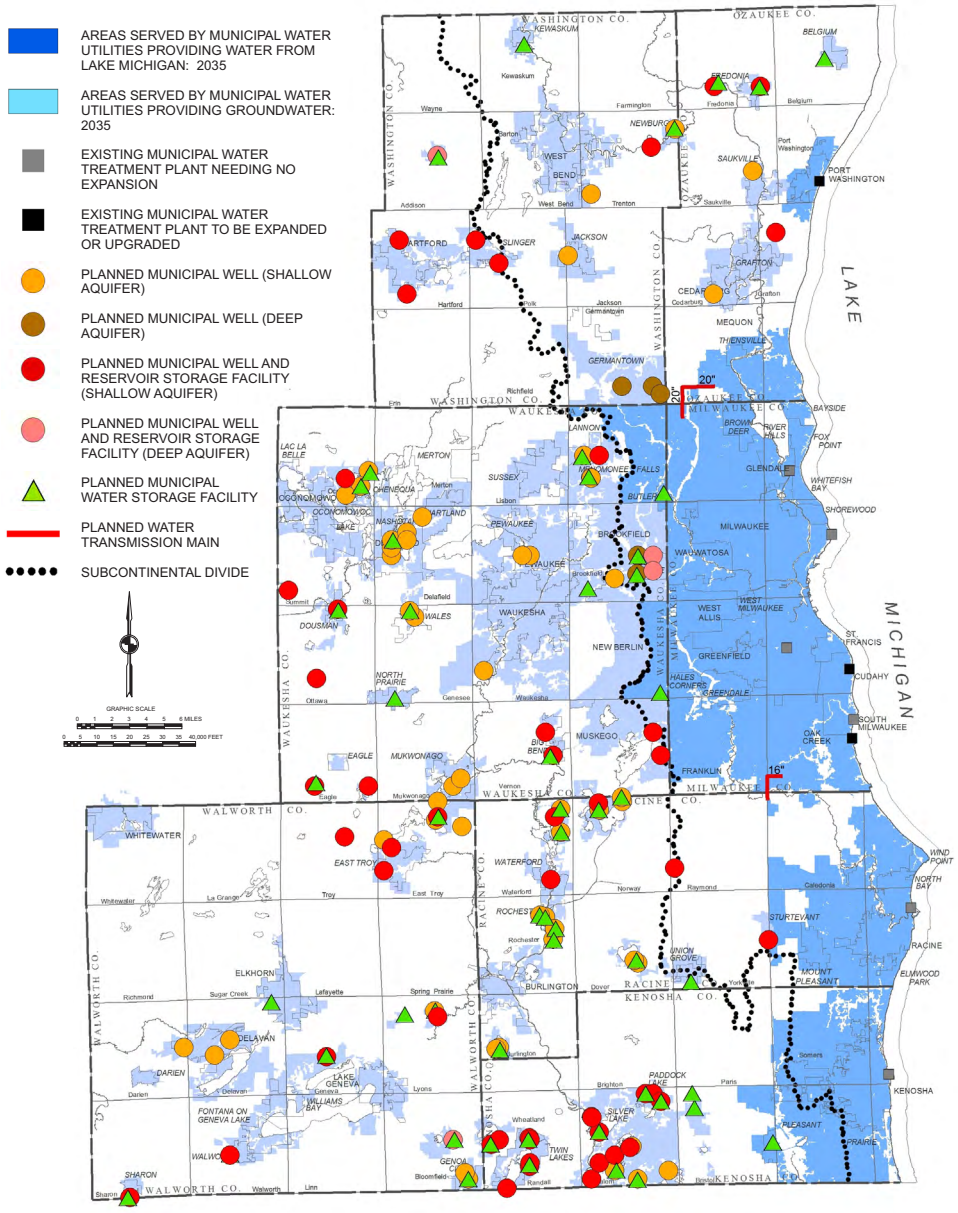
This alternative plan, as shown on Map 2, would shift the source of supply of a limited number of communities from groundwater to Lake Michigan water in order to reduce drawdowns in the deep aquifer and address water quality issues associated with use of that aquifer. Under this alternative plan, four communities located east of the subcontinental divide—the Villages of Germantown and Elm Grove, the eastern portion of the City of Brookfield, and a portion of the Town of Yorkville—and two communities which straddle the subcontinental divide—the central portion of the City of New Berlin and the City of Muskego—would be converted from groundwater to Lake Michigan water as the source of supply. These communities already have return flow to Lake Michigan in place. In addition, for those groundwater-based utilities with deep aquifer water quality problems, shallow aquifer groundwater sources would replace deep aquifer groundwater.

Alternative Plan 3—Limited Expansion of Lake Michigan and Shallow Groundwater Aquifer Supplies with Groundwater Recharge Enhancement

This alternative plan would be the same as Alternative Plan 2, but would also include groundwater aquifer recharge measures for both the shallow and deep aquifers. Locations of the systems that would provide these measures are shown on Map 3. Shallow groundwater aquifer recharge measures would include identification and protection of the remaining most significant groundwater recharge areas within the Region either through preservation or development in a manner which would preserve their natural hydrology and rainfall infiltration, enhancement of rainfall infiltration through bioengineering of about four square miles of open space at sites selected to minimize the impacts of groundwater use on lakes, streams and wetlands, and the development of systems for the further treatment and discharge of wastewater treatment plant effluent into the shallow aquifer at selected locations. The latter systems may violate current State regulations and policies regarding groundwater management, and would require changes to, or variances from, those regulations and policies. Deep aquifer groundwater recharge measures would involve replenishment of the deep aquifer through a series of groundwater injection wells utilizing treated Lake Michigan water from existing Lake Michigan water treatment facilities. These injection wells would be located east of the subcontinental divide. Such injection wells would also require changes to, or variances from, State regulations and policies.

Map 1

ALTERNATIVE PLAN 1-DESIGN YEAR 2035 FORECAST CONDITIONS UNDER EXISTING TRENDS AND COMMITTED ACTIONS



Source: Ruekert & Mielke, Inc. and SEWRPC.

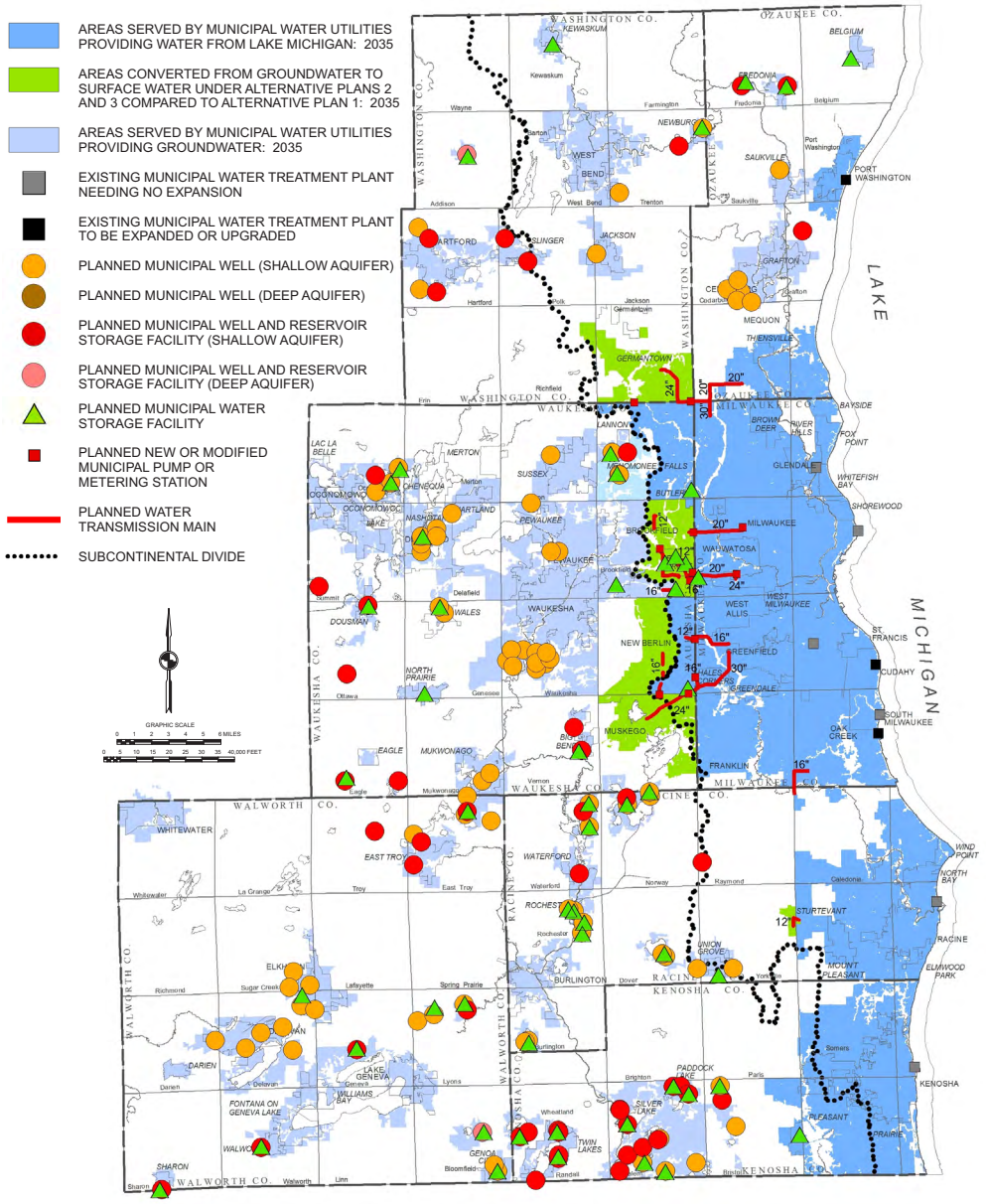
Alternative Plan 4—Further Expansion of Lake Michigan Supply

This alternative plan, as shown on Map 4, would further expand the use of Lake Michigan as a source of water supply—replacing groundwater as the source of supply—beyond that proposed in Alternative Plan 2, including expansion to communities located east of the subcontinental divide, communities straddling the subcontinental divide, and non-straddling communities in counties straddling the subcontinental divide. The additional communities using Lake Michigan water located east of the subcontinental divide would include: the City of Cedarburg and the Villages of Fredonia, Grafton, and Saukville, all in Ozaukee County. The additional communities using Lake Michigan water straddling the subcontinental divide would include: the western portion of the City of Brookfield, the western portion of the Village of Menomonee Falls, the Town of Brookfield, all in Waukesha County, and the Village of Union Grove in Racine County. The non-straddling communities using Lake Michigan water in counties straddling the subcontinental divide would include: the Cities of Pewaukee and Waukesha,

and the Villages of Lannon, Pewaukee, and Sussex, all in Waukesha County. For all communities converting from groundwater to Lake Michigan water, return flow of treated wastewater would be provided. Three options for return flow were considered pending more detailed second level environmental assessments. These options were return flow to Underwood Creek, a tributary to the Menomonee River which flows to Lake Michigan; discharge to the Root River, a tributary to Lake Michigan; or discharge directly to Lake Michigan.

