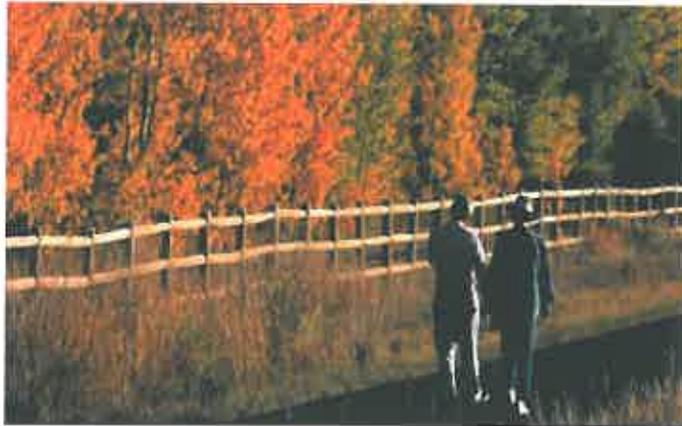


Comprehensive Plan for

City of Bayport, Minnesota



Updated: March, 2010
Amended: February, 2012

Background

Policies and Objectives

Authority to Plan

Chapter 462 of Minnesota Statutes, Municipal Planning and Development, authorizes cities to prepare and implement a comprehensive plan. This statute enables a municipality to carry on comprehensive municipal planning activities to guide the future development and improvement of the municipality. It further enables the City to prepare, adopt, and amend a comprehensive municipal plan and implement such plan by ordinance and other official actions.

In addition to Chapter 462, the Metropolitan Land Use Planning Act, Chapter 473, requires local units of government in the metropolitan area to either adopt or update their comprehensive plans to make them consistent with certain standards and policies as established by the Metropolitan Council. The intent of this state statute is to control and guide urban development in the metropolitan area.

Bayport's Comprehensive Plan Update is presented in this document. It is primarily written in response to the Metropolitan Council's System Statement for the City of Bayport and takes into account new growth projections and policies published in the 2030 Regional Development Framework. This plan update also factors in policies of other State and regional plans such as The 2030 Transportation Policy Plan, the 2030 Water Resources Management Policy Plan, and the 2030 Regional Parks Policy Plan.

Purpose

The purpose of this Comprehensive Plan Update is to demonstrate compliance with the Regional Council's 2030 Regional Development Framework in a way that reflects the City of Bayport's vision. The policies in this plan will guide Bayport's land use, housing, resource protection and infrastructure decisions in the coming years.

Scope

The comprehensive plan update is a statement of public policy, based on a common vision of where the City wants to go and how it intends to get there. It is intended to be a general update consisting of policies, objectives, concepts and relationships in response to the System Statement and the 2030 Regional Development Framework. It is intended to be flexible, to serve as a frame of reference for future development and investment decisions. If interpreted too literally, it serves no purpose other than that of a zoning ordinance. If interpreted too generally, its value as a guide will be compromised.

Process

Comprehensive planning is a process, not a product. The update is a written guideline in response to changing public needs. The City Council will adopt



the update after careful public review by all stakeholders, including adjoining jurisdictions as well as the Metropolitan Council.

Application

The comprehensive plan update will be used as a guide for making land use changes, preparing and implementing ordinances, preparing capital improvement programs and influencing the rate, timing and location of future growth. This document should be used when a development decision is being made; changes or deviations are made to the Zoning Ordinance, and when the City budget is being prepared.

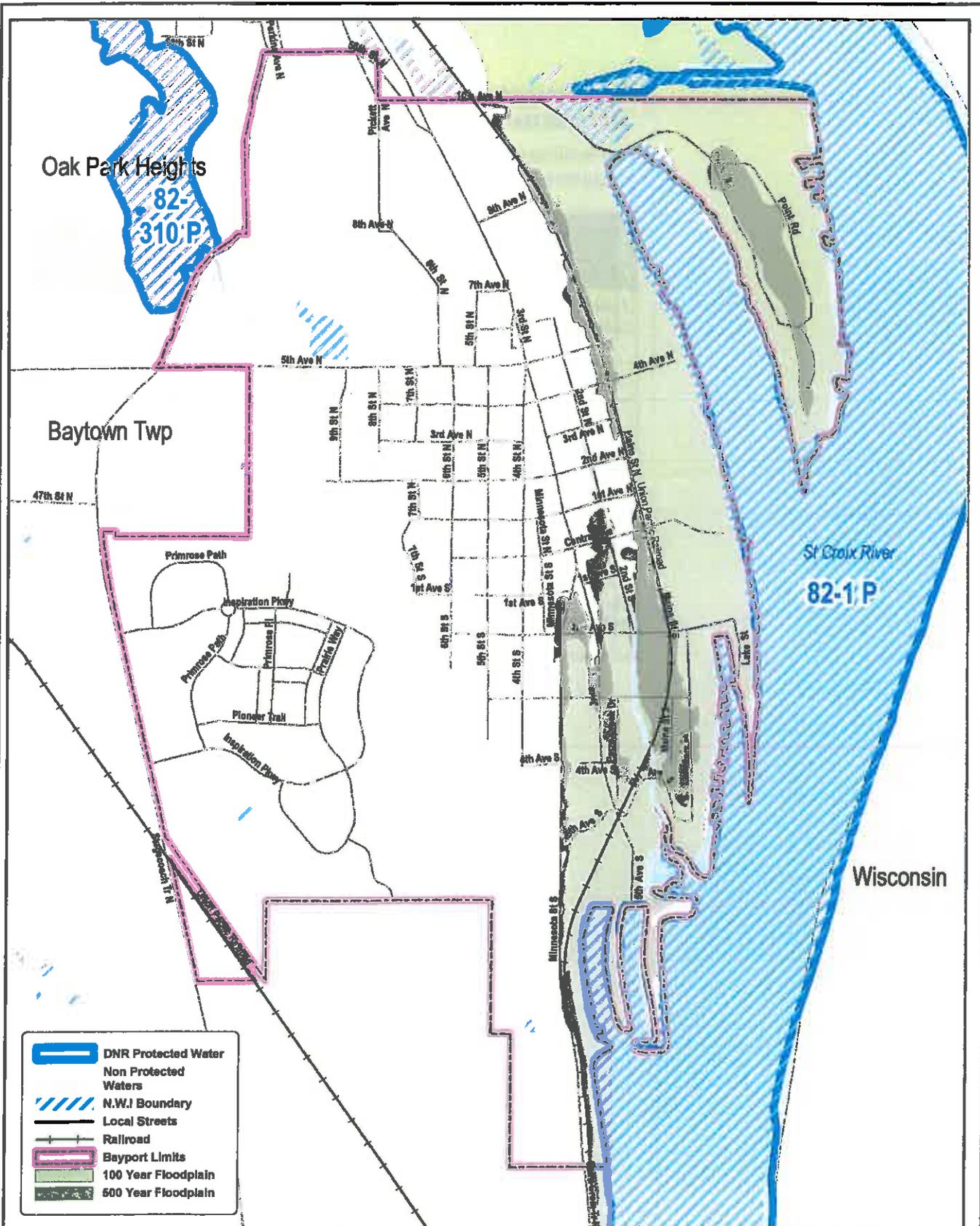
Regional Planning Area Designations

Bayport is classified as a “developed community” in the 2030 Regional Development Framework, indicating that greater than 15 percent of land within its borders was identified as vacant or available for development in 2000.

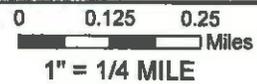
Population, Household, and Employment Forecasts

The following population forecast table is based upon the Metropolitan Council's recommendations. (October 2, 2008 letter to the City of Bayport)

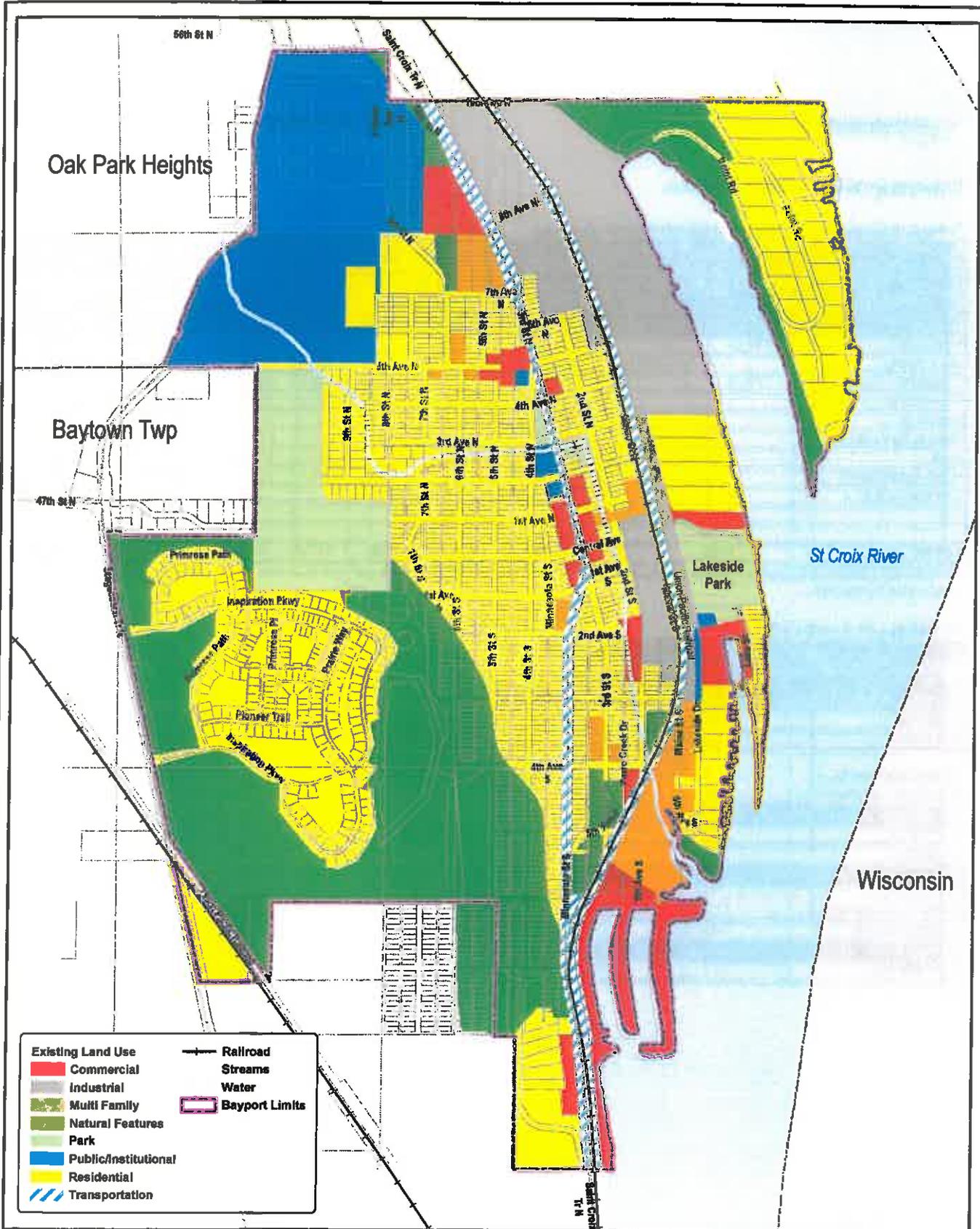
	1990	2000	2010	2020	2030
Total population	3,200	3,162	4,250	4,650	5,150
All other population	1,736	1,781	2,850	3,250	3,750
Prison population	1,464	1,381	1,400	1,400	1,400
Total households	743	763	1,140	1,300	1,500
Total employment	3,200	4,900	5,200*	5,700	6,300



