

# Wastewater System Plan

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## **Existing Wastewater Conveyance and Treatment System**

The Metropolitan Council currently provides wastewater collection and treatment services to 2.5 million people in 103 communities, which represents about 90 percent of the seven-county metropolitan area's pollution.

The Council owns and operates the Metropolitan Disposal System (MDS). The MDS includes eight wastewater treatment plants: Metropolitan, Empire, Rosemount, Blue Lake, Seneca, Eagles Point, Hastings, and St. Croix Valley; it also includes approximately 600 miles of regional interceptors that connect flow from 5,000 miles of sewers owned by local communities. The system treats up to 300 million gallons per day of wastewater from homes, industries, and commercial businesses.

The system is operated through the Council's Environmental Services Division (MCES). MCES works with more than 800 industrial clients to substantially reduce the amount of pollution entering the wastewater collection system. Wastewater is reliably treated to high levels of pollutant removal. Permit limits continue to achieve near-perfect compliance with federal and state clean water standards. The map in Appendix E shows the location of all metropolitan interceptor sewers and wastewater treatment plants in the metropolitan area.

The Metropolitan Council's responsibilities for operation of the MDS extend beyond merely collecting and treating domestic wastewater, industrial wastewater, and leachate from its service area. MCES also accepts septage from individual sewage treatment systems (ISTS), community and/or cluster systems, biosolids from municipal wastewater plants located within the rural metropolitan area and, as capacity permits, biosolids from areas located within surrounding counties and Wisconsin. MCES also accepts leachate collected from landfills throughout Minnesota.

The following sections describe the system in more detail.

### ***MCES Wastewater Treatment Plants***

**Metropolitan Wastewater Treatment Plant (Metropolitan Plant).** Built in St. Paul in 1938, the Metropolitan Plant was the first wastewater treatment plant in a major city located on the Mississippi River. The plant has an average annual treatment capacity of 251 million gallons per day (Table 3). The Metropolitan Plant is the largest treatment facility in Minnesota and is among the nation's largest with 332 miles of regional interceptors, averaging 203 million gallons of wastewater every day from 62 communities (1.8 million people) and over 800 industries. About 75 percent of the wastewater generated in the metropolitan area is treated at the Metropolitan Plant.

The Metropolitan Plant utilizes the activated sludge process for treating wastewater, including phosphorus and ammonia nitrogen removal, prior to discharge to the Mississippi River. Sludge is processed by thickening, centrifugal dewatering, and fluid-bed incineration with energy recovery (steam and electricity). These processing facilities were completed in 2004 as part of a major rehabilitation and upgrade program at the plant. Ash from incineration is landfilled.

**Empire Wastewater Treatment Plant.** Built in 1979, the Empire Wastewater Treatment Plant is located in Empire Township and includes 16 miles of interceptors to serve approximately 100,000 people (Table 3). The Empire Plant serves Apple Valley, Lakeville, Farmington and portions of Empire Township and Rosemount. The plant currently discharges its wastewater to the Vermillion River.

The Empire Plant is being expanded from 12 mgd to 24 mgd, utilizing the activated sludge process for phosphorus and ammonia nitrogen removal. Biosolids are digested and spread on farmland. A new 13-mile pipeline is being constructed to convey treated wastewater through Rosemount to the Mississippi River, which will be completed by 2007. Concurrently, an interceptor is being constructed to convey wastewater from Rosemount to the Empire Plant, enabling closure of the Rosemount Plant in 2007.

**Rosemount Wastewater Treatment Plant.** The Rosemount Plant is MCES's smallest facility, treating an average of 800,000 gallons per day (Table 3). The plant uses conventional biological treatment with an aerated pond system. Secondary treatment is provided with effluent discharged to the Mississippi River. Solids production is minimized in the aerated pond process; accumulated biosolids will be removed as needed.

The facility serves most of the city of Rosemount (approximately 7,000 people) through eight miles of interceptors. The current capacity of the plant is 1.3 million gallons per day. Due to growth in the plant service area and overall economics, MCES will close the Rosemount Plant and convey the wastewater to the Empire Wastewater Treatment Plant starting in 2007.

**Eagles Point Wastewater Treatment Plant.** The Eagles Point Wastewater Treatment Plant began service in 2002, replacing the Cottage Grove Plant that had been in operation since 1962. The plant is located in and serves Cottage Grove (approximately 28,000 people) and will eventually serve much of Woodbury.

The Eagles Point Plant has a capacity to treat 10 million gallons of wastewater per day (Table 3). It removes phosphorus and ammonia nitrogen before discharging wastewater to the Mississippi River. Biosolids are processed and transported to the Metropolitan Plant.

**Hastings Wastewater Treatment Plant.** The Hastings Plant is located in Hastings along the Mississippi River. The plant serves approximately 18,000 residents in Hastings, discharging an average of 1.8 million gallons per day of wastewater to the Mississippi River (Table 3).

The Hastings Plant utilizes biological treatment technology. Biosolids are processed and transported to the Metropolitan Plant. The plant was designed to treat an average wastewater flow of 2.9 million gallons per day. The plant will reach the end of its useful life sometime between 2010 and 2015, by which time it will be relocated and expanded.

**St. Croix Valley Wastewater Treatment Plant.** The St. Croix Valley Plant is located on the St. Croix River, a nationally protected waterway. The plant is located in Oak Park Heights and provides service to Bayport, Oak Park Heights, and Stillwater (approximately 21,000 people) through one-third mile of interceptors. The plant currently treats an average of 3.4 million gallons of wastewater per day and has a design capacity of 4.5 million gallons of wastewater per day (Table 3).

The St. Croix Valley Plant utilizes the activated sludge process with chemical addition for phosphorus removal. Biosolids are processed and transported to the Metropolitan Plant. The plant also utilizes extensive odor control facilities to protect neighbors from nuisance odors.

**Seneca Wastewater Treatment Plant.** The Seneca Wastewater Treatment Plant is MCES's second-largest facility, and includes 46 miles of interceptors. The plant serves approximately 234,000 people in the communities of Eagan, Bloomington, Burnsville, Savage and parts of Inver Grove Heights, Lakeville, and Apple Valley. Built in 1972, the plant is the third largest in the state (after the Metropolitan Plant and a facility in Duluth).