Map 2

ALTERNATIVE PLAN 2-DESIGN YEAR 2035; FORECAST CONDITIONS WITH LIMITED EXPANSION OF LAKE MICHIGAN SUPPLY



Source: Ruekert & Mielke, Inc. and SEWRPC.

Evaluation of Alternative Plans

Table 2 summarizes the projected impacts of the alternative water supply plans on the groundwater and surface water systems of the Region. Under Alternative Plan 1 conditions, drawdown of the deep aquifer is expected to continue over most of the Region, although the rate of drawdown is expected to slow significantly. By contrast, Alternative Plans 2, 3, and 4 are expected to result in drawups in the deep aquifer over most of the Region. Figure 1 shows that the amount of drawup and the geographical extent of the drawups differ among these alternative plans. The differences in the results from these three alternative plans show that higher drawups and more widespread drawups in the deep aquifer could be achieved by either providing enhanced recharge to the deep aquifer or by shifting more water utilities from using the deep aquifer to using Lake Michigan or the shallow aquifer as their source of water supply. The results of the analyses as presented in Figure 1 indicate that Alternative Plans 2, 3, and 4 would all provide for sustainable use of the deep aquifer.

Table 2 summarizes the impacts of the four alternative water supply plans on the shallow aquifers and surface water systems. Localized impacts in water levels in the shallow aquifer may be expected to occur around community wells under any of these alternative plans. The average drawdowns on a county-wide basis which may be expected to result under the alternative plans would be one foot or less, with localized maximums of less than 80 feet. Some reduction in groundwater-derived baseflow to surface waterbodies would occur under each of the four alternative plans. While the average reduction would be small, some localized impacts would be significant. The analyses indicate that higher reductions in groundwater-derived baseflow would accompany greater reliance upon the shallow aquifer as a source of water supply. The analyses also indicate that lower reductions in groundwater-derived baseflow could be achieved by either providing enhanced recharge to the shallow aquifer or by shifting more water utilities from use of the shallow aquifer to use of Lake Michigan as their source of water supply.

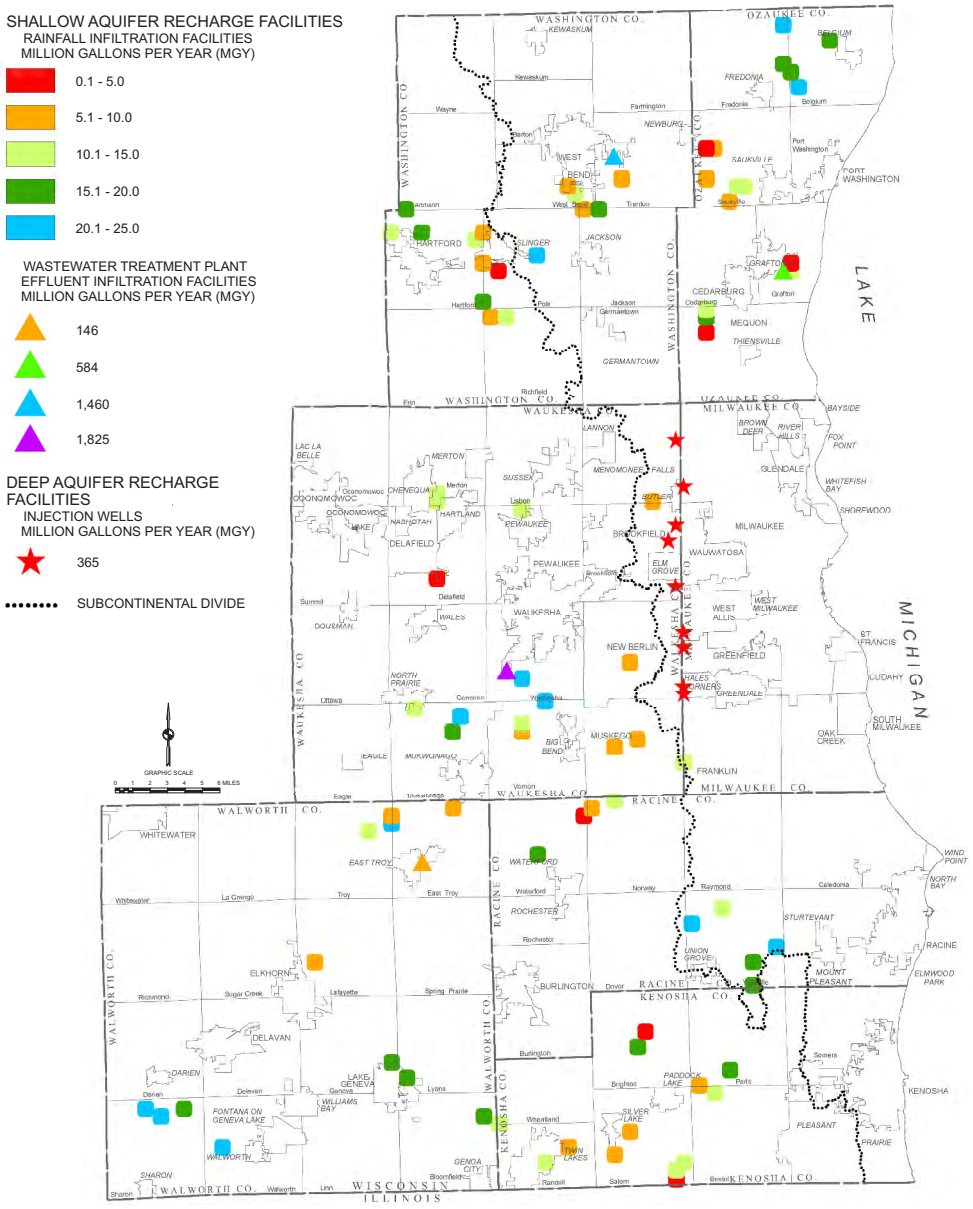
Table 3 summarizes the estimated costs of the four alternative water supply plans. The costs presented represent those associated with all new, expanded, or upgraded facilities. Capital costs of the alternative plans range from about $170 million for Alternative Plan 1 to about $470 million for Alternative Plan 4. The higher capital costs within this range result from some alternative plans requiring the construction of major facilities to support shifting the source of water supply for some communities from the deep aquifer to the shallow aquifer or Lake Michigan, to provide return flow to Lake Michigan, and to provide for enhanced groundwater recharge. The operations and maintenance costs given in the table represent the net amount arrived at by combining the operations and maintenance costs of the proposed new facilities and the reductions in costs resulting from the proposed replacement of existing facilities, and the elimination of individual residential water softener or other water treatment devices. Equivalent annual costs range from about $6.2 million for Alternative Plan 2 to about $14.3 million for Alternative Plan 4.

A comparative evaluation of the alternative plans was conducted by comparing the performance of each plan with respect to attainment of the water supply planning objectives and their attendant standards (see page 7).

Based upon the comparative evaluation of the four alternatives considered, the following conclusions were drawn:

Map 3

ALTERNATIVE PLAN 3-DESIGN YEAR 2035
GROUNDWATER RECHARGE FACILITIES



Source: SEWRPC.

- Recovery of the deep groundwater aquifer could be achieved through a relatively limited shifting of utilities from use of the deep groundwater aquifer to Lake Michigan as a source of supply and by placing greater reliance on the shallow groundwater aquifer as a source of water supply. This would result in sustainable use of the deep aquifer,

- Although artificial recharge of the deep groundwater aquifer through injection wells would result in a greater rebound in water levels, such recharge is not needed in order to achieve sustainability. In addition, the additional cost, potential impacts on groundwater quality, and regulatory issues associated with this alternative make it an undesirable as well as unnecessary way to achieve sustainable use of the deep groundwater aquifer,

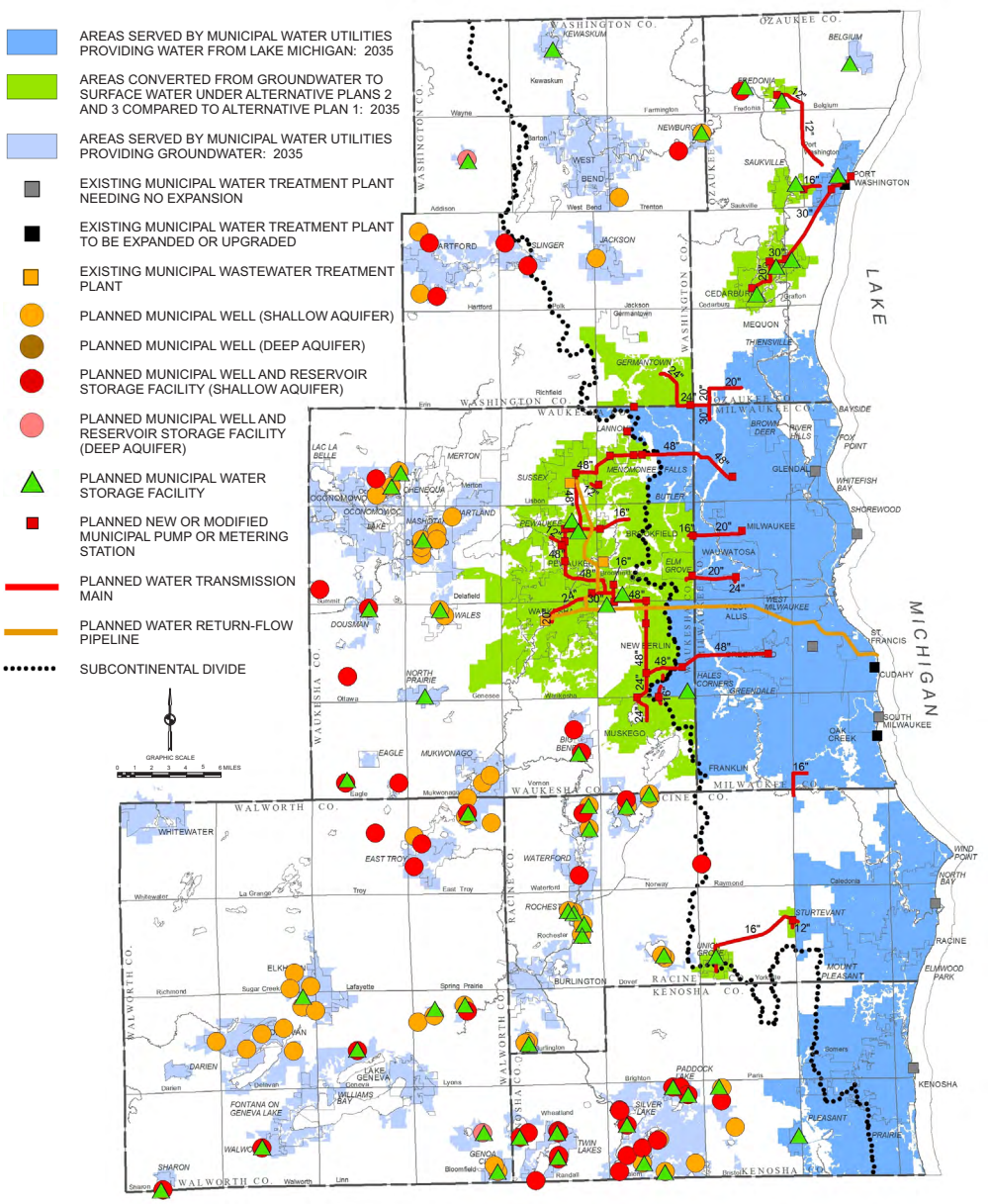
- Shifting the source of water supply from the deep groundwater aquifer to the shallow groundwater aquifer would result in reductions in groundwater-derived baseflow to some surface waters in the Region; however, many of the streams

that would experience reductions receive supplements to baseflow from the discharge of wastewater treatment plant effluent. Other streams, lakes, and wetlands would experience augmentations to baseflow,