SOURCE: MnDOT, MnDNR, MetroGIS & SEH



Hydrological Features



Existing Land Use	Railroad
Commercial	Streams
Industrial	Water
Multi Family	Bayport Limits
Natural Features	
Park	
Public/Institutional	
Residential	
Transportation	



Existing Land Use

Existing Developable Worksheet

Table Calculating Net Density of Residential Development

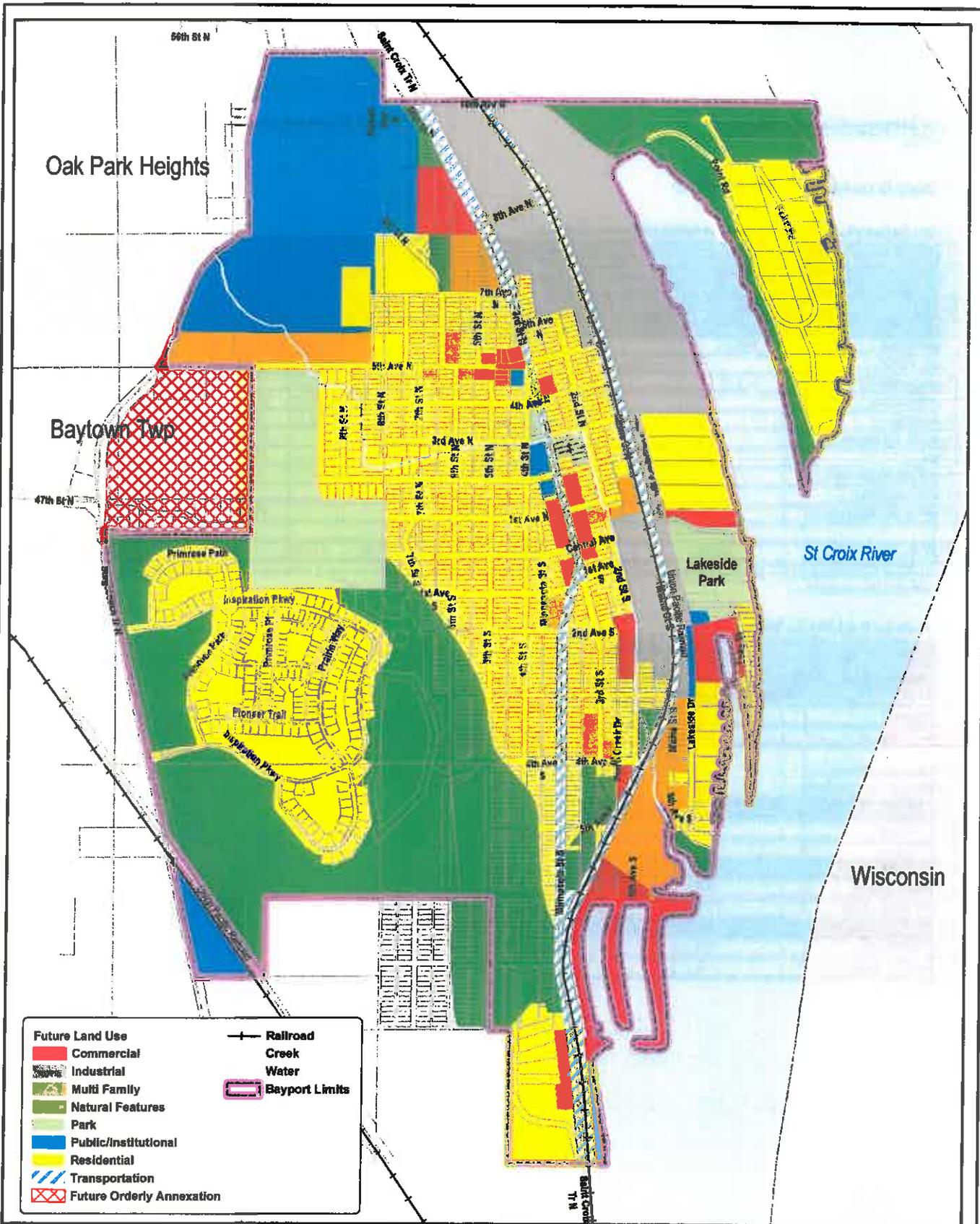
Land Use	Single Family # of Units	Multi Family # of Units	Acres Gross Resid.	Acres Wetland & water-bodies	Acres Public Parks & Open	Acres Arterial Roads ROW	Acres Other Undeveloped	Net Developable Acres	Net Density Units/Acre
	A	B	C	D	E	F	G	H=C-D-E-F-G	(A+B)/H
Residential	634		355.70	0.50		85.30	22.70	247.20	2.56
Multi Family		129	32.20	0.60		1.50	1.20	28.90	4.46
Residential Primarily	325		245.10		157.20	10.80	0.02	77.08	4.22
Commercial			48.40	0.10		2.60	8.70	37.00	0.00
Industrial			103.40	0.10		3.90	0.00	99.40	0.00
Natural Features			105.80	8.10		1.60	51.50	44.60	0.00
Park			65.40	0.20		0.40	15.70	49.10	0.00
Public/Institutional			117.70	3.80		11.50	2.60	99.80	0.00
Transportation			52.40					52.40	0.00
TOTAL	959	129	1126.1	13.4	157.2	117.6	102.42	735.48	1.479306

* Describe on a separate page any other undeveloped land that does not fall under wetlands and water, public parks or arterial roads, including steep slopes or outlots for future or commercial development.

Existing Land Use Table

Land Use Category	Gross Acreage	Net Acreage
Residential Land Uses		
Residential	356	247
Multi Family	32	29
Residential-Primarily Residential* (Inspiration)	245	77
C/I Land Uses		
Commercial	48	37
Industrial	103	99
Public/Semi Public Land Uses		
Natural Features/Parks	171	84
Public Institutional	118	100
Other		
Transportation	52	52





- | | | | |
|--|---------------------------|--|----------------|
| | Commercial | | Railroad |
| | Industrial | | Creek |
| | Multi Family | | Water |
| | Natural Features | | Bayport Limits |
| | Park | | |
| | Public/Institutional | | |
| | Residential | | |
| | Transportation | | |
| | Future Orderly Annexation | | |

0 0.125 0.25 Miles
1" = 1/4 MILE



Future Land Use

Future Developable Worksheet

Table Calculating Net Density of Residential Development

Land Use	Single Family # of Units	Multi Family # of Units	Acres Gross Resid.	Acres Wetland & water-bodies	Acres Public Parks & Open	Acres Arterial Roads ROW	Acres Other Undeveloped	Net Developable Acres	Net Density Units/Acre
	A	B	C	D	E	F	G	H=C/D/E/F/G	I=(A+B)/H
Residential	1245		341.60	0.50		85.60	22.70	232.80	5.35
Multi Family		255	45.70	2.80		1.90	1.20	39.80	6.41
Residential Primarily	325		245.10		157.20	10.80	0.02	77.08	4.22
Commercial			50.10	0.10		2.60	8.70	38.70	0.00
Industrial			103.50	0.10		3.70	0.00	99.70	0.00
Natural Features			119.90	8.10		1.70	51.50	58.60	0.00
Park			65.40	0.20		0.40	15.70	49.10	0.00
Public/Institutional			102.60	1.60		11.50	2.60	86.90	0.00
Transportation			52.40					52.40	0.00
Orderly Annexation			50.60	0.20			19.20	31.20	0.00
TOTAL	1570	255	1176.9	13.6	157.2	118.2	121.62	766.28	2.381636

* Describe on a separate page any other undeveloped land that does not fall under wetlands and water, public parks or arterial roads, including steep slopes or outlots for future or commercial development.

Future Land Use Table

Land Use Category	Gross Acreage	Net Acreage
Residential Land Uses		
Residential	342	233
Multi Family	46	40
Residential-Primarily Residential* (Inspiration)	245	77
C/I Land Uses		
Commercial	50	39
Industrial	104	100
Public/Semi Public Land Uses		
Natural Features	185	108
Public Institutional	103	87
Other		
Transportation	52	52
Orderly Annexation	51	31



LAND USE TABLE IN 5-YEAR STAGES

Existing and Planned Land Use Table (In acres)

Within Urban Service Area	Allowed Density Range Housing Units/Acre		Existing (2000)	2010	2015	2020	2025	2030	Change 2000-2030
	Minimum	Maximum							
Residential Land Uses									
Residential	2.5	4.4	269	255	255	255	255	255	-14
Multi Family	4.5	14	30	41	41	41	41	41	11
Residential - Primarily Residential* (Inspiration)	3.8	9.9	77	77	77	77	77	77	0
C/I Land Uses									
	Est. Employees/Acre								
Commercial	7.87 Employees/Acres		46	47	47	47	47	47	-1
Industrial	6.25 Employees/Acres		99	99	99	99	99	99	0
Public/Semi Public Land Uses									
Institutional			102	90	90	90	90	90	-12
Parks and Recreation			328	342	342	342	342	342	14
Roadway \ Utility Rights of Way			136	136	136	136	136	136	0
Railroad			26	26	26	26	26	26	0
Annexation Area								50	
Subtotal Sewered			1113	1113	1113	1113	1113	1163	50
Undeveloped									
Wetlands	--	--	13	13	13	13	13	13	0
Total			1126					1176	

Land Use Categories

Residential 2.5 - 4.4 units per acre

Detached housing units. The corresponding zoning district allows for lots as small as 10,000 square feet.

Residential Primary Residential 3.8 – 9.9 units per acre

Inspiration – A mix of new low density development developed using cluster housing and conservation development techniques.

Multi Family 4.5 - 14 units per acre

Two-family dwellings, townhomes and apartments. The intended purpose is to provide areas capable of supporting multiple family dwellings.