The plant is located on the Minnesota River in Eagan. The plant's current capacity is 39 million gallons per day (Table 3). The Seneca Plant utilizes the activated sludge process for treating wastewater, including phosphorus and ammonia nitrogen removal, prior to discharge to the Minnesota River. Sludge is processed by thickening, centrifugal dewatering, and multiple hearth incineration. The resulting ash is landfilled.

**Blue Lake Wastewater Treatment Plant.** Blue Lake, the third largest MCES plant, is the fourth largest plant in Minnesota. Located on the Minnesota River in Shakopee, the Blue Lake Plant treats an average of 28 million gallons of wastewater per day. The plant provides service to 27 communities (approximately 236,000 residents) and includes 108 miles of interceptors.

The Blue Lake Plant has a design capacity to treat 37 million gallons of wastewater per day (Table 3). The Blue Lake Plant utilizes the activated sludge process for treating wastewater, including phosphorus and ammonia nitrogen removal, prior to discharge to the Minnesota River. Biosolids are processed by a solids handling facility. The solids handling facility is operated under a joint venture between MCES and the New England Fertilizer Company. The sludge produced at Blue Lake is dewatered, dried, and pelletized for use as a fertilizer.

**Table 3. Metropolitan Disposal System Wastewater Treatment Facilities, 2004**

Treatment Plant	Design Capacity (MGD)	Current Flow (MGD)	River Receiving Effluent	Liquid Treatment (4)	Solids Processing
Blue Lake	37	28	Minnesota	B, N, S (5)	Drying/ Pelletization
Eagles Point	10	3.8	Mississippi	B, N, P, S	Haul to Metropolitan
Empire	12 (1)	8.3	Vermillion (3)	B, N, S (6)	Digestion/Land Application
Hastings	2.9	1.8	Mississippi	B, S (7)	Haul to Metropolitan
Metropolitan	251	203	Mississippi	B, N, P, S	Incineration and Energy Recovery
Rosemount	1.3 (2)	0.8	Mississippi	B, P, S	Store in Ponds
St. Croix Valley	4.5	3.4	St. Croix	B, P, S	Haul to Metropolitan
Seneca	39	25	Minnesota	B, N, S (5)	Incineration

**Notes:** 1. Being expanded to 24 MGD by 2006.  
 2. Being eliminated by 2007; flow will be treated at Empire.  
 3. Outfall to Mississippi River being constructed by 2007.  
 4. B = Biochemical Oxygen Demand  
 N = Ammonia Nitrogen  
 P = Phosphorus  
 S = Suspended Solids

5. Plants are operated to remove phosphorus. Upgrades to meet phosphorus limits will be Completed by 2008.  
 6. Plant expansion includes phosphorus removal.  
 7. Phosphorus removal will be included in new plant, scheduled for operation in 2010.

## ***Interceptor System Facilities***

The Metropolitan Disposal System serves 103 communities in the seven-county area and has plans to serve several more communities in the near future. Each of these 103 communities maintains the sanitary sewer pipes that collect wastewater from homes, businesses, and industries. MCES operates and maintains a network of 600 miles of interceptor sewers, wastewater pumping stations, and flow metering stations that transport wastewater from the community sewer systems to eight wastewater treatment plants.

**Lift Stations.** Sixty-one lift (pumping) stations are currently active. Although most of the interceptor system relies on gravity to convey wastewater to treatment plants, variations in topography make it necessary for lift stations to pump wastewater to a higher elevation so that it can flow downhill toward the treatment plant.

**Metering Stations.** There are 188 metering stations used to determine wastewater flow from the 103 communities served by the MDS. The flow meters are regularly calibrated and maintained to provide accurate measurements of wastewater flow rates and volumes from each community. Flow measurements are used to establish wastewater service charges for each community.

**Centralized Monitoring Facility.** The operation of the interceptor system is centrally monitored at the Regional Maintenance Facility in Eagan. The interceptor network is closely monitored by a sophisticated computerized telemetry system that provides continuous data and monitors the status of MCES's facilities, lift stations, and flow meters. Unusual conditions trigger an alarm display on the monitor so that appropriate service personal can be dispatched to investigate and correct the problem. Dispatchers staff the center 24 hours a day, 365 days a year.

## ***Non-MDS Wastewater Treatment Plants***

There are 17 municipal wastewater treatment plants in the metropolitan area that are not currently owned or operated by MCES. These treatment plants are owned and operated by the municipality where they are located: Belle Plaine, Bethel, Carver, Cologne, East Bethel, Elko-New Market, Hamburg, Hampton, Jordan, Loretto, Mayer, New Germany, Norwood-Young America, Rogers, St. Francis, Vermillion, and Watertown.

The locally owned treatment plants are all required to treat to secondary treatment standards. The smallest plant, Bethel, has an average design capacity of 37,500 gallons per day (Table 4). The largest plant, Rogers, has a maximum month design capacity of 1.6 million gallons per day. Most of the Rural Growth Center treatment plants discharge to some type of surface water such as a creek, ditch, or rivers; however, the Bethel and St. Francis wastewater treatment plants discharge to the groundwater through a rapid infiltration system.

The Council recognizes that some rural centers in the metropolitan area are under extreme pressure to add housing and employment to their communities, and thus expand their municipally owned wastewater treatment plants, while others are not and do not want to take on large quantities of growth. If a rural center is willing to expand to accommodate the increased growth as forecasted by the Council, it may need MCES to become involved in the possible acquisition, operation and betterment of the wastewater treatment plant located in that community.