- Infiltration of treated wastewater treatment plant effluent into the shallow groundwater aquifer could supplement localized recharge of the shallow groundwater system; however, the level of treatment required in order to permit infiltration would make this an expensive option. In addition, significant groundwater quality concerns and regulatory issues are associated with this option,
- Rainfall infiltration systems could also supplement localized recharge of the shallow groundwater system. In some circumstances, such systems may mitigate the effects of pumping from the shallow groundwater aquifer,
- Shifting the source of water supply from groundwater to Lake Michigan would permit the abandonment of point-of-use water softening systems and result in less chloride being discharged to the environment,

Map 4

ALTERNATIVE PLAN 4-DESIGN YEAR 2035; FORECAST CONDITIONS WITH FURTHER EXPANSION OF LAKE MICHIGAN SUPPLY



Source: Ruekert & Mielke, Inc. and SEWRPC.

- Delineation of groundwater recharge areas indicate that a high degree of protection of the best groundwater recharge areas in the Region would be achieved through implementation of the adopted 2035 regional land use plan, specifically, about 65 percent of the highly rated groundwater recharge areas and about 83 percent of the very highly rated recharge areas may be expected to be maintained by inclusion in the environmental corridors, isolated natural areas, and prime and other agricultural areas identified for preservation in the adopted land use plan and in rural residential areas. Careful design of new residential development, for example by using cluster and conservation subdivision design, and the use of selected stormwater management practices would be expected to increase this amount.
- Continued reliance upon the shallow and deep ground water aquifers as sources of supply for communities located west of the subcontinental divide is viable with respect to the quantities required and available. This option, however, is associated with a greater loss of baseflow to surface waters and higher chloride discharges to surface waters.

Table 2

GROUNDWATER AND SURFACE WATER IMPACTS OF ALTERNATIVE REGIONAL WATER SUPPLY PLANS

Alternative Plan	Groundwater Level Impacts		Surface Water Baseflow Impacts
	Deep Aquifer	Shallow Aquifer	
Alternative Plan 1: Design Year 2035 Forecast Conditions Under Existing Trends and Committed Actions	**Significant slowdown in the drawdown of the deep aquifer** Average drawdown by county of 10 to 22 feet Maximum drawdown of 64 feet. No drawup	**Localized impacts around community wells** Average drawdown by county of one foot or less Maximum drawdown of 76 feet	**Average 4.5 percent reduction in groundwater-derived baseflow** Average base flow change by county of 0.0 to 7.4 percent reduction 19 of 100 sensitive sites have reduction of 10 percent or more
Alternative Plan 2: Design Year 2035 Forecast Conditions With Limited Expansions of Lake Michigan and Shallow Groundwater Aquifer Supplies	**Drawup in the deep aquifer** Average drawup by county of eight to 92 feet Maximum drawup of 237 feet No significant drawdown	**Localized impacts around community wells** Average drawdown by county of one foot or less Maximum drawdown of 76 feet	**Average 5.3 percent reduction in groundwater-derived baseflow** Average baseflow change by county of 2.0 percent augmentation to 10.4 percent reduction 23 of 100 sensitive sites have reduction of 10 percent or more
Alternative Plan 3: Design Year 2035 Forecast Conditions with Groundwater Recharge Enhancement	**Drawup in the deep aquifer** Average drawup by county of 14 to 212 feet Maximum drawup of 368 feet No significant drawdown	**Localized impacts around community wells** Average drawdown by county of one foot or less Maximum drawdown of 76 feet	**Average 1.7 percent reduction in groundwater-derived baseflow** Average baseflow change by county of 3.1 percent augmentation to 3.9 percent reduction 16 of 100 sensitive sites have reduction of 10 percent or more
Alternative Plan 4: Further Expansion of Lake Michigan Supply	**Drawup in the deep aquifer** Average drawup by county of 35 to 136 feet Maximum drawup of 270 feet No significant drawdown	**Localized impacts around community wells** Average drawdown by county of one foot or less Maximum drawdown of 51 feet	**Average 0.7 percent reduction in groundwater-derived baseflow** Average baseflow change by county of 14.9 percent augmentation to 4.5 percent reduction 13 of 100 sensitive sites have reduction of 10 percent or more

Source: SEWRPC.

WATER SUPPLY PLANNING OBJECTIVES

Objective No. 1—Support of Existing Land Use Patterns and Support and Direction of Planned Land Use Patterns

A regional water supply system which, through its capacity and efficiency, will effectively serve the existing regional land use pattern, promote the implementation of the regional land use plan, and identify any constraints to development in subareas of the Region which may require refinement of the regional land use plan.

Objective No. 2—Conservation and Wise Use of the Surface Water and Groundwater Supplies

A regional water supply plan which conserves and wisely utilizes the surface water and groundwater supplies of the Region so as to sustain those supplies for future, as well as existing needs.

Objective No. 3—Protection of Public Health, Safety, and Welfare

A regional water supply system which protects the public health, safety, and welfare.

Objective No. 4—Economical and Efficient Systems

The development of water supply facilities, operational improvements, and policies, that are both economical and efficient, best meeting all other objectives at the lowest practical cost, considering both long-term capital and operation and maintenance costs.

Objective No. 5—Responsive and Adaptive Plans

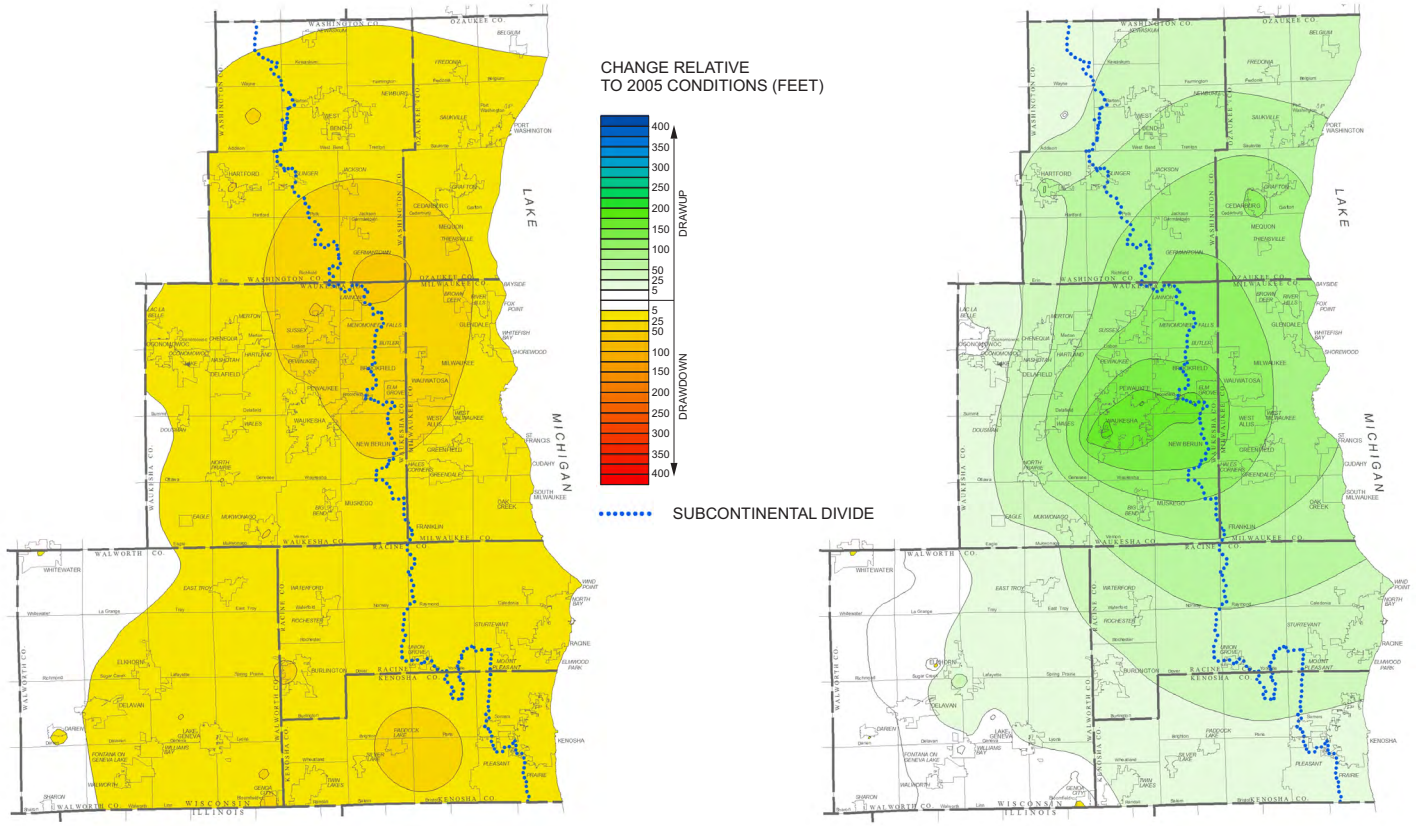
The development of water supply systems, operations, and policies which are flexible and adaptive in response to changing conditions.