High Density * +14.6 units per acre (allowed only by PUD)

Land use that would support multiple family dwellings in areas of infill development. These areas would require a comprehensive plan amendment and are not currently designated on the land use map.

Commercial

Area for the development or redevelopment of corporate offices, businesses or residential businesses.

Industrial

Office buildings, office showrooms, light industrial buildings and manufacturing related warehousing.

Natural Features

City or private parks or natural areas

Public Institutional

City offices, State prison or cemeteries

Residential Development Staging Plan

Bayport is a developed community with a very limited supply of land for new development. In the last few years the most significant development has been the completion of the rebuilt Croixdale senior citizen housing complex with approximately 100 units and the Inspiration housing development which will ultimately have 253 single family houses, of which 121 are currently platted. Housing supply should be able to accommodate



seniors, renters and homeowners. Commercial development will most likely be infill along the commercial corridor.

The City's current goals are to limit growth, for example, forgoing annexation of surrounding townships. In the fall of 2006, both the City of Bayport and Baytown Township agreed to an orderly annexation agreement for a 26.76 acre site west of Barkers Alps Park. The agreement was the first step in an anticipated development proposal; however, the initial proposal was not advanced by the developer. The City of Bayport has no future plans for annexation nor does it desire to actively seek lands outside of its incorporated boundary. This is consistent with both the City's goals and its neighbors - preserving other municipalities' independence while working together, in everyone's best interest, to accommodate growth in the future.

As this demonstrates, the need for major capital programs to add infrastructure, i.e. roads, sewer, water, is not a significant priority for the City in the near term. Further studies are being done at this time to fully assess and analyze future water and sewer infrastructure requirements in cooperation with the Regional Council in the long-term.

Residential Development and Housing Plan

Current Conditions

The City of Bayport has not seen significant population growth in over a decade and until recently its slow residential growth has reflected this trend. Much of the development that has occurred within the City has occurred through infill development. The Croixdale development, an 111-unit assisted living and senior housing complex, was completed in 2005. Other examples of growth in housing stock include small lot, single family housing rehabilitation projects, minor subdivisions and lot splits, and (small 12-units and under) PUD twin-home developments.

Following the completion of the Inspiration Development, which will add 328 units, the total number of housing units in the City will reach 1,225. Currently, 72.8 percent of housing units in Bayport are single family units, 2.0 percent are duplexes, and the remaining 25.2 percent are multifamily units. Housing tenure is fairly evenly distributed, with between 10 and 20 percent of households being occupied by current householder per census period.

The 2000 U.S. Census shows a residential vacancy rate of 3% in Bayport. Of the remaining units, 22.5 percent are renter-occupied and 74.5 percent are owner-occupied. Housing values in Bayport tend towards the lower end of the market spectrum for the seven county metropolitan area, with a median value in 2005 of \$223,180. This may be due in part to the fact that until the construction of housing units in the Inspiration and Croixdale developments, only 6.2 percent of homes in Bayport were built after 1990. Nearly two thirds of Bayport's housing stock was constructed prior to 1960.

Housing Affordability

The Metropolitan Council has identified new affordable housing needs for all cities and townships within the Twin Cities Metropolitan Area for the period from 2011 to 2020. The housing plan element of local comprehensive plans is required to reflect the allocated portion of the forecasted demand for affordable housing. The City's share of this allocation is 29 affordable housing units.

Based upon the City's Existing and Future Land Use categories, the following densities are allowed:

Residential 2.5 – 4.4 units per acre

Multi Family 4.5 – 14 units per acre

High Density +14.6 units per acre (allowed by PUD)

The City of Bayport will seek to achieve that objective by watching for redevelopment opportunities in which investors may use local, county, regional or state agency or not-for-profit assistance to reduce the cost of some new units, or to rehabilitate existing rental housing units and regulate the rental units to affordable levels. In addition, zoning and land use plan incentives such as higher allowable densities or the use of flexible design mechanisms such as a planned unit development provisions of the Zoning Ordinance.

The City of Bayport has negotiated housing goals with the Metropolitan Council as they relate to the Livable Communities Act. The City of Bayport supports the following principals for providing housing within the community:

1. A balanced housing supply, with housing available for people at all income levels.
2. The accommodation of all racial and ethnic groups in the purchase, sale, rental and location of housing within the community.
3. A variety of housing types for all people of all ages.
4. A community of well-maintained housing and neighborhoods, including ownership and rental housing.
5. Housing development that respects the natural environment of the community while striving to accommodate the need for a variety of housing types and counts.
6. The availability of a full range of services and facilities for its residents, and the improvement of access to and linkage between housing and employment.

The Comprehensive Plan states that the following design standards are necessary for all residential areas:

- Establish design guidelines which encourage developments that are architecturally compatible with historic neighborhoods and are in keeping with traditional design standards.

- Encourage buildings to be designed and/or renovated in character and size with the historical nature of the City. Buildings that are out of context with surrounding buildings due to additional size or height will be discouraged.
- Define standards to regulate the bulk, height, area and density of buildings in new residential areas to create consistency with existing residential neighborhoods.
- Provide financial incentives for building renovation and replacement in keeping with the area's historical architecture.
- Reduce the number of direct driveway accesses to the arterial and collector street system as part of the development and redevelopment process.
- Encourage stormwater on-site infiltration (i.e. rain gardens)

It is also the policy of the Comprehensive Plan to broaden housing options by supporting the following:

- Encourage innovative zoning and land use approaches to encourage the development of diverse and affordable housing for persons of all ages.
- Facilitate the redevelopment and replacement of blighted residential properties to satisfy community housing needs.
- Promote mixed housing and clustering by planned unit development but maintain overall densities in circumstances where it is advantageous to protect natural features such as woodlands, wetlands, and the bluffs.
- Require parkland dedication or, at the discretion of the City, cash payments in lieu of land to satisfy the needs of the developing residential areas. Land dedication should correlate with parklands shown on the Comprehensive Plan. Dedication should not include lands that are unsuitable for recreation purposes.

To achieve these housing goals, the City of Bayport will work with Washington County HRA, the Minnesota Housing Finance Agency, the Greater Metropolitan Housing Agency, and the Metropolitan Council among other agencies in order to provide affordable housing and to secure the preservation of affordable housing.

Residential Development Conforms to Regional Plans

Bayport's available residential land supply is limited. Projections predict population growth between 2000 and 2030 at nearly 63 percent. As a designated developed community, Bayport seeks a flexible approach to accommodate this growth or any changes in actual population growth - given the nature of long-term forecasting.

Current policies anticipate predicated growth and will increase densities while preserving parks and natural resources by using strategies designed to

utilize innovative zoning and land uses. Traditional approaches, such as infill development, are also encouraged.

Policies are designed to make sure regional services and infrastructure will be efficiently provided, and that development and growth will be coordinated with other local communities and the Metropolitan Council.

Solar Access Protection

Since 1978, the Metropolitan Land Planning Act has required communities to include an element in their plans to protect access to direct sunlight for solar energy systems. The purpose of this provision is to protect solar collectors from shading by adjacent structures and/or landscaping.

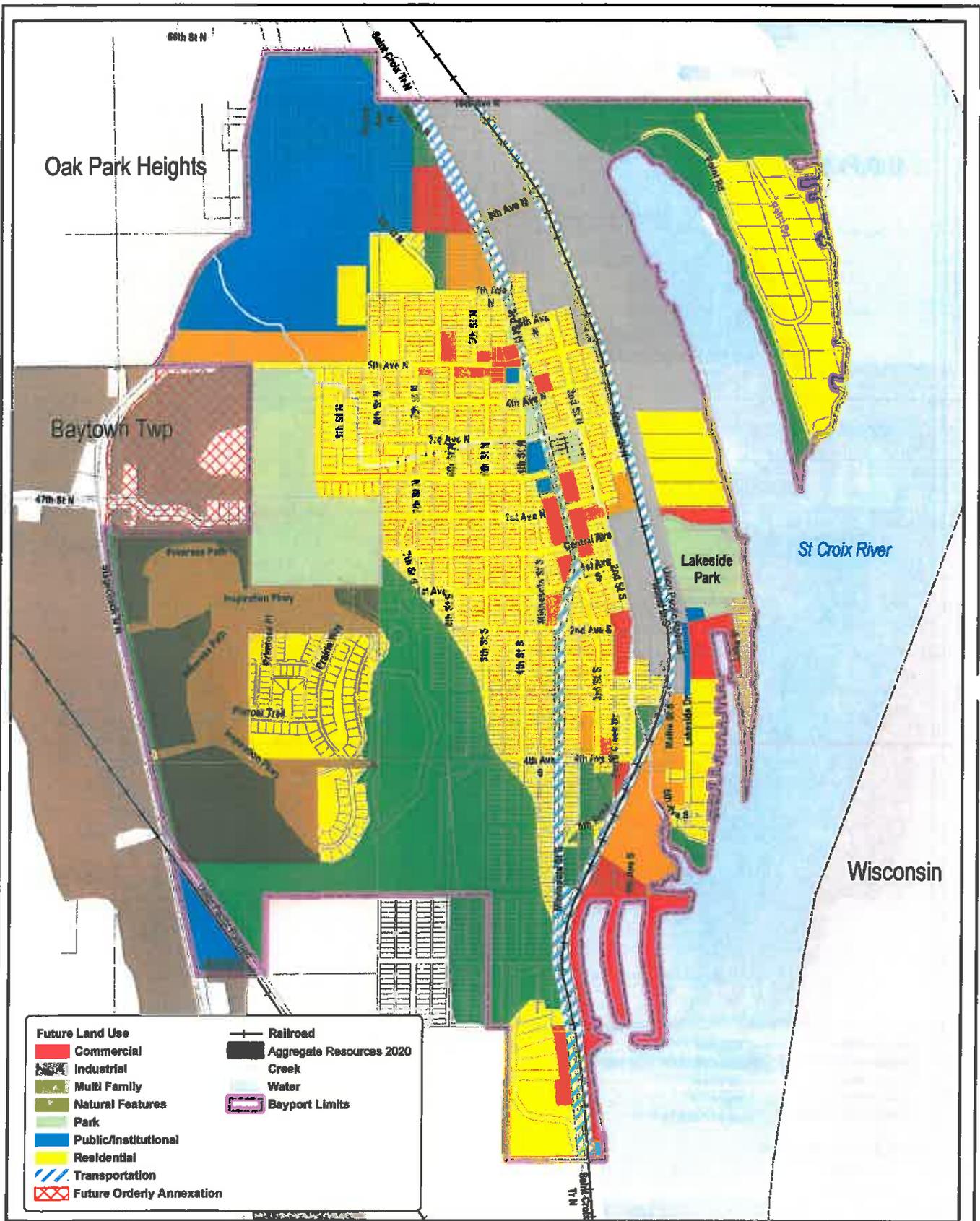
The City of Bayport recognizes the value of solar access protection and energy conservation in general; however, the community is experiencing limited new construction in urbanized areas. In addition, while a considerable amount of new development will occur throughout the City in the future, the application of this provision will be difficult within the context of an established land use pattern and natural topography. For this reason, the City will look beyond solar accessibility to address the conservation of energy in general through its comprehensive planning efforts.