**Table 4. Municipal (Non-MDS) Wastewater Treatment Plants**

Treatment Plant	Design Capacity, gpd (1)		Receiving Water	Effluent Limits (2)
	Max Month	Average		
<b>Belle Plaine</b>	974,000	839,000	Minnesota River	B, P, S
<b>Bethel</b>	-	37,500	Ground Water	Aerated Pond
<b>Carver</b>	361,000	255,000	Carver Creek (to Minnesota)	B, N, S
<b>Cologne</b>	325,000	260,000 (4)	Ditch to Lake Benton	B, P, S
<b>East Bethel</b>	120,000	96,000	Minard Lake	B, P, S
<b>Elko-New Market (3)</b>	95,000	76,000 (4)	Vermillion River	B, N, S
<b>Hamburg</b>	-	63,000	Ditch to Bevens Creek (to Minnesota)	B, S
<b>Hampton</b>	-	101,000	Ditch to Vermillion River	B, S
<b>Jordan</b>	1,289,000	580,000	Sand Creek (to Minnesota)	B, N, P, S
<b>Loretto</b>		61,000	Slough to Spurzem Creek	B, P, S
<b>Mayer (3)</b>	135,000	108,000 (4)	Crow River	B, N, P, S
<b>New Germany</b>	-	46,000	Crow River	B, S
<b>Norwood-Young America</b>	-	517,000	Ditch to Bevens Creek (to Minnesota)	B, S
<b>Rogers</b>	1,602,000	1,280,000 (4)	Ditch to Creek to Crow River	B, P, S
<b>St. Francis</b>	540,000	432,000 (4)	Ground Water	B, N, P, S
<b>Vermillion</b>	-	54,000	Ditch to Vermillion River	B, S
<b>Watertown</b>	1,262,000	362,000	Crow River	B, N, S

**Notes:** 1. Flow as stated in NPDES Permits, except as described in note 4

2. Effluent Limits:

B = Biochemical Oxygen Demand

N= Ammonia Nitrogen

P = Phosphorus

S = Suspended Solids

3. Expansion proposed

4. Average flow estimated, based on maximum month flow times 0.8

## Wastewater Flow Projections

The wastewater flow projections that are used in the preparation of this System Plan are based on the sewer population, household and employment projections for each community as shown in Appendix B1-a. Table 5 provides a summary of sewer population, household and employment projections for each wastewater treatment plant service area.

**Table 5. Sewered Population, Household, and Employment Forecasts (Thousands)**

Wastewater Treatment Plant	Population				Households				Employment			
	2000	2010	2020	2030	2000	2010	2020	2030	2000	2010	2020	2030
<b>Blue Lake</b>	237	314	386	419	90	124	156	171	162	196	224	243
<b>Eagles Point</b>	48	71	99	121	16	26	38	48	13	23	34	45
<b>Empire</b>	108	162	210	242	36	57	78	92	30	42	51	58
<b>Hastings</b>	18	23	27	30	7	9	11	13	8	9	9	9
<b>Metropolitan</b>	1,735	1,932	2,118	2,243	693	786	872	932	1,118	1,272	1,382	1,462
<b>St. Croix Valley</b>	21	28	30	32	8	10	11	12	18	21	23	25
<b>Seneca</b>	234	253	269	280	92	102	112	118	182	212	228	246
<b>Rogers</b>	4	10	17	25	1.2	3.3	6.2	9.3	4.2	9.1	12	16

The wastewater flow projections that are shown in Appendix B1-b were calculated using 75 gallons per day (gpd) per person and 25 gpd per employee from new development, and gradual reduction of wastewater flow from existing development, which reflects water conservation and reduction of inflow and infiltration. These projections represent annual average flow conditions for each community served by the Metropolitan Disposal System; these projections will be submitted to the communities as guidelines to be used in the preparation of the comprehensive plans. MCES will use sewer population, household and employment information to estimate system flows and schedule needed improvements to the Metropolitan Disposal System.

Table 6 provides a summary of wastewater flow projections for each wastewater treatment plant service area. The low figure in the range of projected flows is based on the above projection method. The high figure is based on 85 gallons per day (gpd) per person and 30 gpd per employee from new development.

**Table 6. Wastewater Flow Projections (Million Gallons Per Day)**

Wastewater Treatment Plant	2000	2010	2020	2030
<b>Blue Lake</b>	28.3	34.0 - 34.9	39.4 - 41.2	41.7- 43.9
<b>Eagles Point</b>	3.8	5.6 - 5.9	7.8 - 8.5	9.6 - 10.5
<b>Empire</b>	9.8	13.8 - 14.4	17.2 - 18.3	19.5 - 21.0
<b>Hastings</b>	1.8	2.1 - 2.2	2.4 - 2.6	2.6 - 2.9
<b>Metropolitan</b>	202	213 - 216	225 - 230	229 - 235
<b>St. Croix Valley</b>	3.4	3.7 - 3.8	3.9 - 4.2	4.1 - 4.5
<b>Seneca</b>	24.9	25.5 - 25.7	27.1 - 27.7	27.6 - 28.4
<b>Rogers</b>	0.54	1.1 - 1.2	1.7 - 1.9	2.4 - 2.7

When planning new interceptors and treatment plants it is prudent to use more conservative methods of flow projections to provide flexibility in the system to accommodate future development. For this reason, MCES has also projected each community's flows using two additional methods. The first method uses 274 gpd per household and 30 gpd per employee to project flows through 2030. The second method,

to project the long-term needs of the region, uses 800 gpd per developable acre for the developing communities and adds 10 percent post-2030 growth for redevelopment in the developed communities. These more conservative methods of flow projection were used in the following sections to program interceptor system improvements.

## **Long-Term Wastewater Service Areas**

The wastewater system plan includes a specific plan to serve the region's projected 2030 growth and a general plan to serve the region's growth well beyond 2030. The wastewater system plan has a longer planning horizon than local comprehensive plans, because sewers have a long useful life (80 years or longer), high capital cost, and significant disruption during construction, especially in developed areas. The wastewater system plan also supports achievement of regional goals for water quality, cost-effective service, and local community flexibility.

### ***Existing Metropolitan Disposal System***

Beneficial water use classifications and water quality standards to protect those uses are promulgated by the Minnesota Pollution Control Agency (MPCA) for the waters of the state, which includes lakes, rivers, and groundwater. Wastewater treatment removes organics, suspended solids, and nutrients (nitrogen and phosphorus) to meet discharge permit limits established by MPCA to maintain compliance with their water quality standards. Control of urban and agricultural runoff is also important for protecting water quality, especially for phosphorus and suspended solids.