Figure 1

CONDITIONS IN THE DEEP AQUIFER ASSOCIATED WITH ALTERNATIVE WATER SUPPLY PLANS: 2035

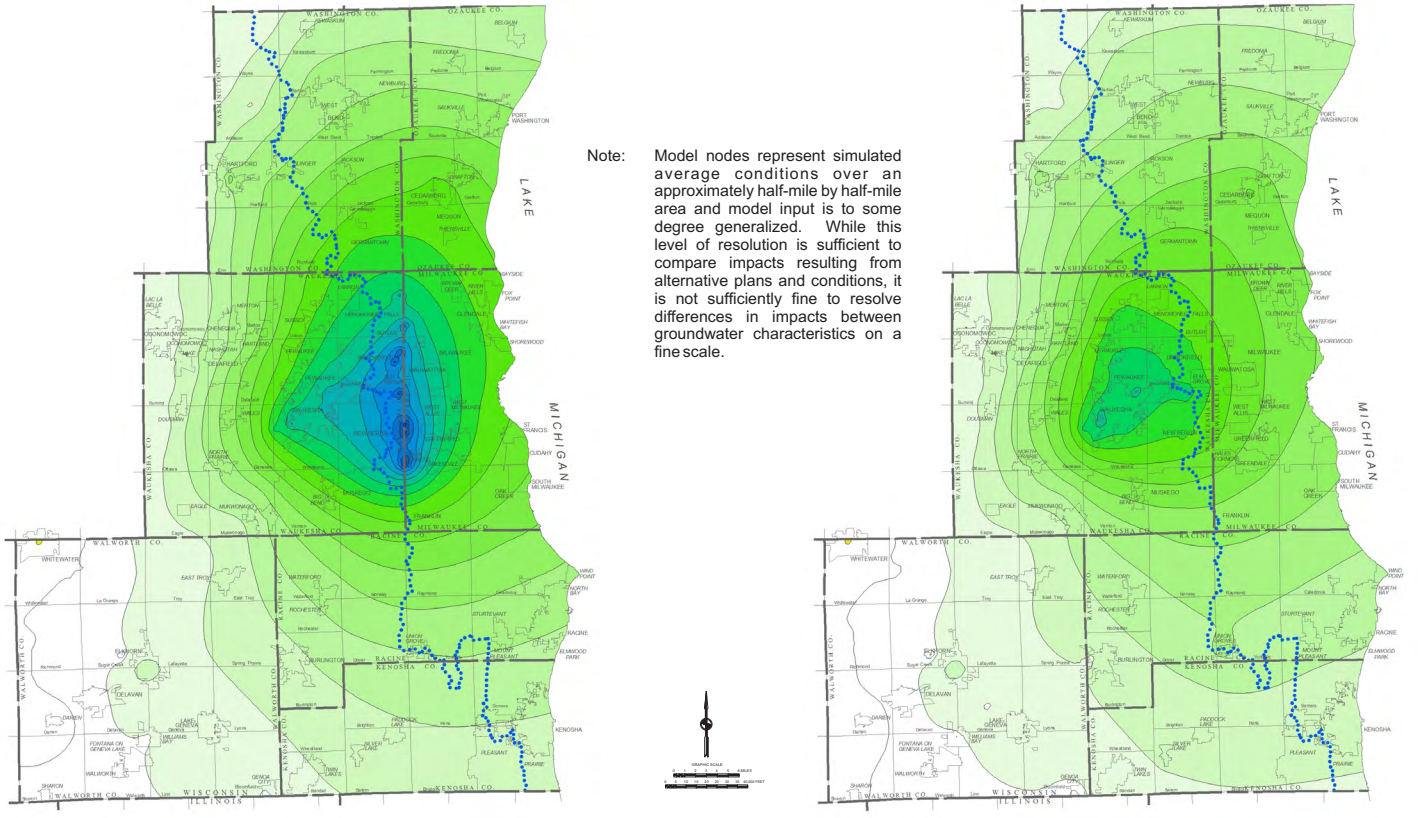
ALTERNATIVE PLAN 1

ALTERNATIVE PLAN 2



ALTERNATIVE PLAN 3

ALTERNATIVE PLAN 4



Note: Model nodes represent simulated average conditions over an approximately half-mile by half-mile area and model input is to some degree generalized. While this level of resolution is sufficient to compare impacts resulting from alternative plans and conditions, it is not sufficiently fine to resolve differences in impacts between groundwater characteristics on a fine scale.

Source: U.S. Geological Survey.

These findings indicated that each alternative plan considered contained sound components that merit consideration for inclusion in a recommended plan. It was therefore concluded that a carefully constructed composite plan incorporating the best components of the alternative plans considered would be capable of meeting the planning objectives more fully than any of the four alternative plans initially considered.

Table 3

COSTS OF ALTERNATIVE REGIONAL WATER SUPPLY PLANS

Alternative Plan	Capital (dollars)	Annual O&M (dollars)[a]	Equivalent Annual (dollars)
Alternative Plan 1	170 million	5.1 million gross 5.1 million net	11.2 million
Alternative Plan 2	219 million	3.2 million gross -3.3 million net[b]	6.2 million
Alternative Plan 3	368 million	8.6 million gross 2.1 million net[b]	12.9 million
Alternative Plan 4	470 million	7.3 million gross -14.4 million net[c]	14.3 million

[a] *Gross operation and maintenance cost represents the operation and maintenance costs of new upgraded and expanded facilities. Net operations and maintenance costs includes a credit for reduced household water softening costs.*

[b] *Includes a credit of $6.5 million for reduced household water softening costs.*

[c] *Includes a credit of $21.7 million for reduced household water softening costs.*

Source: SEWRPC.

DEVELOPMENT OF A PRELIMINARY RECOMMENDED REGIONAL WATER SUPPLY PLAN

Elements of the Preliminary Recommended Plan

The preliminary recommended plan—a composite plan combining the best elements of the alternative plans considered—includes the following elements:

- For the vast majority of water utilities required to serve existing and planned water supply service areas, the existing sources of supply—generally Lake Michigan,the shallow aquifer, or a combination of shallow and deep aquifers underlying the Region were determined to be adequate. Therefore, the plan proposes that these utilities continue to utilize their existing sources of supply. The utilities concerned are shown in Table 4.

- The plan proposes that over time four utilities—the City of Delavan Water and Sewage Utility, the City of Elkhorn Water Utility, the City of Hartford Water Utility, and the Town of Bristol Utility District No. 1—place greater reliance on use of the shallow groundwater aquifer as a source of water supply either by replacing existing deep wells with shallow wells or by supplementing pumpage from existing deep wells with pumpage from shallow wells as new wells are constructed.

- The plan proposes the conversion to Lake Michigan as a source of water supply of existing utility service areas, or portions of utility service areas, which currently have return flow to Lake Michigan in place. Seven of these—(1) the eastern portion of the City of Brookfield Municipal Water Utility service area, (2) the City of Cedarburg Light and Water Commission, (3) the Village of Elm Grove, (4) the Village of Germantown Water Utility, (5) the Village of Grafton Water and Wastewater Commission, (6) the Village of Saukville Municipal Water Utility, and (7) the Town of Yorkville Utility District No. 1—are located east of the subcontinental divide. Two—the central portion of the City of New Berlin Water Utility service area and the City of Muskego Public Water Utility—serve communities that straddle the divide. These last two are within the Milwaukee Metropolitan Sewerage District sanitary sewer service area and, therefore, have existing return flow.

- The plan proposes that certain areas of existing urban development that are currently served by private, onsite wells be provided by municipal water supply either through the extension of service by existing utilities or in some cases by the creation of new utilities. Such conversion is proposed only when need is demonstrated and at the option of the affected utilities. Absent a demonstrated need, residents and businesses of the areas would remain on individual wells indefinitely. Potential new utilities that would be required are listed in Table 5.

- The plan envisions that the existing, self-supplied water systems serving residential communities and most of the systems serving commercial, institutional, and recreational land uses located within the planned municipal water supply service areas will be connected to the municipal systems by the plan design year 2035. Under the plan, a number of private, self-supplied water supply systems generally located beyond planned municipal water supply service areas would remain. These include self-supplied residential, industrial, commercial, institutional, recreational, agricultural, irrigation, and electric-power generation uses.

- The plan recommends the implementation of comprehensive water conservation programs, including both supply side water supply efficiency measures and demand side water conservation measures. The scope and content of these conservation programs are recommended on a utility-specific basis to reflect the source of supply and existing infrastructure. Expected reductions in demand vary from 4 to 10 percent on an average daily demand basis and from 6 to 18 percent on a maximum daily demand basis.

- The plan includes a groundwater recharge area protection component directed at preserving existing groundwater recharge areas classified as having a high or very high recharge. This component may be expected to be largely achieved through the implementation of the adopted design year 2035 regional land use plan, since that plan recommends preservation of the environmental corridors, isolated natural areas, prime and other agricultural areas of the Region that facilitate recharge. The areas concerned are shown on Map 5. About 65 percent of the highly rated and about 83 percent of the very highly rated recharge areas may be expected to be preserved by inclusion in the environmental corridors, isolated natural areas, and prime and other agricultural areas identified for preservation in the adopted land use. Careful design of new residential development and the use of selected stormwater management practices would be expected to increase this amount.
- The plan includes a stormwater management component which recommends the implementation of available stormwater management practices, including treatment and infiltration systems, which—to the extent practicable—will maintain the natural recharge of new residential and selected nonresidential land use developments.
- The plan includes provisions related to the siting of all new high-capacity wells and for the analysis and monitoring of impacts of such wells in the shallow aquifer. These provisions specify the measures that should be taken in the early stages of locating sites for high capacity wells in the shallow aquifer to develop the necessary understanding of the hydrogeological system associated with each candidate site and its surrounding area and to assess the likelihood of impacts of proposed wells upon nearby existing wells and surface waterbodies. These components also provide for monitoring of water levels in the vicinity of new high capacity wells in the shallow aquifer, both during the test well phase of placement and during operation of the well.
- The plan includes a provision encouraging the installation of enhanced rainfall infiltration systems in areas where evaluations conducted in conjunction with siting of high capacity wells in the shallow aquifer indicate probable reductions in baseflow to nearby surface waterbodies that are likely to affect streamflows or water levels in lakes or wetlands due to installation and operations of these wells.

These last four components of the preliminary recommended plan are intended to form the basis of a process to minimize the negative impacts to surface water systems associated with high-capacity well development.

Subalternatives to the Preliminary Recommended Plan

As part of the development of the preliminary recommended plan, two subalternatives were considered. Table 6 summarizes their characteristics. The two subalternatives differ only with respect to the source of water supply for the City of Waukesha. Under Subalternative 1, the City of Waukesha would continue to utilize groundwater as a source of supply, with the supply being obtained by about an equal use of the shallow and deep aquifers. This subalternative is summarized on Map 6. Under Subalternative 2, it is envisioned that the City of Waukesha would be connected to a Lake Michigan supply and would provide a return flow to Lake Michigan. This subalternative is summarized on Map 7. Return flow could be provided by returning treated wastewater either to Lake Michigan or to streams tributary to Lake Michigan. Examples of return flow options are shown on Map 8. Subsequent detailed planning and engineering would be required to determine the best means of providing this return flow.