Aggregate Resource Protection

Some mineral deposits, primarily sand and gravel, exist to the west and south of Bayport. Mining of these materials occurs in two areas, southwest and south of the City. The mines are located far enough away from the slopes, so as not to cause erosion to the bluffs. While some rock formations exist along the bluffs, mining of these rocks would be regulated by the City and Washington County's Lower St. Croix River Bluff Land and Shoreland Management Ordinance.

Aggregate resources, as shown on the following map, are located within the Inspiration of Bayport Development. As a condition of development approval, much of this land area is held in perpetuity as part of a conservation land trust. As such, no future mining or development could occur. Any future development (outside of the land trust) that occurs within this area would need to follow Chapter 26 (Environment, as amended) of the City Code, Appendix B (Zoning Ordinance, as amended) and Appendix C (Lower St. Croix River Bluffland and Shoreland Management, as amended).





0 0.125 0.25 Miles
1" = 1/4 MILE



Aggregate Resources 2020

Transportation

Existing Transportation System

This section describes in detail the existing transportation system and identifies deficiencies and opportunities for this system.

Existing Streets

The City of Bayport's transportation connections are limited by the St. Croix River on the east and the bluffs in the middle of the City and County State Aid Highway 21 (CSAH 21) to the west. State Highway 95 represents the principal north/south access road through Bayport and provides connections to Trunk Highway (TH) 36 to the north and 1-94 to the south. Because of this, almost all traffic is compelled to pass through the core area of Bayport. On the west boundary of Bayport, Stagecoach Road (County State Aid Highway (CSAH) 21) is the only other major north/south road. Stagecoach Road provides access to Baytown Township and connects to communities south of Bayport. Stagecoach Road extends to the north of Bayport to 59th St. N., where it connects to the south end of CSAH 23. CSAH 23 is also a north/south road (located to the north of Bayport) which provides access to State TH 36. CSAH 23 provides direct access into Oak Park Heights and Stillwater and indirect access to Bayport, via CSAH 21.

CSAH 14 and 28 are the primary east/west access roads in the northern part of Bayport; however, they provide limited access to the City. CSAH 14 does connect to TH 95 and provides access to Lake Elmo, West Lakeland and Baytown Township. CSAH 28 is located at the north City limits and serves as a connection between TH 95 and CSAH 21. There are no accessible east/west roads in the southern portion of Bayport except 22nd Street North which is several miles south of the city limits.

All other roads in Bayport are local roads which provide connections to and between neighborhoods in Bayport. Several new local roads were added as part of the Inspiration Development on the western portion of the City. These new roads all feed to CSAH 21.

Developing additional corridors in the future may be limited because of the land ownership and bluff constraints. In particular, future east/west corridors which could connect the existing City to future growth areas to the west of the community will be limited. Because of this, existing roads that provide access to Bayport and surrounding communities may need to be upgraded and widened to accommodate future traffic volumes.

Transportation Congestion

The City of Bayport is relatively free from traffic congestion except for several intersections along Highway 95 which experience congestion problems between 2:30 and 3:30 p.m. This congestion is due to the shift changes at Andersen Corporation. The intersections which receive the most traffic are:

- 3rd Ave. South
- 2nd Ave. South



- Central Ave
- 1st Ave. North
- 2nd Ave. North
- 3rd Ave. North
- 4th Ave. North
- 5th Ave. North
- 6th Ave. North

Since traffic is traveling to and from the Andersen Corporation, congestion at these intersections is occurring on the east side of Highway 95. This congestion problem increases during the May to October season when Andersen Windows is manufacturing and selling more of its products.

Existing Railroad

The City currently has one spur line and one main line which traverse the eastern boundary and southwest corner of Bayport. Both of these rail lines are owned and operated by the Union Pacific Railroad Company. The spur line starts at the Lakeland Junction and runs north/south along the St. Croix River to an area just north of the Xcel A. S. King Plant in Oak Park Heights. Lakeland Junction is located along the St. Croix River just north of the City of Lakeland. This spur line services both the Xcel Plant and the Andersen Corporation and as such, is used solely for the loading and unloading of industrial materials and products. Only one to two trains per day travels along this spur line presently.

Bayport also has a portion of the Union Pacific main line running through the recently annexed portion (Inspiration Development) of its community. This main line runs east/west from Eau Claire to St. Paul and is known as the Eau Claire Subdivision. Six to eight trains run along this main line per day.

The location of these railroad lines present certain challenges to the existing and future land uses of the City. Loading and unloading of cars along the spur railroad line occurs daily. Because of this activity, traffic flow is disrupted and noise pollution is increased. As development occurs along the main line (to the west of the City), opportunities to reduce the physical, social and environmental impacts should be encouraged.

Existing Water Transportation

In the past, a ferry boat operated between Bayport and North Hudson for several years until the City of Hudson erected a bridge across the St. Croix River at Hudson. Today, barge activity does occur on the St. Croix River; however, there are no barge terminals in Bayport that transport either passengers or materials. The majority of water transportation that occurs along Bayport's shore is recreational. Private boats are kept at the marinas and a public boat launch site is available for fishing and recreational boating. The public boat launch facility consists of 4th Avenue North which dead ends into the St. Croix River. Access to this site is poor and parking for cars and boat trailers is inadequate. Due to problems with nonresidents parking

boat trailers on streets to access the water, the City has worked with Andersen Corporation to provide for limited permit parking in their adjacent lot and has put a ban on boat trailer street parking. In the future, efforts should be made to encourage more convenient use of the launch facility by making it more accessible and a more prominent part of the community.

Transportation Plan

Bayport's proposed street and highway system consists of a functional hierarchy of arterial, collector and local streets. Arterials are under the jurisdiction of the County and/or State, collectors are under the jurisdiction of the County. Local streets are those roads that are not a major street and are under the responsibility of the City.

Traffic Analysis Zone

The City of Bayport's population, household, and employment forecasts are allocated into one Traffic Analysis Zone (TAZ). The zone is displayed in the table and figure below.

Allocation of Forecasts to Traffic Analysis Zone (TAZ)

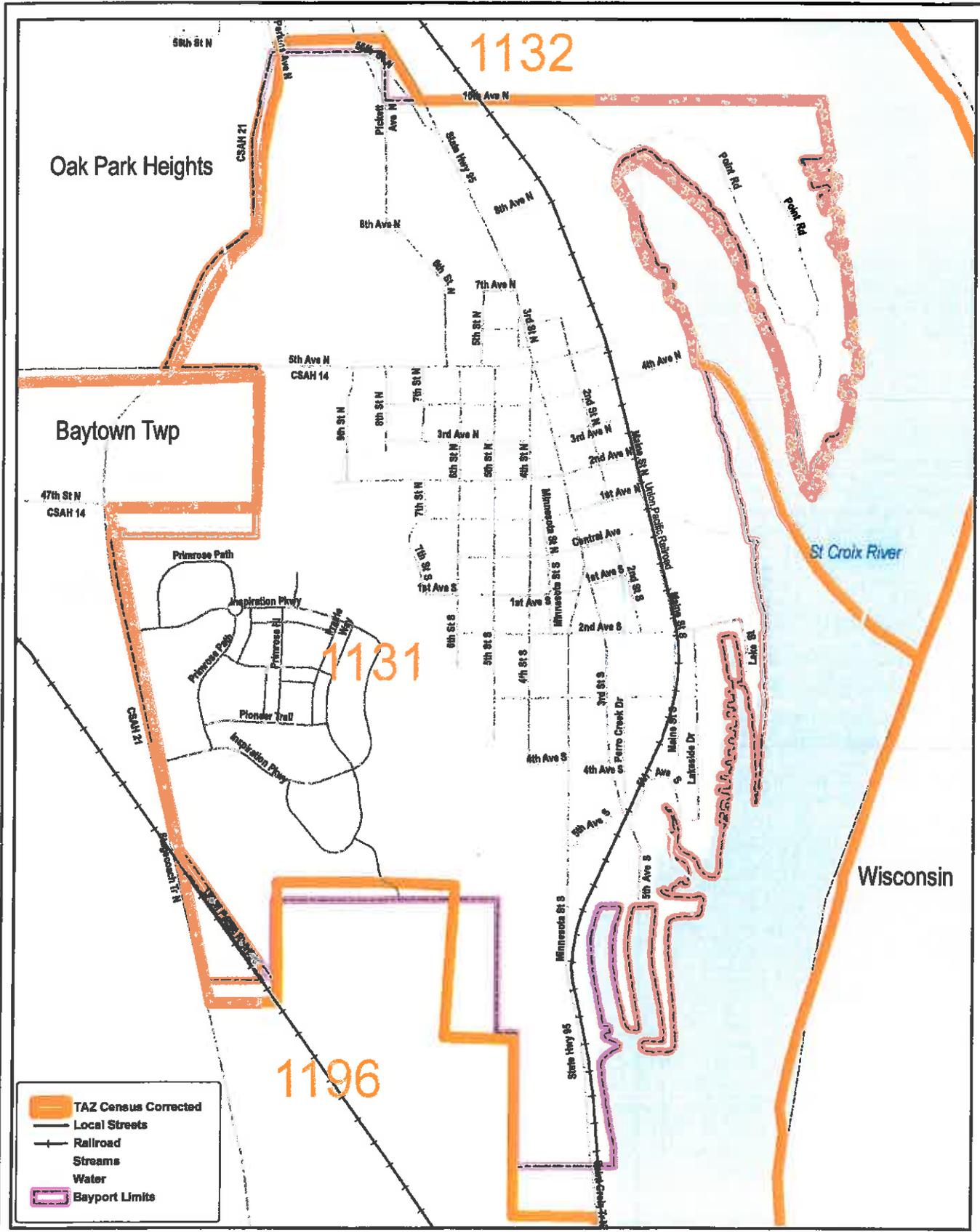
TAZ #	2000			2010			2020			2030		
	Pop	HH	Emp	Pop	HH	Emp	Pop	HH	Emp	Pop	HH	Emp
1	3162	763	4900	4250	1140	5200	4650	1300	5700	5150	1500	6300