Wastewater treatment costs increase as effluent limits become more stringent. Effluent discharge limits for major rivers tend to be less stringent than effluent discharge limits for smaller rivers, lakes, and groundwater, because major rivers have a higher capacity to cleanse themselves through natural processes. Consequently the Metropolitan Disposal System supports the coordinated, economical and orderly development of the region by serving major portions of the region and discharging treated wastewater primarily to the Minnesota and Mississippi Rivers, along with one small discharge to the St. Croix River, which is a National Scenic River and Outstanding Resource Value Water.

The attached map shows the long-term service areas for the wastewater treatment plants currently owned and operated by the Council. The service areas have been determined through a process as follows:

1. Estimate the capacity of each treatment plant site based on potential long-term effluent discharge limits;
2. Estimate the potential developable area that could be served by the plant, in addition to currently served areas; and
3. Analyze existing interceptor capacity, future interceptor capacity, feasibility and costs to determine the most cost-effective service area configuration.

These long-term service areas consider development and redevelopment potential well beyond 2030 by analyzing wastewater capacity on the basis of developable area, which excludes lakes, rivers, wetlands, steep slopes, and parks. The areas are established based on a wastewater generation rate of 800 gallons per acre per day for developing communities and by including 10 percent post-2030 growth for developed communities. In areas with other significant natural resources or circumstances requiring more area devoted to stormwater management, such as trout stream watersheds and/or tight soils

(making infiltration of stormwater more difficult), the area effectively available for future development will be further reduced.

Several developing communities have areas of large-lot (e.g. 2½ acres) development served by septic systems. These areas could potentially be redeveloped at higher densities served by sewers, and could be served by the Metropolitan Disposal System. The MDS has been designed to provide future wastewater services to large undeveloped portions of the region as shown on the long-term wastewater service area map. Communities should address the staging of growth for these areas through 2030 as well as the protection of the remaining rural areas for future sewered development in their local comprehensive plan updates and surface water management plans. The wastewater system plan addresses these issues on a case-by-case basis. The system is conservatively designed, because the increased incremental cost (typically one pipe-size difference) is small.

### ***Long-Term System Development***

The long-term wastewater service areas show 2020 Metropolitan Service Area (MUSA) and 2020-2040 Reserve areas from the 1998 local comprehensive plan updates as areas for which regional wastewater service is committed, although capacity may be staged and not yet fully in place. The regional wastewater system can be expanded to serve areas beyond the current 2020 MUSA and 2040 Reserve areas. These potential service areas, as shown on the long-term wastewater service area map, include: (a) areas that are contiguous to the current service area; (b) areas that are contiguous to non-MDS plants, e.g. Rogers and Rural Growth Centers; and (c) areas that can be served by future MDS plants. Those areas that can be served by expansion of the service area of existing MDS plants are shown on the map. The other areas are conceptual and will be defined more clearly in the future through discussions with local communities and counties and through feasibility studies on a case-by-case basis. Although the actual expansion of the MDS is based on providing wastewater system capacity to facilitate development in communities consistent with their approved comprehensive sewer plans, the most efficient expansion of the regional wastewater system is to serve, in order:

1. The areas in the 2020 MUSA and 2020-2040 Reserve Area;
2. The potential service areas of the existing regional wastewater treatment plants;  
and
3. Non-MDS plants (Rogers and Rural Growth Center plants) which become part of the MDS, as well as potential future MDS plants, such as Crow River, Carver County, Scott County, and Anoka County.

This reflects the economy of scale of the existing regional wastewater treatment plants, as well as the broader infrastructure efficiency of contiguous sewered development at a density of three units per acre or greater. To meet the overall goals and policies of the *2030 Regional Development Framework*, it will likely be necessary to develop these three elements of the long-term regional system concurrently. When resources are limited, the staging of the capital improvement program will consider the relative life cycle costs of each project specific to these three elements of the regional wastewater system, balanced to meet the needs of local communities and the region as a whole.

## ***Non-MDS Wastewater Treatment Plants***

The City of Rogers owns and operates its own wastewater treatment plant, which also serves part of Hassan Township and a small portion of Dayton. Rogers has requested that the Council acquire its plant within the next several years. Because the local comprehensive plans in the northwest area show contiguous development by 2020, the regional wastewater system plan includes acquisition and expansion of the Rogers plant. An alternative, which may be considered, is the acquisition of a new treatment plant site and construction of a new plant to serve Rogers and Hassan and, in the long-term, other areas of the Crow River watershed (see discussion of future wastewater treatment plants).

There are 15 municipal wastewater collection and treatment systems serving Rural Centers. These are the focus of the Rural Growth Center policy in the Wastewater Service chapter in this plan. The regional wastewater system plan will not address the specific method for wastewater handling for each of these plants. That will be addressed through the Council's capital improvement program following plant acquisition via voluntary agreement between the city and the Council. Communities should plan on a five- to seven-year implementation period for expanding wastewater capacity, following the voluntary agreement.

The following specific provisions are included in the system plan:

- ***Elko-New Market*** will be served by an interceptor to the Empire Plant by 2010.
- ***Carver*** will be served by an interceptor to the Blue Lake Plant by approximately 2010, depending on local request.
- ***Loretto*** will be served by the Metropolitan Plant via the Elm Creek Interceptor. Timing should be coordinated with surrounding development in Medina, which is currently designated as 2020-2040 Reserve Area in Medina's comprehensive plan.
- ***Jordan and Belle Plaine*** along the Highway 169 corridor are potential candidates for future incorporation into a regional wastewater treatment plant. This corridor is designated as Reserve Area in the Scott County comprehensive plan.
- ***Hampton and Vermillion*** are potential candidates for incorporation into the Empire Plant service area. However, timing of interceptor service should be coordinated, not only with these communities following their request, but also with the plans of adjacent townships. Expansion of these cities' wastewater treatment plants will be challenging, because increased discharge to the Vermillion River is environmentally sensitive. Spray irrigation on farmland may be a viable interim expansion alternative.
- ***East Bethel*** along the Highway 65 corridor is a Rural Growth Center which will be served by a new wastewater treatment plant and rapid infiltration basin (groundwater recharge) system. Wastewater treatment system capacity will be staged to accommodate growth. Long-term wastewater service capacity for East Bethel is being planned based on groundwater recharge capacity of suitable rapid infiltration basin sites in East Bethel. This long-term wastewater service capacity is estimated at 5,000,000 gallons per day, which is the amount of wastewater generated from approximately 25,000 households. This long-term wastewater service capacity closely matches the projected wastewater flow generated by the long-term wastewater service area delineated in the draft East Bethel Comprehensive Plan. If additional rapid infiltration basins can be site in Ham Lake and/or Oak Grove, the wastewater

treatment plant could be further expanded to serve portions of Ham Lake and/or Oak Grove.