Evaluation of Subalternatives to the Preliminary Recommended Plan

Table 7 summarizes the projected impacts of the subalternatives to the preliminary recommended water supply plans on the groundwater and surface water systems of the Region. Both subalternatives to the preliminary recommended plan are expected to result in drawups in the deep aquifer over most of the Region. Figure 2 shows that the amount of drawup and the geographical extent of the drawups differ between these two subalternatives. The analyses indicate that higher and more widespread drawups—or rises—in the deep aquifer could be achieved by utilizing Lake Michigan water as the source of supply for the City of Waukesha than could be achieved by continuing to utilize groundwater as a source of supply. These analyses also indicate that the deep aquifer in a large area comprised of portions of Kenosha, Racine, and Walworth Counties may be expected to experience drawdowns in excess of five feet under Subalternative 2 conditions with lesser drawdown amounts and less extensive drawdown areas under Subalternative 1 conditions. These drawdowns would most likely result from the combined effects of pumping from the deep aquifer in the affected area and groundwater flow related to pumping in more distant areas including Waukesha and northern Illinois.

Table 7 also summarizes the impacts of the two subalternatives to the preliminary recommended plan on the shallow aquifers and surface water systems. Localized impacts in water levels in the shallow aquifer would be expected to occur around municipal water utility wells under either of these subalternatives. The average drawdowns on a county-wide basis expected to result under the subalternatives would be two feet or less, with localized maximums of less than about 71 feet. Some reduction in groundwater-derived baseflow to surface waterbodies would occur under both of the subalternatives. While the average

Table 4

UTILITIES CONSIDERED TO HAVE ADEQUATE EXISTING SOURCES OF WATER SUPPLY UNDER THE PRELIMINARY RECOMMENDED REGIONAL WATER SUPPLY PLAN

County and Utility	Source of Supply
Kenosha County	
City of Kenosha Water Utility	Lake Michigan Self-Supplied
Village of Paddock Lake Municipal Water Utility	Groundwater Shallow Aquifer
Village of Pleasant Prairie Water Utility	Lake Michigan Purchased Supply
Town of Bristol Utility District No. 3	Lake Michigan Purchased Supply
Town of Somers Water Utility	Lake Michigan Purchased Supply
Milwaukee County	
City of Cudahy Water Utility	Lake Michigan Self-Supplied
City of Franklin Water Utility	Lake Michigan Purchased Supply
City of Glendale Water Utility	Lake Michigan Purchased Supply
City of Milwaukee Water Utility	Lake Michigan Self-Supplied
City of Oak Creek Water and Sewer Utility	Lake Michigan Self-Supplied
City of South Milwaukee Water Utility	Lake Michigan Self-Supplied
City of Wauwatosa Water Utility	Lake Michigan Purchased Supply
City of West Allis Water Utility	Lake Michigan Purchased Supply
Village of Brown Deer Public Water Utility	Lake Michigan Purchased Supply
Village of Fox Point Water Utility	Lake Michigan Purchased Supply
Village of Greendale Water Utility	Lake Michigan Purchased Supply
Village of Shorewood Municipal Water Utility	Lake Michigan Purchased Supply
Village of Whitefish Bay Water Utility	Lake Michigan Purchased Supply
We Energies-Water Services	Lake Michigan Purchased Supply
Ozaukee County	
Village of Belgium Municipal Water Utility	Groundwater Shallow Aquifer
We Energies-Water Services	Lake Michigan Purchased Supply
Racine County	
City of Burlington Municipal Waterworks	Groundwater Deep Aquifer
City of Racine Water and Wastewater Utility[a]	Lake Michigan Self-Supplied
Village of Caledonia West Utility District[b] Oak Creek	Lake Michigan Purchased Supply
Village of Caledonia West Utility District[b] Racine	Lake Michigan Purchased Supply
Village of Caledonia East Utility District[c] Oak Creek	Lake Michigan Purchased Supply
Village of Caledonia East Utility District[c] Racine	Lake Michigan Purchased Supply
Village of Waterford Water and Sewer Utility	Groundwater Deep and Shallow Aquifers
Village of Wind Point Municipal Water Utility	Lake Michigan Purchased Supply
North Cape Sanitary District	Groundwater Shallow Aquifer

County and Utility	Source of Supply
Walworth County	
City of Lake Geneva Municipal Water Utility	Groundwater Shallow Aquifer
City of Whitewater Municipal Water Utility	Groundwater Deep Aquifer
Village of Darien Water Works and Sewer System	Groundwater Deep and Shallow Aquifers
Village of East Troy Municipal Water Utility	Groundwater Deep and Shallow Aquifers
Village of Fontana Municipal Water Utility	Groundwater Deep and Shallow Aquifers
Village of Genoa City Municipal Water Utility	Groundwater Deep and Shallow Aquifers
Village of Sharon Waterworks and Sewer System	Groundwater Deep and Shallow Aquifers
Village of Walworth Municipal Water and Sewer Utility	Groundwater Shallow Aquifer
Village of Williams Bay Municipal Water Utility	Groundwater Deep and Shallow Aquifers
Country Estates Sanitary District	Groundwater Deep Aquifer
Town of Bloomfield Pell Lake Sanitary District No. 1	Groundwater Deep Aquifer
Town of East Troy Sanitary District No. 3	Groundwater Deep and Shallow Aquifers
Town of Geneva Lake Como Sanitary District No. 1	Groundwater Deep Aquifer
Town of Troy Sanitary District No. 1	Groundwater Shallow Aquifer
Washington County	
City of West Bend Water Utility	Groundwater Shallow Aquifer
Village of Jackson Water Utility	Groundwater Shallow Aquifer
Village of Kewaskum Municipal Water Utility	Groundwater Shallow Aquifer
Village of Slinger Utilities	Groundwater Shallow Aquifer
Allenton Sanitary District No. 1	Groundwater Deep Aquifer
Waukesha County	
City of Delafield Municipal Water Utility	Groundwater Deep and Shallow Aquifers
City of New Berlin Water Utility (east)	Lake Michigan Purchased Supply
City of Oconomowoc Utilities	Groundwater Deep and Shallow Aquifers
Village of Butler Public Water Utility	Lake Michigan Purchased Supply
Village of Dousman Water Utility	Groundwater Deep and Shallow Aquifers
Village Eagle Municipal Water Utility	Groundwater Shallow Aquifer
Village of Hartland Municipal Water Utility	Groundwater Shallow Aquifer
Village of Menomonee Falls Water Utility (east)	Lake Michigan Purchased Supply
Village of Mukwonago Municipal Water Utility	Groundwater Deep and Shallow Aquifers
Village of Sussex Public Water Utility	Groundwater Deep and Shallow Aquifers

[a] *Includes the Village of Sturtevant Water Utility which was purchased by the City of Racine Water and Wastewater Utility in 2007 and is now served by the City Utility on a retail basis.*

[b] *Includes the former Caddy Vista Sanitary District and the Former Caledonia Sanitary District No. 1 which were consolidated in 2007 to form the Caledonia West Utility District.*

[c] *Includes the former Crestview Sanitary District and the former North Park Sanitary Districts which were consolidated in 2007 to form the Caledonia East Utility District.*

Source: SEWRPC.

reduction would be small, there are significant localized impacts. The analyses indicate that higher reductions in groundwater-derived baseflow would accompany greater reliance by the City of Waukesha upon the shallow aquifer as a source of water supply.

Table 8 summarizes the estimated costs of the two subalternatives to the preliminary recommended water supply plan. The costs presented represent those associated with all new, expanded, or upgraded facilities. Capital costs of the preliminary recommended plan range from about $276 million for Subalternative 1 to between $324 million and $352 million for Subalternative 2, depending upon which option for return flow would be found best for the City of Waukesha. The gross annual operation and maintenance costs of new facilities under the two subalternatives are about $5.4 million for Subalternative 1 and range between $8.0 million and $8.5 million for Subalternative 2, depending upon which option for return flow would be found best for the City of Waukesha. It is anticipated that under the plan there will be less need for water softening in those areas proposed for conversion to a Lake Michigan water supply. It is expected that this will result in a reduction of costs to the public related to use and operation of residential water softener or other point-of-use water treatment devices ranging from $9.4 million under Subalternative 1 to $16.7 million under Subalternative 2. When the expected reductions in cost due to the potential elimination of individual residential water softener or other point-of-use water treatment devices are included, Subalternative 1 would result in a net annual savings to the public of about $4.0 million, and Subalternative 2 would result in a net annual savings to the public of between about $8.2 million and about $8.7 million. Equivalent annual costs are estimated to be about $9.9 million for Subalternative 1 and to range between about $8.3 million and $10.5 million for Subalternative 2, depending upon which option for return flow would be found best for the City of Waukesha.

Table 5

POTENTIAL NEW MUNICIPAL WATER UTILITIES ENVISIONED UNDER THE PRELIMINARY RECOMMENDED REGIONAL WATER SUPPLY PLAN

County and Utility
Kenosha County
Village of Silver Lake Proposed Utility
Village of Twin Lakes Proposed Utility
Town of Salem Proposed Utility
Powers-Benedict-Tombeau Lakes Area Proposed Utility
Ozaukee County
Town of Fredonia-Waubeka Area Proposed Utility
Racine County
Northwest Caledonia Area Proposed Utility District
Town of Burlington-Bohner Lake Area Proposed Utility District
Town of Dover-Eagle Lake Area Proposed Utility District
Town of Norway Area Proposed Utility
Village of Rochester Area Proposed Utility
Town of Rochester Area Proposed Utility
Town of Waterford Area Proposed Utility
Walworth County
Town of Lyons Area Proposed Utility
Town of East Troy-Potter Lake Area Proposed Utility
Washington County
Village of Newburg Area Proposed Utility
Waukesha County
Village of Big Bend Proposed Utility
Village of North Prairie Proposed Utility
Village of Wales Proposed Utility
Town of Eagle-Spring Lake Area Proposed Utility
Town of Oconomowoc-Okauchee Lake Area Proposed Utility
Town of Ottawa-Pretty Lake Area Proposed Utility
Town of Summit-Golden Lake Area Proposed Utility

Source: SEWRPC.

A comparative evaluation of the subalternatives to the preliminary recommended plan was conducted by comparing the performance of each subalternative with respect to the attainment of the water supply planning objectives and attendant standards (see page 7).