Pop = Population forecasts

HH = Households forecasts

Emp = Employment forecasts





SOURCES: MnDOT, MnDNR, MetroGIS & SEH

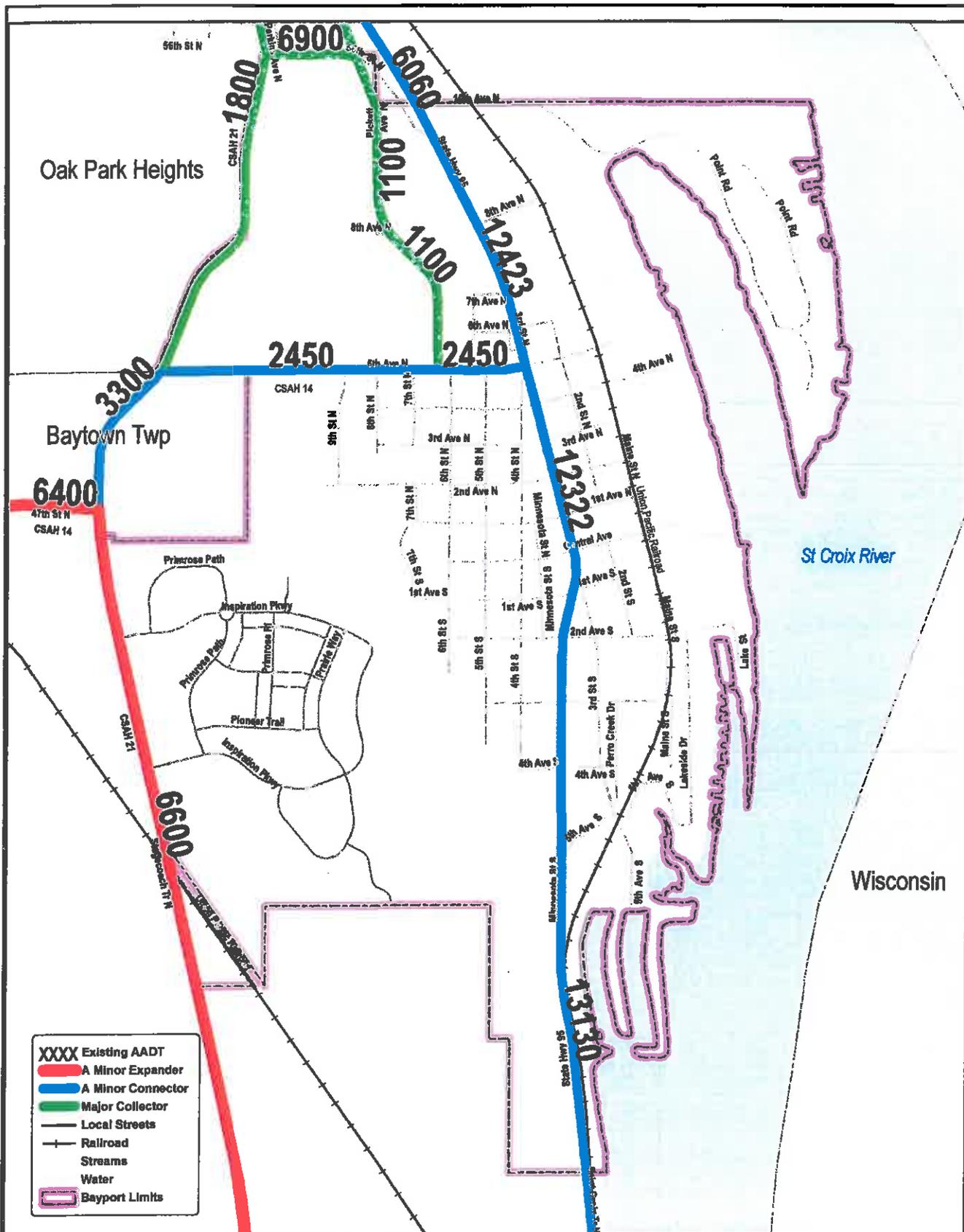


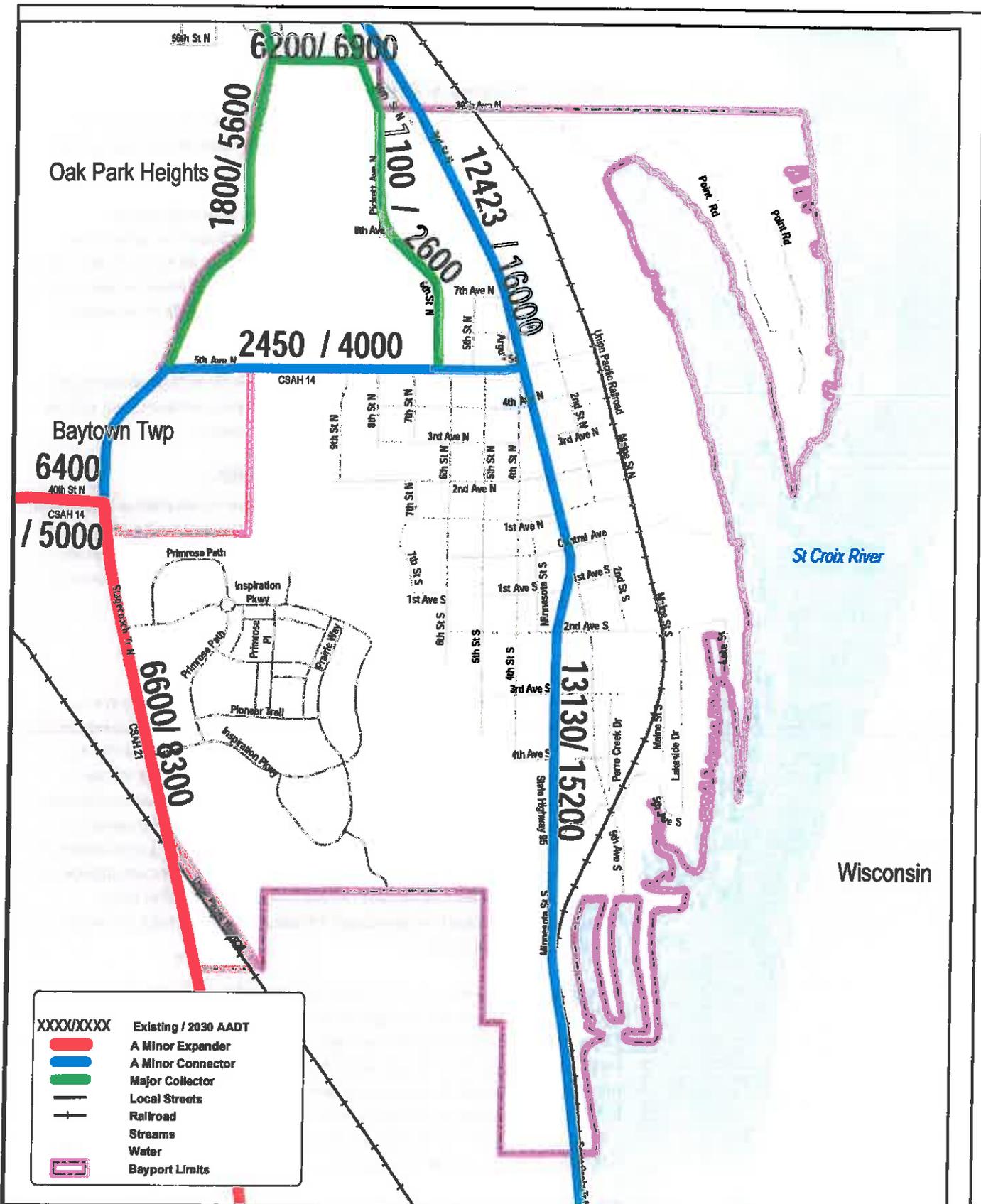
**TAZ Boundary
Census Adjusted**

Functional Classification and Traffic Volumes

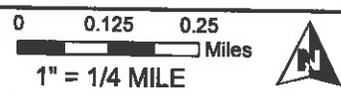
The Functional Classifications and Traffic Volumes Map identifies the jurisdictional classifications and traffic volumes for the primary roads in Bayport. The current AADT volumes indicated on this map are based on 2005 counts performed by Mn/DOT. Projected 2030 volumes from Washington county are also shown.

Due to existing physical constraints, it is anticipated that traffic volumes on the local road within Bayport will not significantly change between now and 2030. The bluffs along the west side and the St. Croix River on the east will prohibit any major changes to these local roads. Other than the Inspiration Development on the west side of the City, Bayport is almost fully developed.





XXXX/XXXX	Existing / 2030 AADT
	A Minor Expander
	A Minor Connector
	Major Collector
	Local Streets
	Railroad
	Streams
	Water
	Bayport Limits



Functional Classifications, Existing and 2030 AADT

Planned Highway Improvements

This section identifies some of the improvements that are programmed to occur in the near future according to Mn/DOT, Washington County, and the City of Bayport.

TH 36 St. Croix Bridge: The Highway 36 St. Croix Bridge Project is currently in process. This new bridge will be constructed at the junction of Highway 36 and 95, where it will expand east across the St. Croix River and connect to the future extension of Highway 64 at the Wisconsin border. This new bridge is meant to reduce congestion and increase safety by allowing more through trips to bypass narrow downtown streets.

Turn lanes will be constructed along CSAH 21 with the second phase of the Inspiration Development. As warrants are met, a traffic control signal will be constructed at the CSAH 14 and CSAH 21 intersection.

Transportation – Land Use Relationship

The City does not have any current plans to annex or develop any additional land. The only foreseeable development in or adjacent to the City would be residential development by private developers. Any future development in the City of Bayport would need to comply with land use, natural resource protection, and transportation planning requirements outlined in the Transportation Policy Plan.

Capacity and Safety Issues

Because of the unique natural features and land use patterns, Bayport's transportation system will have to be planned carefully to ensure maximum use of its roads to eliminate congestion and access problems. While the existing roads will need to be preserved, maintained, and in some cases widened; new local roads will also need to be built to meet development and future traffic needs. Any new or existing roads that are built, upgraded, or reconstructed, should be built according to the designated design standards and access control guidelines identified in this section. It is not anticipated that any additional local streets that would be built as part of future developments would create enough additional traffic to exceed capacity of the regional road network.

Safety has always been a concern of the City of Bayport. With a State highway (TH 95) running through the middle of the City and Andersen Elementary School fronting the highway, pedestrian safety and crossing is a major concern. The City has initiated a crossing program. At major intersections with TH 95, flags have been installed on both sides of the highway. Pedestrians, including students going to and from the school or using Perro Park, are encouraged to take a flag, use it to help drivers see them and leave the flag on the opposite side of the street.

Future traffic volumes may require the addition of a traffic signal at the intersection of CSAH 21 and CSAH 14 as a result of the additional traffic created by the Inspiration Development. The developer was required to escrow funds for a portion of the future traffic signal.

Dedicated bicycle/pedestrian paths are one means of attempting to reduce pedestrian/vehicle accidents by physically separating bicycles and vehicles. The intersection of CSAH 21 and CSAH 14 as a result of the additional traffic created by the Inspiration Development. The developer was required to escrow funds for a portion of the future traffic signal.