### ***Potential Future Wastewater Treatment Plants***

**Crow River Watershed.** The Rogers Plant can be expanded to serve the needs of Rogers and Hassan (that portion planned for sewer development). The eastern portion of Corcoran can be served by the Elm Creek Interceptor, as well as a small portion of southwestern Corcoran. However, there is likely to be long-term development in western Corcoran and portions of the Crow River watershed. Further, permanent location of the Rogers Plant in the center of Rogers will probably face community opposition eventually, especially given its proximity to the commercial area at Interstate 94/Highway 101. Consequently, it is likely that a new wastewater treatment plant will eventually be needed for the Crow River watershed to serve Rogers, Hassan, western Corcoran, Greenfield, and Independence. As discussed earlier, it may be prudent to site a new plant sooner rather than later.

**Carver County.** The potential wastewater generation from the long-term service area of the Blue Lake Plant could exceed the build-out capacity of the plant site sometime after 2030. The plan to address this possibility is a service area revision that diverts wastewater from western communities, such as Waconia, Laketown Township, Minnetrista, and St. Bonifacius, to a new regional wastewater treatment plant in Carver County, with effluent discharged to the Minnesota River. This new plant should probably be located south of Highway 212, so that it could also serve development along the corridor between Chaska and Cologne, as well as replacing the Cologne Plant.

**Scott County.** In Scott County, the Blue Lake Plant can serve Prior Lake, Shakopee, Jackson Township, and northern Spring Lake Township. The service area along Highway 169, including Louisville Township, Sand Creek Township, St. Lawrence Township, Belle Plaine Township, and Blakely Township needs a long-term wastewater service plan. Near-term service is expected to be provided by Jordan and Belle Plaine. This area is a candidate for a long-term regional wastewater treatment plant.

**Anoka County.** The Metropolitan Plant service area extends to Lino Lakes, Blaine, Andover, and Ramsey in Anoka County. The Rum River has been designated as an Outstanding Resource Value Water by the MPCA. Consequently, future wastewater treatment systems in northwest Anoka County will need to provide a high level of treatment followed by rapid infiltration to groundwater. This method is used by Bethel and St. Francis and could be used to serve future sewer development beyond the service area of the Metropolitan Plant. For example, a new sewer community could be developed along Highway 65 in East Bethel or along Highway 47 in Burns Township/Oak Grove.

**Hastings.** A new Hastings Plant is planned to replace the existing plant located near downtown. The new plant will be expandable, with a long-term service area which may include portions of Marshan, Nininger, and Vermillion Townships.

## **Capital Improvement Program**

### ***Base Plan***

Annually the Council adopts a capital improvement program, authorized capital program (funding authorizations for projects), and capital budget (annual funding appropriation for projects). This section of the system plan presents an overall capital improvement plan for the 2005 to 2030 period. The three objectives of the capital improvement plan are:

1. Maintain the infrastructure investment through rehabilitation/replacement;
2. Expand the system capacity through treatment plant and interceptor expansions and interceptor extensions; and
3. Improve the quality of the system by upgrading the wastewater treatment process, improving odor control and flow metering, increasing system reliability, and other performance improvements.

Table 7 presents a general description of projected capital improvement needs by wastewater treatment plant and associated interceptor system, and a statement of project objective, timing, and estimated cost. Capital cost estimates are presented using three percent annual inflation.

Total projected capital cost for 2005 to 2030 is approximately \$3.8 billion. On an annual spending basis, with adjustment for inflation, this equals the level of spending during 1970 to 2004. Total projected capital costs by objective are approximately 55 percent for infrastructure maintenance, 42 percent for growth, and 3 percent for quality improvement. These cost estimates do not include the costs to comply with future regulatory requirements, nor to store, convey, and treat excessive infiltration/inflow.

The regional wastewater system capital improvements are financed by Metropolitan Council general obligation bonds and Minnesota Public Facilities Authority loans. During the 1970s and 1980s, most of the capital improvements were funded by federal and state construction grants. Consequently, wastewater system debt service will increase higher than the inflation rate through 2010, which completes the 20-year transition from grants to 100 percent metropolitan funding. Thereafter, debt service is projected to increase approximately at the rate of inflation. Operating costs are expected to increase at approximately the rate of inflation plus growth.

### ***Infiltration/Inflow***

Currently, many communities in the service areas of the Blue Lake Plant and Metropolitan Plant generate peak wastewater flows that exceed the MDS design standards. If this excessive infiltration/inflow is not removed, it must be stored, conveyed, and treated. Estimated capital costs are approximately \$290 million for storage/conveyance and \$170 million for treatment.

A major adverse regional wastewater system impact of excessive inflow and infiltration is that wastewater treatment plant capacity is utilized (sites have a finite capacity). The total estimated loss of wastewater treatment capacity for growth is 60 mgd, which could serve 75,000 acres of developable land.