Based upon the comparative evaluation of the two subalternatives to the preliminary recommended plan, the following conclusions were drawn:

- There are viable options which rely on increased use of the shallow groundwater as a source of supply for communities located west of the subcontinental divide,
- Both subalternatives to the preliminary recommended plan represent viable water supply plans for the Southeastern Wisconsin Region,
- When Subalternative 2 is assumed to include the most costly return flow option for the City of Waukesha, the equivalent annual costs of the two subalternatives to the preliminary recommended plan are about equal. When other return flow options are considered, the equivalent annual cost of Subalternative 2 is less than that of Subalternative 1,

Table 6

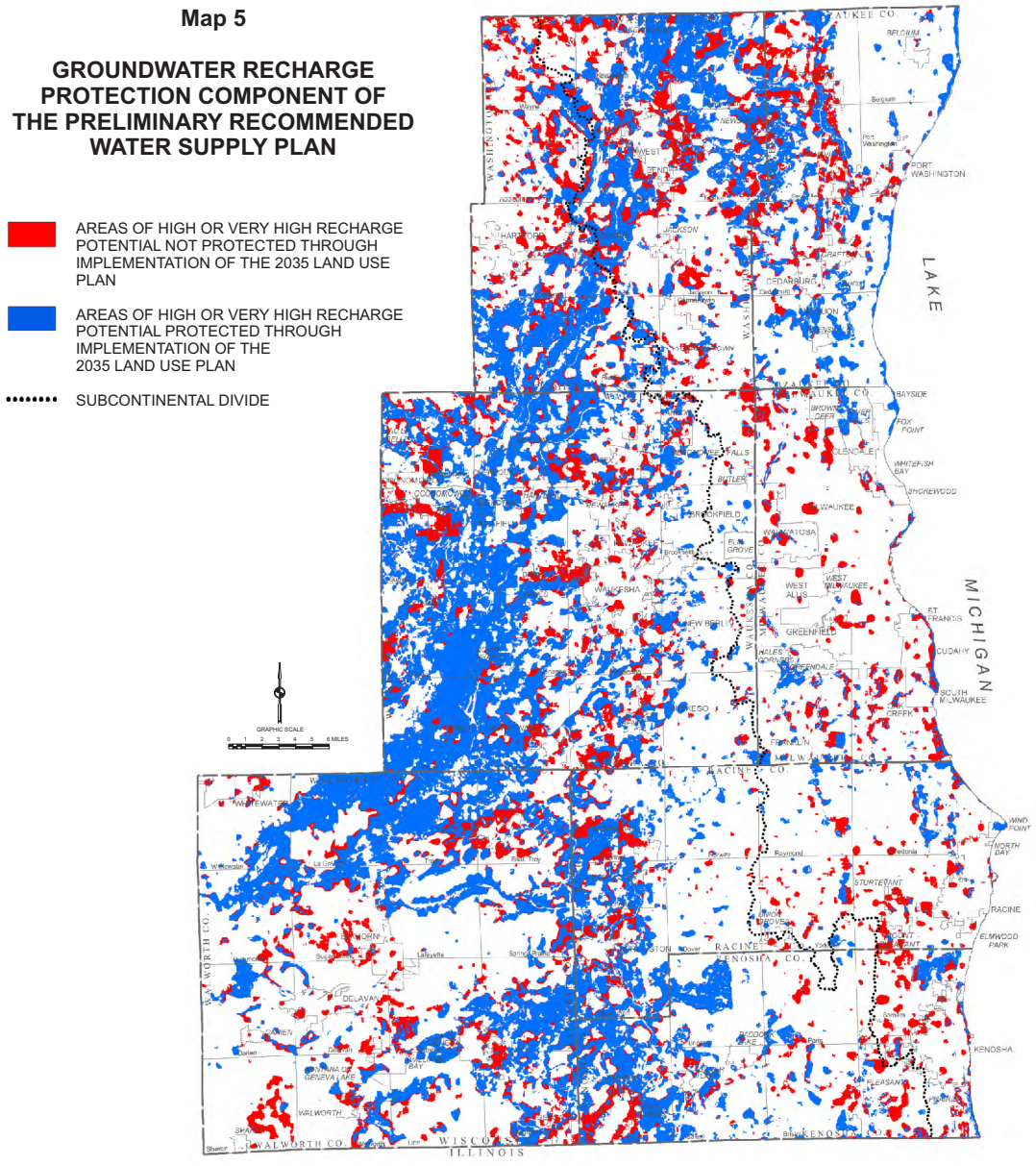
SELECTED CHARACTERISTICS OF SUBALTERNATIVE S TO THE PRELIMINARY RECOMMENDED PLAN

Alternative Plan	Components	2035 Groundwater Pumpage Amounts	2035 Lake Michigan Supply Amount
Subalternative 1: Design Year 2035 Forecast Conditions Intermediate Expansion of Lake Michigan Supply and City of Waukesha on Groundwater Supply	112 wells (two deep, 110 shallow) 97 storage tanks 1 new water treatment plant 2 water treatment plant expansions 37 rainfall infiltration systems 7 Lake Michigan supply connections	88 mgd, an increase from 77 mgd in 2005 61 mgd from shallow aquifer 27 mgd from deep aquifer	232 mgd, an increase from 206 mgd in 2005
Subalternative 2: Design Year 2035 Forecast Conditions Intermediate Expansion of Lake Michigan Supply and City of Waukesha on Lake Michigan Supply	104 wells (two deep, 102 shallow) 97 storage tanks 1 new water treatment plant 2 water treatment plant expansions 31 rainfall infiltration systems 8 Lake Michigan supply connections	78 mgd, nearly the same as in 2005 56 mgd from shallow aquifer 22 mgd from deep aquifer	242 mgd, an increase from 206 mgd in 2005

Source: SEWRPC.

Map 5

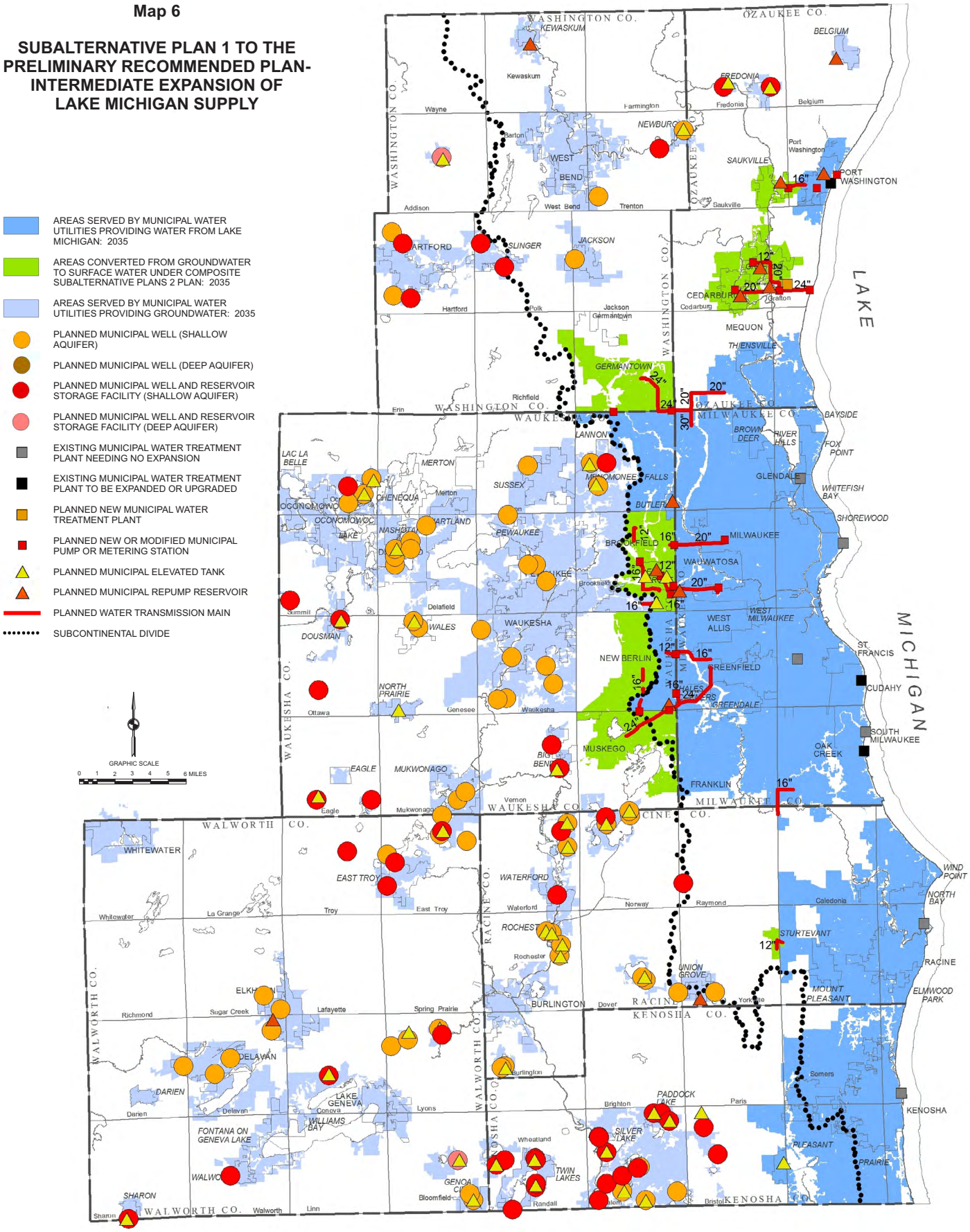
GROUNDWATER RECHARGE PROTECTION COMPONENT OF THE PRELIMINARY RECOMMENDED WATER SUPPLY PLAN



Source: SEWRPC.

Map 6

SUBALTERNATIVE PLAN 1 TO THE PRELIMINARY RECOMMENDED PLAN- INTERMEDIATE EXPANSION OF LAKE MICHIGAN SUPPLY



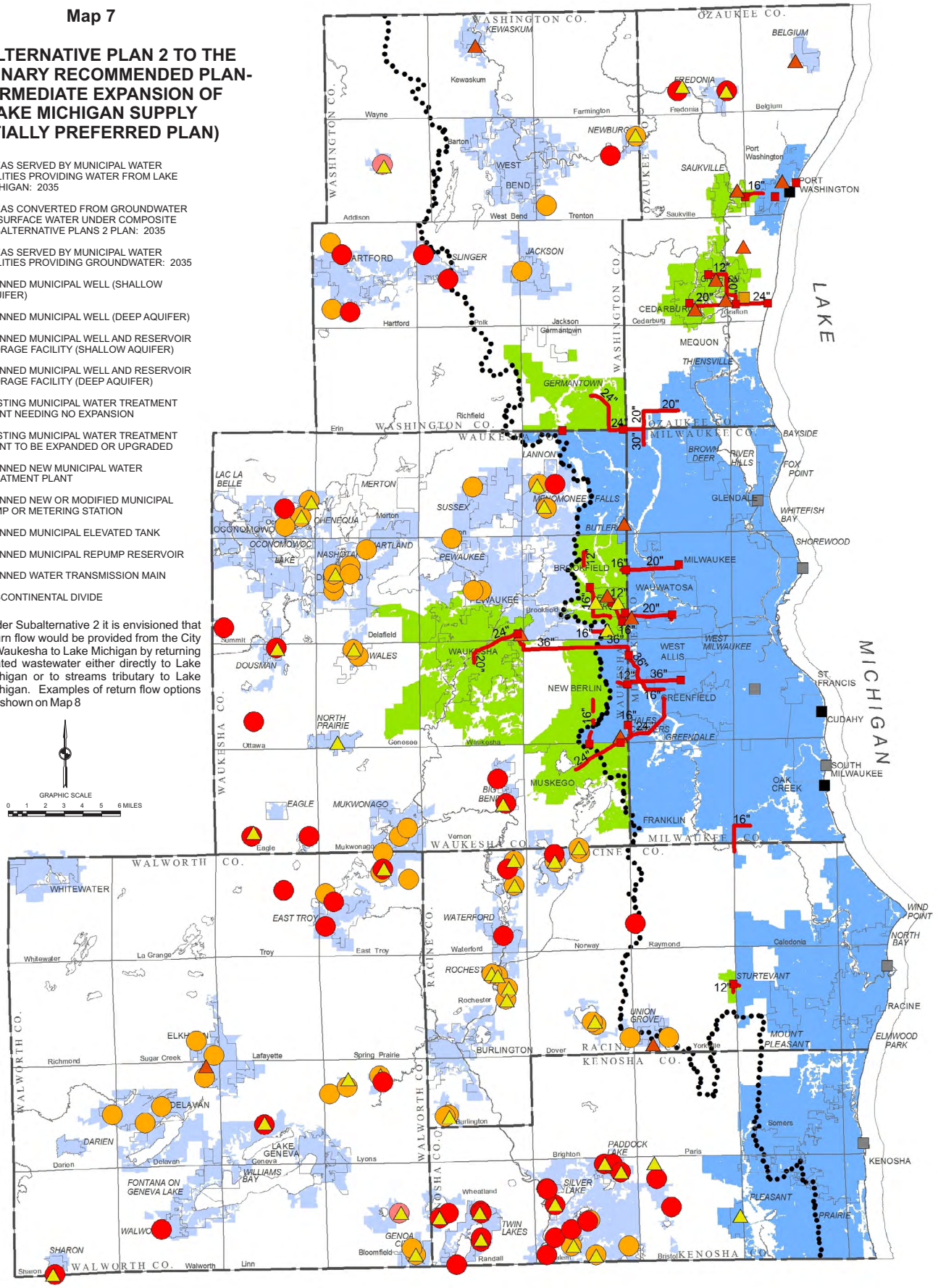
Source: Ruekert & Mielke, Inc. and SEWRPC.