The inclusion of bicycle/pedestrian paths will be encouraged with any new development that occurs. Mn/DOT has also included the construction of a bicycle/pedestrian path as a part of the new St. Croix River crossing bridge. This path will link the existing sidewalk located along the west side of TH 95 at the north end of the City with proposed paths along the bridge and northerly into Stillwater.

The following table shows the City of Bayport's Standards for Functional Classifications, Design, and Access Control. These standards are to be used with new developments.

City of Bayport Functional Classification System			
	Aerial	Collector	Local
Spacing	0.5-2 miles	0.25-1 mile	1 block
Location	On edges of development and neighborhoods	On edges or within neighborhoods	Within neighborhoods and other homogeneous land use areas
Intersection Characteristics	Limited signals and cross street stops	Some limitations on direct land access	Direct access
On-street parking	Restricted as necessary	Restricted as necessary	As required
Large Trucks	Restricted as necessary	Restricted as necessary	Permitted as necessary
Management Tools	Traffic signal timing, land access spacing, preferential treatment for transit	Continuity, number of lanes, traffic signal, timing, land access	Stop signs, cul-de-sacs, diverters
Accessibility Focus	Connects adjacent subregions and activity centers within subregions	Connects neighborhoods within and between regions	Connects blocks within neighborhoods and specific activities within homogeneous land use areas
Level of Mobility	Provides mobility within and between two subregions	Provides mobility between neighborhoods and other land uses	Provides mobility within neighborhoods and other homogeneous land use areas
System Access	To interstate freeways, major arterials, other minor arterials, and collectors, restricted direct land access	To minor arterials, other collectors, local streets, land access	To collectors, other local streets, land access
Trip-making Service Performed	Medium to short trips at moderate to low speed. Local transit trips	Primarily serves collector and distribution function for the arterial system at low speeds. Local transit trips	Almost exclusively collection and distribution. Short trips at low speeds

Source Metropolitan Council



Transportation Design Standards			
Design Element	Arterial	Collector	Local
Number of Traffic Lanes	4	2-4	2
Traffic Lane Widths (ft)	12-14'	12'	10-12'
Curb Parking or Shoulder Width	No parking	8-10'	8"
Minimum Pavement Width	52'	40'	28'
Median Width (ft) if applicable	16'	NA	NA
ROW Width (ft)	100-200'	80'	50-66'
Design Speed (mph)	35-50	30-40	30
Grade (%)	.4-4	.4-6	.4-7

Transportation Access Control Guidelines				
		Arterial	Collector	Local
General types of Access Control	Minimum	Some access of major generators	Access carefully planned	
	Desirable	Limited	Limited	
Desirable spacing of crossing public roadway	Arterial	½ mile	½ mile	½ mile
	Collector	¼ mile	1/8 mile	1/8 mile
	Continuous Local	No direct access	1/8 mile	Use other criteria - sight distance, speed, traffic volumes
	Non-continuous Local	1/8 miles with no median openings		
Private entrance spacing	Minimum	200'	100'	50'
	Desirable	500'	300'	100'
Corner clearance to non-public entrance	Minimum	50'	30'	30'
	Desirable	100'	100'	100'

Access Management

Future access and congestion concerns can be met by reducing the number of direct driveway access points to the arterial and collector street system as part of the development and redevelopment of buildings and also, requiring that residences back or side to major streets. In addition to this, the City should work with Andersen Corporation to determine how to address the existing and future congestion problems that result from the large number of workers coming and going to work during shift changes. Andersen Corporation has tried staggering shift changes to help reduce congestion. It appears that this change has helped congestion to some extent.

Bicycle and Pedestrian Requirements

Bayport has few designated bicycle trails and some non-continuous sidewalks throughout the City. Bayport's small size and the variety of parks dispersed throughout the community may represent opportunities for future connections within the City.

Whenever major roads are constructed or expanded, the City typically incorporates new bicycle/pedestrian trails with the project if funding is available. The Inspiration Development has a trail system that has been constructed as part of the development. Plans for bicycle/pedestrian paths are also proposed as part of Washington County's Comprehensive Park, Trail and Open Space System Plan. These trails are proposed as regional connections linking Bayport to the other communities. The Middle St. Croix Valley Regional Trail Search Corridor is a proposed trail corridor that will stretch from the planned Brown's Creek State Trail in the City of Stillwater to Interstate 94 and will connect to local trails in the City of Lakeland and other surrounding communities, including Oak Park Heights, Baytown Township, and West Lakeland Township.

Washington County has plans to upgrade CSAH 21 (Stagecoach Trail) in the future as traffic increases. With the added developments along Stagecoach Trail in Baytown Township and the trails located within these developments, the City of Bayport will work with the County to incorporate trails into any plans for Stagecoach Trail improvements.

The City has established four goals to provide for a safe and integral bicycle and pedestrian system:

- To provide safe pedestrian access along and across TH 95. This can be accomplished with the continued use of the intersection flags, installation of a pedestrian bridge or underpass and installation of traffic control signals.
- To provide pedestrian access between Barker's Alps and Inspiration and Baytown Township.
- To provide a bicycle and pedestrian connection to Stillwater and Oak Park Heights. A portion of this connection will be provided when the Highway 36/St. Croix River Bridge project is undertaken.
- In cooperation with Washington County and adjacent communities, obtain unused railroad right of ways for trail purposes.

Currently, there is no bicycle/pedestrian access to any transit corridors/facilities in Bayport since no transit facilities exist. The City of Bayport will work with adjoining communities, encouraging the installation of bicycle/trails with new developments and with street improvements projects.

Transit Requirements

Bayport is currently in the Metropolitan Transit Market Area III. The residents of Bayport however are currently not provided with regional bus transit service by the Metro Transit. Metro Transit does provide bus service to the City of Stillwater.

Senior citizen and handicap services are provided by Human Services, Inc (HSI). In addition to this, the Community Volunteer Service (CVS) provides service to elder persons who are ambulatory. St. Croix Valley Dial-A-Ride Service does provide service to Bayport. This is a low-cost curb to curb mini-bus or van service residents can use. Reservations must be made a minimum of one (1) day in advance.

There are no plans for expansion of the bus service by the Metro Transit in the near future. However, as the transit dependent increase in the future due to the growing elderly population, the City of Bayport will need to work with and support agencies who provide transit services to meet these needs.

There are currently no plans for light rail or commuter rail service to the Bayport area. It is estimated that the cost to extend light rail service to the area will make this project prohibitive. Commuter rail service on the existing Chicago and Northwestern railroad is feasible. The City of Bayport will work with adjacent communities and the Washington County Rail Authority to encourage commuter rail service.

Aviation Requirements

There are no airports or special aviation facilities in Bayport and the City is not directly influenced by any of the airports near Bayport. Lake Elmo Airport is the closest and is over four miles to the southwest of Bayport.

The City of Bayport has no existing structures that exceed a height of 500 feet above ground level. In order to minimize future influence by airports, the City intends to protect the life and safety of residents and property and maximize aviation safety. The following are the City's policies for Aviation:

- To protect all primary, horizontal, conical, approach, and transitional airspace zones from vertical intrusions and prohibit general obstructions to air navigation per MN Administrative Rules-Chapter 8800 for MnDOT Aeronautics.
- To require that sponsors notify the FAA using FAA Form 7460-1 at least 30 days in advance of any proposed construction or alteration of structures that would exceed a height of 200 feet above ground level at the site.
- To require that all structures exceeding a height of 200 feet above the ground be the subject of Conditional Use Permit (CUP) procedures as defined by the Zoning Ordinance.
- To require that heliports comply with the licensing requirements of Mn/DOT, the approach and altitude standards established by the Federal Aviation Administration (FAA) and noise standards

established by the Minnesota Pollution Control Agency (MPCA) as requirements of CUP approval.

Rail Requirements

There are no major railroad modifications expected for either the main or spur lines. Rail service will continue in Bayport to service the needs of Andersen Corporation and Xcel Energy.

Public Utilities

Existing Public Utilities

The City of Bayport provides sanitary sewer collection and public water services to its residents. In the past, the City provided sanitary sewer and electricity to its residents. Bayport's wastewater is now treated at the Metropolitan Council Environmental Service (MCES), St. Croix Valley treatment facility in Oak Park Heights and Xcel now provides electric service to the City.

On-site Sewer Facilities

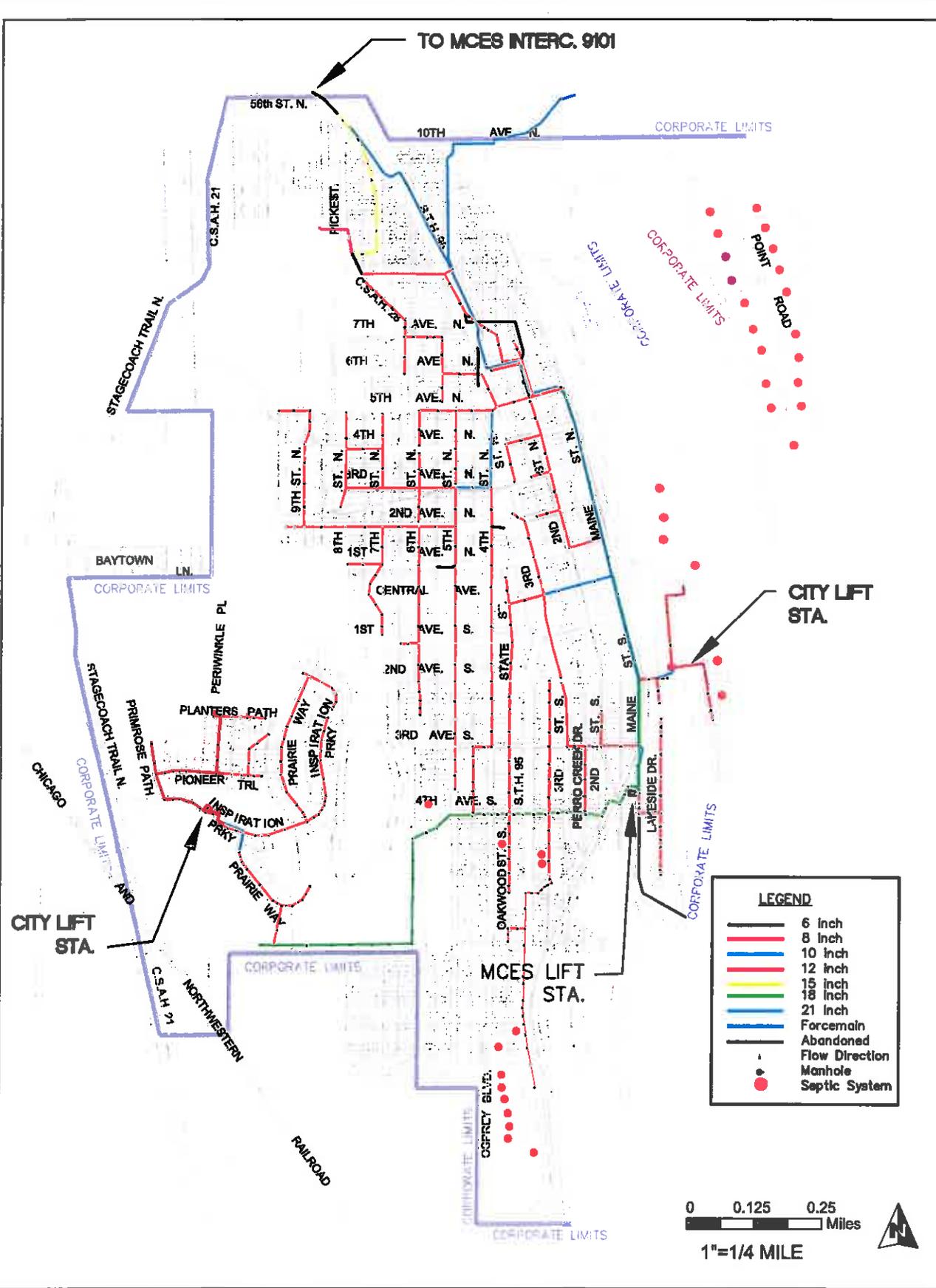
Approximately 40 residences have on-site sewer facilities in Bayport. The primary locations of these systems are Point Road, Osprey Boulevard and along the St. Croix River north of Lakeside Park. These sites are located on soil classified as Chetek or Burkhart sandy loams which are suitable for on-site sewer facilities. The design and installation of the on-site sewer facilities are regulated by the City according to Washington County Standards. Permits and inspection were provided by Washington County during the construction of these systems. In the year 2000, Washington County began implementing an ISTS management program which tracks inspections and pumping.