**Table 7. Regional Wastewater System Plan – Capital Improvement Plan (Costs in \$1,000,000s)**

Facility/Area	Project	Objective	2005 - 2010	2011 - 2020	2021 - 2030
<b>Wastewater Treatment Plants</b>					
<b>Metropolitan</b>	Liquid Treatment: Retrofit plant to provide biological phosphorus removal; rehabilitate/replace process equipment, electrical and mechanical systems, and disinfection system.	R, Q	\$14		
	Solids Processing: Replace solids processing system with new dewatering and incineration system with energy recovery and improved air pollution control, including mercury removal; provide facilities to chemically stabilize and store a portion of the solids for land application.	G, R, Q	\$20		
	Equipment/Utilities: Rehabilitate/replace major process equipment, power distribution, and plant utility systems, which are not included in the liquid treatment and solids processing systems.	R		\$100	
	Odor Control: Covers for remaining area of primary tanks and treatment of ventilation air.	Q		\$15	
	Disinfection: On-site sodium hypochlorite generation.	Q		\$15	
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<b>Blue Lake</b>	Expansion/Upgrade: Retrofit plant to provide biological phosphorus removal; replace disinfection system; expand liquid treatment and solids processing; rehabilitate utility systems.	G, R, Q	\$34	\$90	
	Rehabilitation: Rehabilitate/replace process equipment in liquid treatment and solids processing.	R		\$15	\$50
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<b>Eagles Point</b>	Solids Processing: Provide solids dewatering to reduce truck haul volume.	G		5	
	Rehabilitation: Rehabilitate/replace process equipment and control system.	R			\$25
	Expansion: Expand plant to 15 mgd.	G			\$45
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<b>Empire</b>	Expansion/Outfall: Plant expansion to 24 mgd; 13-mile effluent outfall to Mississippi River.	G, Q	\$90		
	Solids Processing: Additional digestion, dewatering and storage.	G		\$10	
	Process Equipment: Additional pumps, blowers; control system.	G		\$5	
	Outfall Phase 2: Second forcemain and/or on-site effluent storage to provide capacity and reliability.	G			\$15
	Plant Expansion: Plant expansion to 30 mgd.	G			\$80

Table 7. Page 2

Facility/Area	Project	Objective	2005 - 2010	2011 - 2020	2021 - 2030
<b>Hastings</b>	New Plant: Site acquisition; conveyance from existing plant site; new 4 mgd plant with phosphorus and ammonia removal.	G, R, Q	\$50		
<b>Rogers</b>	Plant Acquisition/Expansion: Acquire plant and expand to 3 mgd.	G	\$17		
<b>Seneca</b>	Disinfection/Phosphorus: Retrofit plant to provide biological phosphorus removal; replace disinfection system; rehabilitate older portions of plant.	R, Q	\$15		
	Solids Processing: Replace existing solids processing facilities.	R		\$80	
	Liquid Treatment: Rehabilitate primary and secondary treatment facilities.	R			\$40
<b>St. Croix Valley</b>	Rehabilitation: Rehabilitate/replace process equipment.	R		\$15	
	Expansion: Expand plant to 6 mgd.	G			\$25
<b>Rural Growth Centers</b>	Acquisition/Expansion: Based upon voluntary agreement between cities and Council, acquire plants and expand to serve agreed upon growth.	G	\$50	\$50	\$40
<b>TOTAL: WASTEWATER TREATMENT PLANTS</b>			<b>\$260</b>	<b>\$400</b>	<b>\$700</b>

**Interceptor System**

**Metropolitan**

<i>Northeast System</i>	L3 Flow Attenuation: Provide temporary above-ground storage tanks to shave peak flows until downstream sewer relief projects are implemented.	G	\$8		
	White Bear Relief: Provide new interceptor through White Bear Lake to relieve Interceptor 6901; connect to Upper Beltline Interceptor.	G	\$43		
	Middle Beltline Relief: Provide parallel gravity interceptor through St. Paul to expand capacity.	G	\$9		
	Upper Beltline Relief: Provide parallel gravity interceptor between St. Paul and White Bear Lake to expand capacity.	G	\$2	\$98	
	Hugo-Forest Lake Relief: Provide parallel gravity interceptors; rehabilitate, expand, and upgrade L2 and L3; add dual forcemains.	G, R	\$2	\$40	
	Mahtomedi Relief; L7: Provide parallel gravity interceptor; rehabilitate, upgrade, and expand L7.	G		\$12	
	Interceptor 1-VH-422: Relocate portion of interceptor to accommodate highway construction at I-694/I-35E.	R	\$3		

**Table 7. Page 3**

Facility/Area	Project	Objective	2005 - 2010	2011 - 2020	2021 - 2030
<i>Northwest System</i>	Elm Creek Interceptor: Extend service to Corcoran, Dayton, Hassan, Medina; re-locate section along Hwy 610/CR 81.	G	\$30		
	Dayton-Champlin Interceptor: Extend service to northeast Dayton.	G	\$10		
	Elm Creek Interceptor: Storage facilities to shave peaks and increase average flow capacity.	G		\$25	
	Brooklyn Park Interceptor Rehabilitation: Restore integrity by in-place lining.	R	\$15		
	Anoka System Improvement: Expand capacity to serve Ramsey by expanding L42 and L67 and associated dual forcemains.	G	\$4	\$10	
	Champlin: L33 Rehabilitation/Replacement.	R		3	
	CAB Interceptor Diversion: Divert flow at junction with Elm Creek Interceptor to new tunnel under Mississippi River and construct lift station on east side to pump flow into Coon Rapids Interceptor.	G	\$60	\$80	
	CAB Relief Interceptor: Add gravity interceptor to relieve CAB Interceptor through Champlin and northern Brooklyn Park; also relieve downstream portion of Elm Creek Interceptor.	G	\$10	\$25	
	Brooklyn Park L.S. and Tunnel: Construct new tunnel under Mississippi River and construct new lift station to lift flow into Fridley Interceptor.	R		\$50	
	Coon Rapids Interceptor: Extend gravity interceptor to CAB Diversion lift station; eliminate L34.	R		\$14	
	Blaine Interceptor Relief: Provide second gravity sewer through southern Blaine, Circle Pines, and Lexington.	G		\$10	
	Mounds View Improvements: Rehabilitate L35; replace forcemain with two new forcemains.	R		\$10	
	New Brighton Interceptor: Relocate portion of interceptor to accommodate development; increase capacity of upstream section.	R	\$3	\$2	