Map 7

SUBALTERNATIVE PLAN 2 TO THE PRELIMINARY RECOMMENDED PLAN- INTERMEDIATE EXPANSION OF LAKE MICHIGAN SUPPLY (INITIALLY PREFERRED PLAN)

- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING WATER FROM LAKE MICHIGAN: 2035
- AREAS CONVERTED FROM GROUNDWATER TO SURFACE WATER UNDER COMPOSITE SUBALTERNATIVE PLANS 2 PLAN: 2035
- AREAS SERVED BY MUNICIPAL WATER UTILITIES PROVIDING GROUNDWATER: 2035
- PLANNED MUNICIPAL WELL (SHALLOW AQUIFER)
- PLANNED MUNICIPAL WELL (DEEP AQUIFER)
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (SHALLOW AQUIFER)
- PLANNED MUNICIPAL WELL AND RESERVOIR STORAGE FACILITY (DEEP AQUIFER)
- EXISTING MUNICIPAL WATER TREATMENT PLANT NEEDING NO EXPANSION
- EXISTING MUNICIPAL WATER TREATMENT PLANT TO BE EXPANDED OR UPGRADED
- PLANNED NEW MUNICIPAL WATER TREATMENT PLANT
- PLANNED NEW OR MODIFIED MUNICIPAL PUMP OR METERING STATION
- PLANNED MUNICIPAL ELEVATED TANK
- PLANNED MUNICIPAL REPUMP RESERVOIR
- PLANNED WATER TRANSMISSION MAIN
- SUBCONTINENTAL DIVIDE

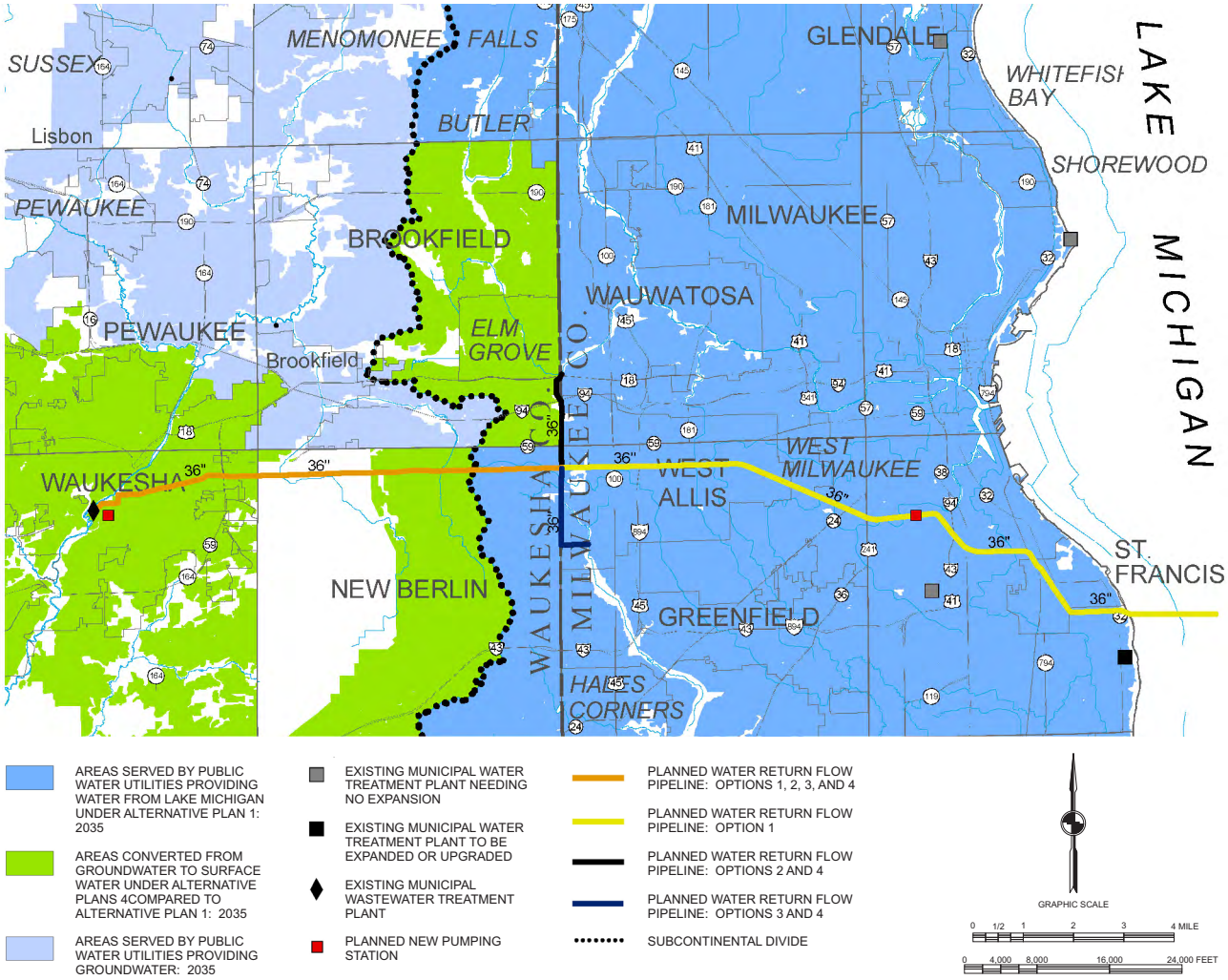
Note: Under Subalternative 2 it is envisioned that return flow would be provided from the City of Waukesha to Lake Michigan by returning treated wastewater either directly to Lake Michigan or to streams tributary to Lake Michigan. Examples of return flow options are shown on Map 8



Source: Ruekert & Mielke, Inc. and SEWRPC.

Map 8

RETURN FLOW OPTIONS FOR THE PRELIMINARY RECOMMENDED WATER SUPPLY PLAN: RETURN FLOW PIPELINES TO LAKE MICHIGAN, THE ROOT RIVER, AND UNDERWOOD CREEK



Note: Subsequent detailed planning and engineering will be required to determine the best means of providing return flow. Under all return flow options, an amount of treated wastewater equal to at least the amount withdrawn would be conveyed from the City of Waukesha sewerage service area back to the Lake Michigan Watershed. The return flow would be actively managed to minimize impacts on the Fox River during low flow periods and, for those options involving return flow via discharge of treated wastewater into streams tributary to Lake Michigan, to eliminate return flow during flood-flow periods on the tributary streams. Since wastewater flows to the Waukesha treatment plant typically consists of amounts of water 15 percent or more greater than the amounts of water used in the service area, active management of the return flow can be used while meeting the return flow requirements.

Source: Ruekert & Mielke, Inc. and SEWRPC.

- Subalternative 2 would result in greater drawups—or rises in the water levels—in the deep aquifer, less loss of baseflow to surface waters, and a smaller amount of chloride being discharged to surface waters than Subalternative 1.

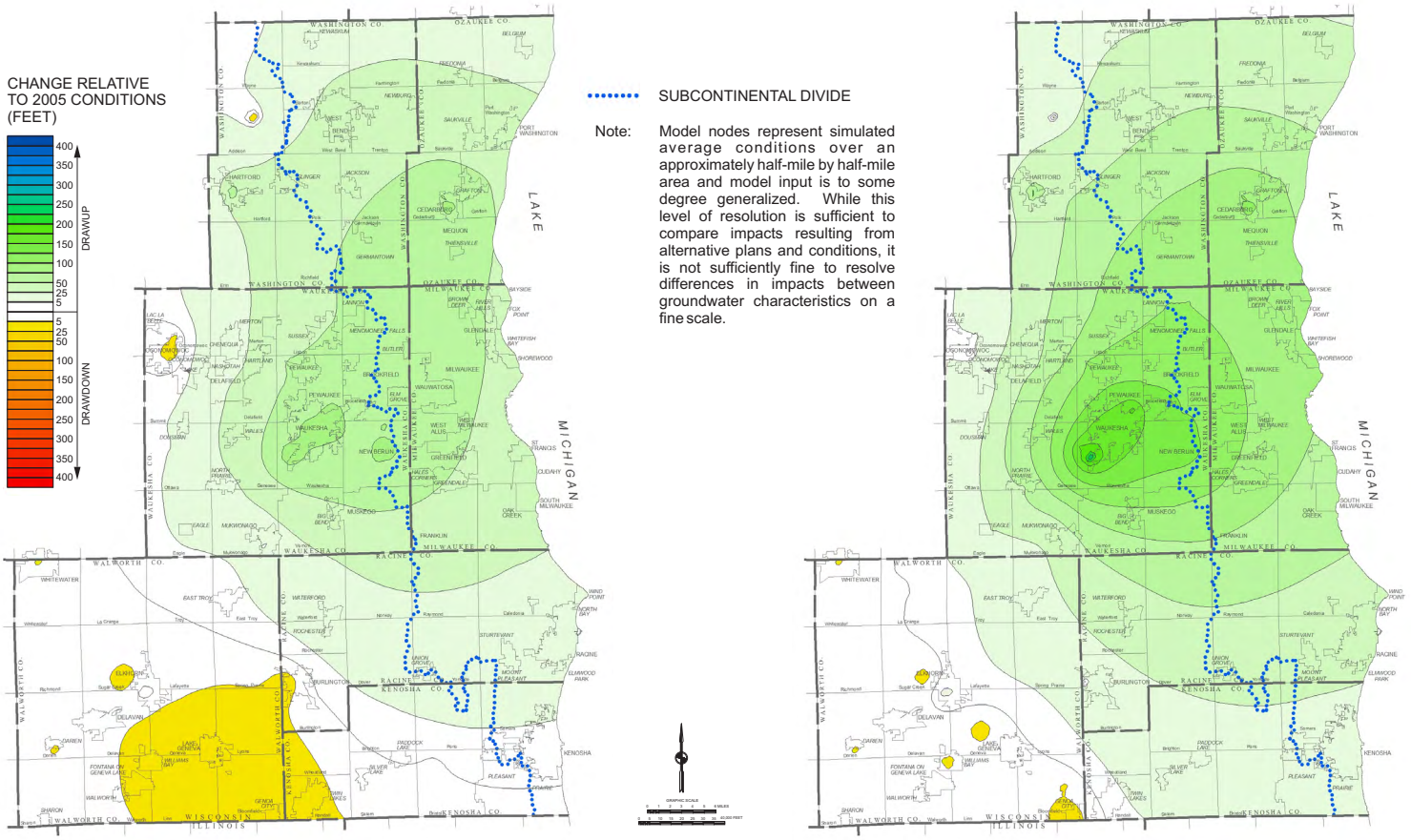
Based upon these findings, Subalternative 2 was selected for inclusion in the preliminary recommended plan. While both of the subalternatives to the plan are considered to be equally cost-effective and are considered to be viable options which generally meet the plan objectives and standards, Subalternative 2 would provide greater drawups in the deep groundwater aquifer, lesser loss of baseflow to surface waters, and greater reductions in chloride discharges to surface waters than Subalternative 1. Subalternative 2 meets the water supply planning objectives somewhat more fully than Subalternative 1 and was therefore recommended for presentation as the initially preferred regional water supply plan for the Southeastern Wisconsin Region.