Sanitary Sewer

Until April 1994, Bayport's Waste Water Treatment Plant (WWTP) was a secondary treatment activated sludge facility which treated the wastewater for the City of Bayport, the Minnesota Correctional Facility in Bayport, and Xcel's Alan S. King generating plant. This facility was constructed in 1939 and was built as a trickling filter treatment plant. Several modifications and expansions occurred after it was built. Because the plant was near capacity in 1993, it was phased out. Now, Bayport's wastewater flows to a MCES lift station located in the southerly portion of the City, then pumped northerly to the St. Croix Valley WWTP located in Oak Park Heights via an interceptor sewer .

Due to septic system failure possibilities to the west and south of Bayport, new demands may be placed on the current sanitary system. If connects are required from developments to the west in Baytown Township, studies will need to be conducted to address the exact sewer needs to ensure that the MCES can handle these and other community increases.





Existing Sanitary Sewer System

Public Water

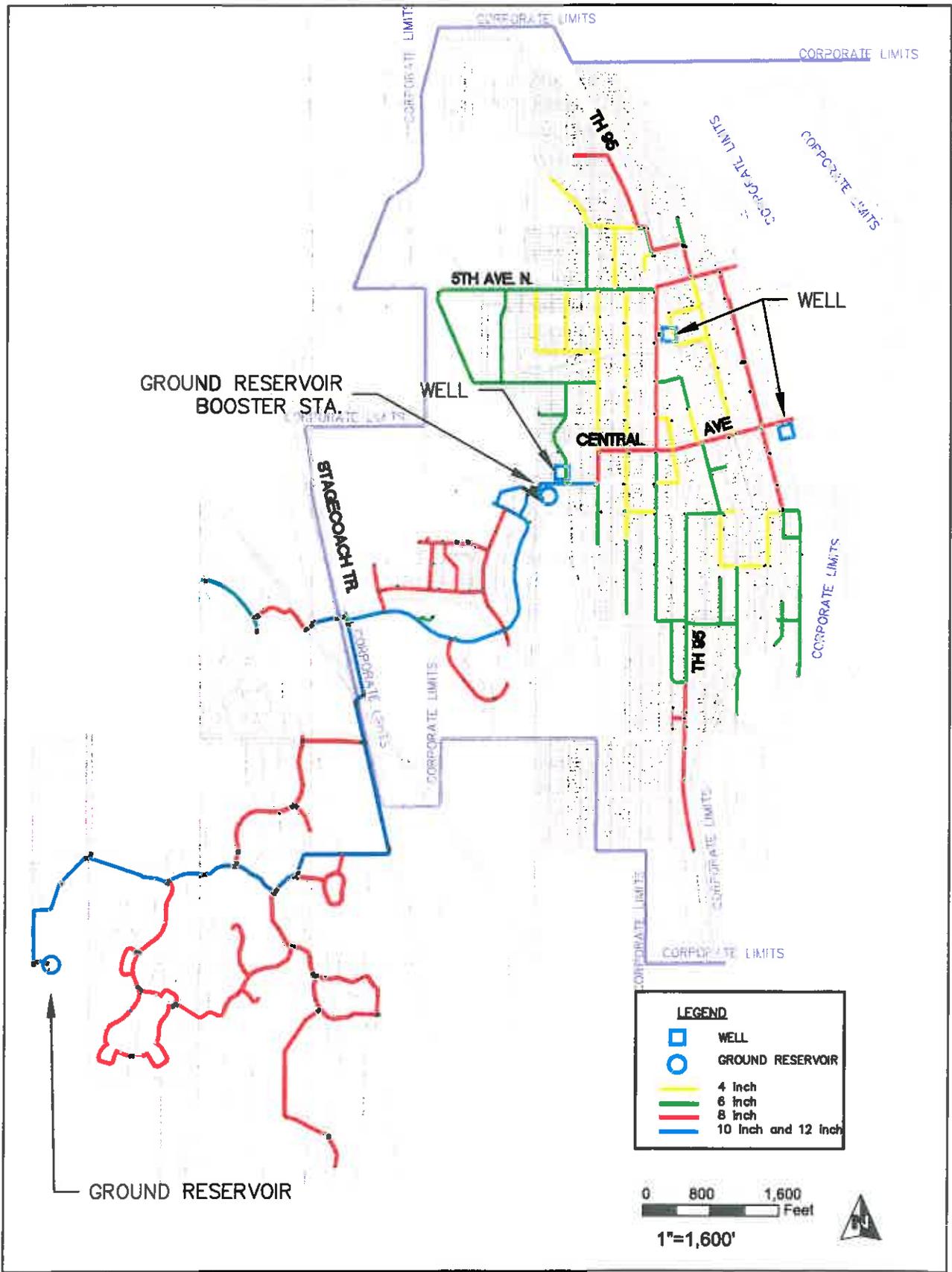
Bayport receives its water from three local wells. While the majority of residents receive City water, approximately 42 residents including Point Road, north of Lakeside Park, and Osprey Boulevard have their own water well service.

The City of Bayport has a 750,000 gallon above ground storage reservoir located at the top of the bluff, northeast of the Inspiration Development and a 300,000 gallon ground reservoir tank located to the south of the City in Baytown Township. With the detection of trichloroethylene (TCE) contamination within aquifers in Baytown Township, the City of Bayport through a Cooperative Agreement with the Township, has agreed to provide water to new developments along the easterly portion of the township. This extension will help to minimize the number of private wells that would be drilled into the TCE contaminated aquifer. As development occurs within the Baytown Township service area, additional wells may be required.

The City's water distribution system consists of approximately 17.6 miles of water mains which vary from 4-12 inches in diameter. The lowest point in Bayport is at an elevation of 671 feet and the highest is 1052 at the new ground reservoir in Baytown Township. Well No. 4 is at 690 feet. The 750,000 gallon ground storage tank has a water elevation of 898 feet and the 300,000 gallon ground reservoir has a water elevation of 1060.²

With the detection of TCE in Well No. 2, the City in cooperation with the Minnesota Pollution Control Agency (MPCA) has constructed a treatment plant for this well. Since TCE is a volatile organic chemical which will evaporate or volatilize when exposed to air, the Air Stripper Treatment Plant exposes the water to relatively high rates of air before it is introduced into the public water system.