Table 7. Page 4

Facility/Area	Project	Objective	2005 - 2010	2011 - 2020	2021 - 2030
Central System	Oakdale: L11 Rehabilitation.	R	\$3		
	St. Paul: L12 Rehabilitation.	R	\$4		
	Interceptor 1-MN-303: Rehabilitate gravity sewer in Minneapolis.	R	\$3		
	Interceptor 1-MN-320: Rehabilitate gravity sewer in Minneapolis.	R	\$4		
	Mpls./St. Paul Interceptor Improvements: Rehabilitate large gravity sewers in core areas.	R	\$50	\$75	\$100
	Riverview Siphon: Rehabilitate gravity sewer in St. Paul, including river crossing.	R	\$10		
	Roseville Interceptor: Rehabilitate gravity sewer in Roseville.	R		\$32	
	Upper Trout Brook Interceptor: Relieve/replace Interceptor 8851, serving Roseville.	G		\$10	
	South St. Paul: Rehabilitate lift station; add second forcemain; rehabilitate/replace old forcemain.	R	\$22		
	Battle Creek Interceptor: Rehabilitate/relocation portions of interceptor in St. Paul.	R	\$10		
	St. Louis Park Interceptor: Rehabilitate gravity sewer.	R	\$2		
	Trout Brook Interceptor: Rehabilitate original gravity sewer.	R	\$4		
	Joint Interceptor: Parallel Joint Interceptor; rehabilitate original interceptor.	R			\$400
<i>West System</i>	Crystal Improvements: Rehabilitate/replace L30; replace forcemain with two new forcemains; improve gravity sewer.	R		\$10	
	Hopkins Improvements: Replace L27 and forcemain with new gravity sewer tunnel.	R	\$44		
	Plymouth Improvements: Rehabilitate forcemains.	R	\$5		
	Plymouth-New Hope System: Replace L29, L41 and forcemains with gravity sewer tunnel system.	R		\$90	
	Golden Valley: Provide relief gravity sewer for portions of Golden Valley interceptor.	G		\$9	

**Table 7. Page 5**

Facility/Area	Project	Objective	2005 - 2010	2011 - 2020	2021 - 2030
<b>Blue Lake</b>					
<i>Mound Area</i>	Minnetrsta to Mound L25: Replace and upgrade L39 and L40 and associated sewers.	R		\$15	
	Mound L25 to L38: Replace L25 with gravity sewer to new, deeper, expanded L38.	G, R	\$15		
	Mound L38 to Victoria L23: Replace single L38 forcemain with two new forcemains.	G, R		\$30	
<i>Victoria Area</i>	L22, L23, L24, and associated sewers: Replace L22 and L23 with gravity sewer tunnel; replace L24 and replace forcemain with two new forcemains.	G, R	\$30		
<i>Excelsior Area</i>	L18, L19, L20, L47, L48 and Associated Sewers: Rehabilitate/replace lift stations and forcemains, including adding dual forcemains; replace with gravity sewer tunnel where feasible.	R	\$15	\$20	
<i>Orono-Wayzata</i>	L26, L44, L45, L46, L49, L59, and associated sewers: Rehabilitate/replace lift stations and forcemains, including adding dual forcemains; replace with gravity sewer tunnel where feasible.	R	\$12	\$40	
<i>Maple Plain</i>	L63 and Forcemain: Rehabilitate L63 and add second forcemain.	R		\$15	
<i>Chanhassen</i>	Lake Ann Interceptor Relief: Add parallel Lake Ann gravity sewer to provide additional capacity.	G		\$45	
<i>Prior Lake</i>	Interceptor Relief: Add parallel gravity sewer to provide additional capacity through Shakopee to Prior Lake.	G		\$15	
<i>Chaska</i>	Chaska West Interceptor: Gravity sewer to serve Chaska, Carver and adjacent future developing areas.	G	\$1		
	Chaska Lift Station: New larger lift station to serve Chaska, Carver, and adjacent areas.	G	\$9		
<i>Minnetonka</i>	Interceptor 7073: Replace section of interceptor along Hwy 101.	R	\$2		
<i>Waconia</i>	Waconia Interceptor: Replace old forcemain with new, larger forcemain.	G, R	\$4		

Table 7. Page 6

Facility/Area	Project	Objective	2005 - 2010	2011 - 2020	2021 - 2030
<b>Eagles Point</b>	South Washington County Interceptor: Convey flow from Cottage Grove, Woodbury, and possibly southern Lake Elmo, to the new Eagles Point Plant.	G	\$16		
<b>Empire</b>	Rosemount Interceptor: New interceptor to convey flow to Empire Plant; eliminates Rosemount Plant.	G	\$22		
	Elko-New Market Extension: New interceptor to convey flow to Empire Plant; eliminates local WWTP.	G	\$29		
	Castle Rock Extension: First phase of extension to expanded service area.	G		\$20	
	Eureka Extension: Second phase of extension to expanded service area.	G			\$60
<b>Seneca</b>	Burnsville Interceptor: Rehabilitation of deteriorated sections.	R	3		
<b>Systemwide</b>	Interceptor Rehabilitation/Lining	R	\$40	\$60	\$200
	Lift Station and Forcemain Rehabilitation	R	-	-	\$100
	Meter Improvements	Q	\$6	10	\$10
	Security Improvements	Q	\$5	-	\$5
	Septage Handling Improvements	R	\$5	-	-
	Small System Improvements	R	\$12	20	\$20
	Standby Power Improvements	R	\$5	-	5
	Supervisory Control & Telemetry	R	<b>\$3</b>	-	<b>\$10</b>
<b>TOTAL: INTERCEPTOR SYSTEM</b>			<b>\$604</b>	<b>\$900</b>	<b>\$900</b>
<b>GRAND TOTAL</b>			<b>\$864</b>	<b>\$1,300</b>	<b>\$1,600</b>

Objectives:

1. G = Growth (Capacity)
2. R = Rehabilitation/Replacement
3. Q = Quality Improvement

Note:

1. Capital cost estimates include 3% annual inflation.
2. Capital cost estimates exclude facilities to convey excessive I/I.
3. Capital costs incurred on projects prior to 2005 are excluded.