Figure 2

CONDITIONS IN THE DEEP AQUIFER ASSOCIATED WITH SUBALTERNATIVES TO THE PRELIMINARY RECOMMENDED PLAN: 2035

SUBALTERNATIVE PLAN 1

SUBALTERNATIVE PLAN 2



Source: U.S. Geological Survey.

Table 7

GROUNDWATER AND SURFACE WATER IMPACTS OF SUBALTERNATIVES TO THE PRELIMINARY RECOMMENDED PLAN

Alternative Plan	Groundwater Level Impacts		Surface Water Baseflow Impacts
	Deep Aquifer	Shallow Aquifer	
Subalternative 1: Design Year 2035 Forecast Conditions Intermediate Expansion of Lake Michigan Supply and City of Waukesha on Groundwater Supply	**Drawup in the deep aquifer** Average drawup by county of three to 39 feet Maximum drawup of 225 feet Some drawdown in southeastern Walworth County	**Localized impacts around community wells** Average drawdown by county of two feet or less Maximum drawdown of 71 feet	**Average 3.4 percent reduction in groundwater-derived baseflow** Average baseflow change by county of 14.3 percent augmentation to 4.6 percent reduction 26 of 100 sensitive sites have reduction of 10 percent or more
Subalternative 2: Design Year 2035 Forecast Conditions Intermediate Expansion of Lake Michigan Supply and City of Waukesha on Lake Michigan Supply	**Drawup in the deep aquifer** Average drawup by county of eight to 85 feet Maximum drawup of 248 feet No significant drawdown	**Localized impacts around community wells** Average drawdown by county of two feet or less Maximum drawdown of 71 feet	**Average 2.0 percent reduction in groundwater-derived baseflow** Average baseflow change by county of 14.9 percent augmentation to 4.5 percent reduction 14 of 100 sensitive sites have reduction of 10 percent or more

Source: SEWRPC.

Table 8

COSTS OF SUBALTERNATIVE S TO THE PRELIMINARY RECOMMENDED PLAN

Alternative Plan	Capital (dollars)	Annual Operations and Maintenance Cost[a] (dollars)	Equivalent Annual (dollars)
Subalternative 1	277 million	5.4 million gross -4.0 million net[b]	9.9 million
Subalternative 2	325 to 352 million[c]	8.0 to 8.5 million gross[c] -8.2 to -8.7 million net[c,d]	8.3 to 10.5 million[c]

[a]Gross operation and maintenance cost represents the operation and maintenance costs of new, upgraded and expanded facilities. Net operations and maintenance cost includes a credit for reduced household water softening costs.

[b]Includes a credit of $9.4 million for reduced household water softening costs.

[c]Range of costs is based upon the costs of the options for return flow components.

[d]Includes a credit of $16.7 million for reduced household water softening costs.

Source: SEWRPC.

SUSTAINABILITY OF THE PRELIMINARY RECOMMENDED PLAN

Sustainability with respect to water supply resources may be defined as the condition of beneficially using water supply resources in such a way that while current and probable future needs are met, the resource is not unacceptably damaged or diminished, but essentially conserved for future use. For the purposes of this water supply planning program, the phrase “unacceptable damage or diminishment” is defined as a change in an important physical property of the groundwater or surface water system—such as water level, water quality, water temperature, recharge rate, or discharge rate—that approaches a significant percentage of the normal range of variability of that property. Changes that are 10 percent or less of the annual or historic period of record range for any property are considered acceptable, unless it can be shown that the cumulative effect of the changes will cause a permanent change in an aquatic ecosystem by virtue of increasing the extremes of that property to levels known to be harmful.

Water levels in the deep sandstone aquifer under most of the Region are expected to rise under the use and recharge conditions envisioned under the initially preferred plan. This increase in water levels should ensure the sustainability of this aquifer.

Because unconfined shallow aquifers are hydraulically connected to surface waterbodies, water levels in the shallow aquifer are buffered by the surface water system. As a consequence, groundwater-derived baseflow to surface waterbodies is a better indicator of impacts on the shallow groundwater system than water levels in the shallow aquifer. Under the initially preferred plan, some surface waters in the Region are expected to experience reductions in groundwater-derived baseflow. In many streams that are expected to experience reductions in groundwater-derived baseflow, however, baseflow is supplemented by discharges of effluent from wastewater treatment plants. For these streams, the impact of groundwater-derived baseflow reductions upon total streamflow is expected to be small or negligible, since the groundwater withdrawals for the utility systems concerned are returned to the streams through the wastewater treatment plants. The initially preferred plan includes mitigative measures for those waterbodies expected to experience reductions in groundwater-derived baseflow that do not receive contributions of treated effluent; however, some reduction in groundwater-derived baseflow, representing about 2 percent of the total regional baseflow, is expected. Given that groundwater-derived baseflow typically comprises between 20 and 50 percent of total streamflow, this is considered to be a small impact and within the range considered acceptable.

Conclusion

The preliminary recommended plan incorporating Subalternative 2 is considered as the initially preferred water supply plan for the Southeastern Wisconsin Region to be presented for public review and reaction. This plan is summarized on Map 7. This plan represents a means of providing a sustainable water supply for the Southeastern Wisconsin Region through the plan design year of 2035 which is specifically designed to be consistent with the Great Lakes-St. Lawrence River Basin Water Resources Compact and with the groundwater protection provisions of Chapter 281.34 of the *Wisconsin Statutes*. It provides a flexible plan under which a number of options for the provision of the return flows required by the extension of Lake Michigan as a source of supply to areas lying west of the subcontinental divide can be considered in subsequent more detailed plan implementation steps. Under this plan, water levels in the deep sandstone aquifer may be expected to rise significantly over most of the Region. Some waterbodies in the Region may be expected to experience reductions in groundwater-derived baseflow under the initially preferred plan; however, in many of these waterbodies baseflow is augmented by discharges of effluent from wastewater treatment plants and the impacts on total streamflow are expected to be minimal. The initially preferred plan recommends mitigative measures for those surface waters not receiving these contributions, so that baseflow reductions should not exceed about 2 percent of the total existing baseflow. Based upon public review and reaction, this preliminary recommended plan will be refined as necessary to produce a final recommended plan.

FOR MORE INFORMATION

The findings and recommendations of the regional water supply planning program are being documented in a series of reports. Several of these reports have been published and are available.

- SEWRPC Technical Report No. 37, *Groundwater Resources of Southeastern Wisconsin,* June 2002.
  - This report documents the hydrogeology of the Southeastern Wisconsin Region. It presents information and mapping related to soils and their ability to attenuate contaminants before they reach the groundwater system, the glacial and bedrock geology of the Region, groundwater aquifers of the Region, groundwater quality, and potential sources of groundwater contamination.
- SEWRPC Technical Report No. 41, *A Regional Aquifer Simulation Model for Southeastern Wisconsin,* June 2005.
  - This report documents the development, calibration, and testing of a three-dimensional groundwater aquifer simulation model which can be used to forecast water levels and groundwater flow under various water demand scenarios.
- SEWRPC Technical Report No. 43, *State-of-the-Art of Water Supply Practices,* July 2007.
  - This report presents the results of a review of the current and probable future state-of-the-art practices in water supply source development, water treatment, water transmission, water storage, and water conservation and reuse.
- SEWRPC Technical Report No. 44, *Water Supply Law,* April 2007.
  - This report identifies and analyzes water supply law applicable to the Southeastern Wisconsin Region, including law applicable to the capture of water and law applicable to the ownership, operation, and financing of water supply systems.
- SEWRPC Technical Report No. 47, *Groundwater Recharge in Southeastern Wisconsin Estimated by a GIS-Based Water-Balance Model,* July 2008.
  - This report documents the development of a soil water balance model used to estimate groundwater recharge in Southeastern Wisconsin. It presents estimates of present day recharge and delineates areas of high recharge.
- Additional reports, including a planning report documenting the plan, are in preparation.

Electronic copies of these reports are available on the Commission's website (http://www.sewrpc.org). Copies can also be ordered from the Commission's office.

NEXT STEPS

The following are the key remaining steps in the regional water supply planning process, and when each is expected to be completed:

- Presentation of initially preferred plan to elected officials—November 2008 to January 2009.
- Series of public meetings—January to early February 2009.
- Adoption of the regional water supply plan—Spring 2009.

CONTACT INFORMATION

Further information on the regional water supply study, including all study materials—Advisory Committee meeting minutes, plan chapters, presentations, and study reports—are all available on the Commission's website.

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This newsletter was mailed directly to a list of individuals and organizations that have expressed interest in receiving such information. If you did not receive this newsletter directly, and would like to receive future issues, please contact the Commission using the contact information above.

THIS NEWSLETTER CONTAINS:

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Study Public Informational Meetings p.1
Water Supply Planning Objectives p.7
Development of a Preliminary Recommended Regional Water Supply Plan ..... p. 9
Sustainability of the Preliminary Recommended Plan ..... p. 18
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