## **Other Long-Term Issues**

### ***Wastewater Reuse***

Treated wastewater can be reused for two purposes: irrigation of crop and forest land, as well as golf courses and park land; and industrial water uses, such as cooling water. Wastewater reuse for irrigation has two major benefits: reduced discharge to surface waters and reduced groundwater demand. Wastewater reuse for industrial purposes also reduces demands on groundwater and may provide opportunities for industrial expansion in areas that may be constrained by inadequate or unreliable groundwater supplies.

The Council will undertake studies to further evaluate the feasibility and cost-effectiveness of these wastewater reuse opportunities. The most feasible application in the near-term will most likely be the Empire Plant effluent, since the plant is near agricultural areas and the new outfall will traverse the Pine Bend industrial area.

### ***Regulatory Scenarios for Wastewater Treatment Plants***

The MPCA establishes water quality standards for surface waters (lakes and rivers) and effluent discharge limits for wastewater treatment plant discharges. The capital improvement program for the Regional Wastewater System Plan is based on current water quality standards and effluent discharge limits. Current effluent limits for the regional system typically include 1 mg/l phosphorus limit as an annual average, seasonal (summer) ammonia nitrogen limits, and seasonal organic loading limits.

Regulatory requirements have become increasingly more stringent over the last 30 years, and that trend is likely to continue. Potential regulatory scenarios for effluent discharge limits include the following:

- 0.4 mg/l Phosphorus: Requires chemical addition, solids side-stream treatment, and effluent filtration to enhance biological phosphorus removal. Estimated capital cost for the Metropolitan Plant is approximately \$100 million (2004 prices).
- Winter Ammonia Limit: Requires approximately 25 percent additional biological treatment tankage. Estimated capital cost for the Metropolitan Plant is approximately \$50 million (2004 prices).
- 10 mg/l Total Inorganic Nitrogen Limit: Current biological treatment technology converts ammonia nitrogen to nitrate nitrogen to meet effluent ammonia limits. Concern about "hypoxia" effects in the Gulf of Mexico has caused the U.S. Environmental Protection Agency to discuss imposition of this total inorganic nitrogen limit on discharges to the Mississippi River, which flows into the Gulf of Mexico. Wastewater treatment modifications will be needed to convert nitrate to nitrogen gas (denitrification). Estimated capital cost for the Metropolitan Plant is approximately \$200 million (2004 prices).

These three examples have an estimated capital cost of \$350 million for the Metropolitan Plant, or approximately \$1.40 per gallon per day capacity. Capital costs to upgrade the other regional wastewater treatment plants are estimated at approximately \$2 per gallon per day times 125 mgd capacity, or approximately \$250 million. Thus, total estimated capital costs to meet these stringent future regulatory scenarios are approximately \$600 million at 2004 prices, or approximately \$1 billion with inflation in the 2011 to 2030 period.

## **Substantial Impacts and Substantial Departures from the Metropolitan Wastewater System Plan**

The *2030 Regional Development Framework* and the regional system plans comprise the Council's Metropolitan Development Guide, which is the region's plan to ensure orderly, coordinated, and economical development of the region. Local comprehensive plans and plan amendments that have substantial impacts on—or contain substantial departures from—the metropolitan wastewater system plan affect how the Council constructs, operates, and maintains the Metropolitan Disposal System (MDS) and can result in system inefficiencies if the nonconforming plans are permitted to occur. Substantial impact or departures may result either from over-utilization or under-utilization. Over-utilization is local development that will use more regional capacity than currently is available or planned. Under-utilization is low-density development that uses less than currently available or planned regional capacity, and is likely to require additional infrastructure elsewhere in the region to accommodate household growth that reasonably would have been expected to occur in the local governmental unit.

As permitted by Minnesota Statutes section 473.175, subdivision 1, the Council may require a local governmental unit to modify any comprehensive plan or part thereof that is inconsistent with the metropolitan system plan if the Council concludes that the local plan is more likely than not to have either a substantial impact on, or to contain a substantial departure from, the Council's adopted policy plans and capital budgets for metropolitan wastewater service. Inconsistencies will provide the Council with grounds for requiring modifications to the local comprehensive plan.

A system impact to the Metropolitan Disposal System (MDS) may occur under various circumstances including, for example:

- When a local governmental unit proposes a land-use change to, and/or expansion of, its local sewer service area that results in projected flows in excess of the capacity within the existing MDS;
- When a community does not adequately address nonpoint source pollution control issues through its local surface water management plan; or
- When excessive inflow and infiltration reduces the regional system's capacity to convey and treat wastewater.

A substantial system impact occurs under various scenarios, including when:

- The MDS was not designed to provide wastewater service for the proposed sewer service area; or
- The projected flow from the sewer service area is greater than planned; or
- The timing for the proposed growth is prior to implementation of a planned improvement to the MDS and greater than what can be accommodated by the MDS; or
- The peak wet-weather flows from the local governmental unit exceeds its designed capacity within the MDS, and thus there is inadequate capacity to accommodate the planned growth for the local governmental unit or tributary local governmental units.

A system departure occurs when 1) a local governmental unit proposes forecasts for sewer development densities that are lower than Council forecasts or lower than density standards that

are the basis for regional infrastructure planning purposes; or 2) when a local governmental unit proposes densities in rural areas that exceed Council policy (i.e., one unit per 10 acres in diversified rural areas and one unit per 40 acres in agricultural areas). This may result in an under-utilization of the available or planned regional wastewater system capacity.

A substantial departure also may occur under different circumstances including when:

- A local governmental unit's sewer household and employment forecasts, within the existing or planned service area of a metropolitan facility, are at least 20 percent lower than the Council's forecasts of growth for the community; or
- A local governmental unit is not achieving the Council's density standards for sewer development; or
- A local governmental unit is planning to allow development that proposes densities in rural areas (i.e., areas not currently served by public sewers) that exceed Council policy, such as development on 2 1/2-acre lots that would preclude future economical sewer development.