² Source: July 16, 2004 Comprehensive Water Study

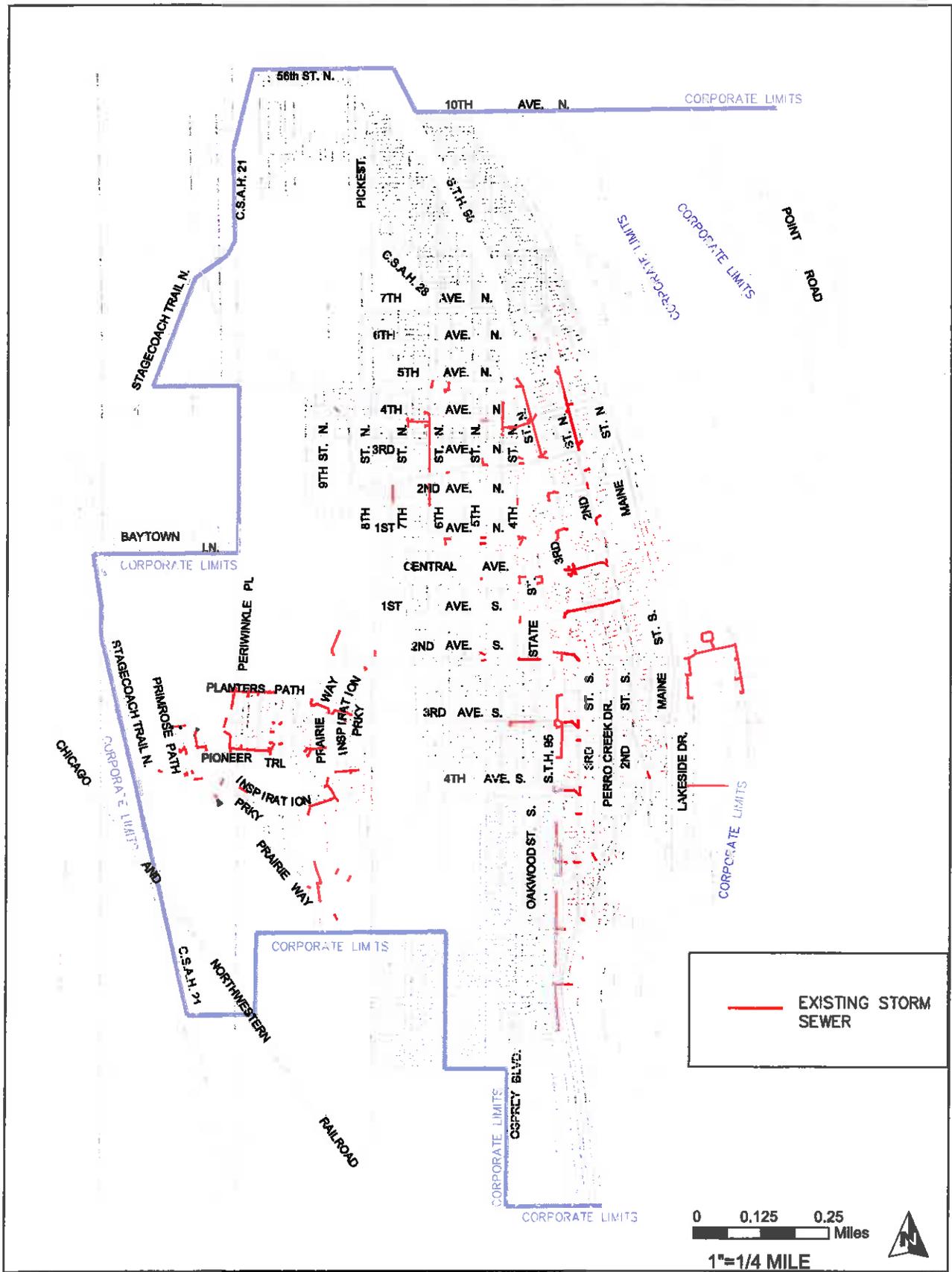


Existing Water System

Storm Water

Surface water for the original part of the City drains from the bluffs, easterly to the urban areas in the valley and is then directed by open ditches and storm sewers to Perro Creek and ultimately into the St. Croix River. Because there are no retention ponds, except at the Prison, surface water is generally discharged directly to the river. Dense vegetation along the bluffs helps minimize heavy runoff.

Surface water for the newer area of the City, the Inspiration Development, is collected by storm sewers or open ditches, and directed into retention ponds. The development has an elaborate “storm water treatment train” system of ponding and infiltration that retains and treats runoff prior to discharge to the CSAH 21 ditch. This ditch ultimately drains to the Prison Pond and is discharged into Perro Creek and the St. Croix River. The overall surface water management program for the City of Bayport is described in more detail on page 40 and in the Appendix of this plan.



Existing Storm Sewer



Solid Waste

Bayport does not have a solid waste dump site for the community's garbage. The City contracts out for solid waste services. The City reviews these contracts every two years. The waste hauler vendor hauls all solid waste to the Xcel Energy RFD Plant in Newport.

Recyclables that are collected include newspapers, glass, metal cans, corrugated cardboard, mixed paper and junk mail, periodicals, plastics, No. 1 and No. 2, phone books, and motor oil. The City's contractor also collects refrigerators, furniture, tires, and yard waste for an additional charge.

A Hazardous Waste Reduction and Disposal Center is located within the City of Oakdale at 1900 Hadley Avenue North. Items that can be disposed of at this center include building products, automotive/petroleum products, household cleaners, pesticides, and materials such as acids and corrosive chemicals. This service is provided by Washington County.

Sewer and Wastewater Plans

Wastewater Plan Requirements

The City of Bayport has a very limited supply of land available to be developed. Because of political and natural limits to the north and east, all possible future expansion would occur to the west and south into Baytown Township. New developments within the township that abut the City of Bayport are constructing individual septic systems or small community septic systems. It is anticipated that no private treatment facilities will be built to service any future expansion areas. The area most easily serviced by sanitary sewer is that located immediately west of the existing City limits on the west side of CSAH 21 in Baytown Township.

A small area lying southeast of the intersection of 5th Avenue North and CSAH 21, currently outside of the Metropolitan Urban Service Area (MUSA) line, can be serviced via the extension of an existing sanitary sewer. This area lies below the bluff line and represents the only area adjacent to the City and can be gravity served by the existing system. This area comprises approximately 38 acres and is located outside of Bayport's City limits and outside the MUSA. Baytown Township and the City of Bayport have an orderly annexation for this area if development occurs that will allow these parcels to be annexed.

Projected Sewer Flow Volume

The following table forecasts population, households, employment, and wastewater flows for the City of Bayport as contained in Appendix B-1 of the adopted *Water Resources Management Policy Plan*.

MCES Population, Employment, and Sewer Flow Projections

Year	2010	2020	2030
Sewered Population	4,250	4,650	5,150
Sewered Households	1,138	1,300	1,500
Sewered Employment	5,200	5,700	6,300
Average Annual Wastewater Flow (MGD)	0.62	0.63	0.67
Allowable Peak Hourly Flow (MGD)	2.05	2.08	2.21

System Capacity Description

The City of Bayport has two lift stations and two segments of trunk sanitary sewers. An 18" trunk was constructed from the Metropolitan Council Environmental Services (MCES) lift station located along Maine Street to serve the Inspiration Development area, and was sized at the time to provide service to approximately 798 acres within Baytown Township. It is expected that there will be limited use of this trunk from the township since the adjacent areas have developed with private septic systems. The second segment of trunk is along Maine Street which collects the sewage from the original City limits and directs it to the MCES at the south end of the City.

There are two existing City lift stations serving Bayport. One is located within the Inspiration Development and is sized to serve 253 single family homes and a 108 unit multi-family complex. It is anticipated that a limited area of Baytown Township to the west of Stagecoach Trail can connect to this lift station. The second lift station is located at the southerly end of Lakeside Park. This lift station is sized to serve seven existing homes and approximately 15 acres of future residential property north of Lakeside Park. Sewer service will not be extended to serve additional areas from this lift station.

The City has adopted a policy prohibiting sanitary sewer service to land which are outside the Metropolitan Urban Service Area (MUSA). Additionally, the policy states that the City will not extend sanitary sewer service to any area which is within land zoned as a Rural Service Area. It is anticipated that there will be no extension of trunk sanitary sewer services.

Lift Station Capacities

	Average Flow MGD	Peak Flow MGD
Inspiration Lift Station	0.08	0.3
Lakeside Park Lift Station	0.01	0.04

Year	2010	2015	2020	2025	2030
Average Annual Wastewater Flow (MGD)	0.62	0.62	0.63	0.65	0.67



Infiltration and Inflow Management

The City of Bayport desires to reduce/eliminate Inflow/Infiltration (I/I) in the City's sanitary sewer system. Article IV (Sewer System), Section 58-112 (Unlawful discharge; installation of grease, oil and sand interceptors) of the City's current ordinances outlines that it is unlawful to discharge into the City's sanitary sewer system "Any storm water, surface water or water from any air conditioning system". They intend to meet the goal established for the City by the Metropolitan Council to the allowable peak hourly flow rate of 1.7 mgd currently metered at M609.

During 2001 spring flooding of the St. Croix River, the St. Croix Valley Wastewater Treatment Plant in Oak Park Heights ran at capacity. Floodwaters were entering the sanitary sewer pipes, significantly increasing the volume of clean water being treated. At one point, wastewater was nearly double the treatment plant's design capacity. Lift stations that pump the sewage to the plant were also running at design capacities to keep up with the large inflow of clean water. As many as 10 to 12 cities along the St. Croix River were asked to examine ways to keep floodwaters from entering the sanitary sewer pipes. The City of Bayport was one of the communities that the Metropolitan Council directed to complete a flood related Inflow/Infiltration (I/I) Study due to flooding issues. The City of Bayport completed a flood related Inflow/Infiltration (I/I) Study and a 10-year Implementation Plan for the southeast areas of the City that was submitted to MCES in July 2004. It was determined that during periods when the St. Croix River reaches peak flood elevations, there was a significant increase in the I/I levels in this area of the City.

Work on the proposed Implementation Plan began in 2004 and included inspecting and improving sanitary sewer mains in the SE area the City where infiltration was most likely to be occurring. Sewer mains were televised to identify locations where I/I problems exist. Improvements, completed in 2004, consisted of a combining full length lining, spot joint repairs, repairs to service stubs, replacement of manhole castings and covers, and lining of several brick manholes. Work on the remainder of the implementation plan was delay due to lack of funding. A copy of the I/I study and Implementation plan is included in Appendix B.

In late 2005, the City of Bayport's inflow contribution to the MCES treatment facility was above peak allowable flow rates established by MCES and a surcharge of \$98,000 was incurred by the City. The City initiated a study in 2007 to determine causes for large inflow. The study began the process to isolate areas that product I/I and provide recommendations for remedial actions that may reduce the I/I. A copy of the 2007 Flow Monitoring Report is included in Appendix C.

As street improvements occur in other areas within the City, sanitary sewer mains are televised to see if they are structurally sound, as well as to see if infiltration is evident. Problem sections of the mains are replaced to strengthen and reduce infiltration. Manholes are sealed by replacing or concrete lining. This practice will continue with all new street improvement

projects as the City has budgeted for yearly improvement projects to reduce I/I.

The City in 2009 will initiate the second phase of the 2004 I/I Implementation Plan. This second phase 2 will consist of television inspections of the sanitary sewer mains through out the City, reviewing and addressing private connections to the sanitary sewer system. It will be completed in four parts and is scheduled to begin in 2009.

- **Part 1** will involve televising approximately ½ of the City's sanitary sewer system in 2009 and the remaining ½ in 2010. A Capital Improvement Program (CIP) can be prepared to address the aging and failing sanitary sewers to address I/I.
- **Part 2** will involve reviewing the City's ordinances regarding private connections to the sanitary sewer system. There may be several homes that have sump pumps or drain tiles connected to sanitary sewer services that could be contributing an excess of clear water to the services during peak floods. In 2009, the City will undertake amending their Ordinances related to I/I.
- **Part 3** will involve actual inspections of private connections to determine which properties do not comply with the ordinance. This work is expected to begin in 2010.
- **Part 4** will involve addressing those properties found in non-compliance with Part 2. Bayport will also develop a program to help ensure that properties remain in compliance with the ordinance and resolution.

Septic System Management

The City of Bayport has approximately 40 on-site sewage disposal systems which serve residential homes in the City. The City of Bayport has an interest to help ensure the proper functioning of these on-site systems. Consequently, the City of Bayport will implement all of the applicable elements of Chapter 7080, Minnesota Pollution Control Agency Water Quality Division, Individual Sewage Treatment Septic Systems Program. Washington County implemented a county-wide ISTS Management Program that became effective January 1, 2000.

The City contracts with Washington County Department of Health Environmental and Land Management to perform inspection and monitoring of on-site sewage disposal systems within the City. The City also requires homeowners to contract with a state licensed inspector to insure compliance with Chapter 7080, Minnesota Pollution Control Agency Water Control Division Individual Sewage Treatment Septic Systems Program. On-site sewage disposal systems must conform to Washington County Chapter 4, On-site Sewer Requirements which incorporate MPCA Chapter 7080. As part of the Chapter 4 of the County's codes, inspections of on-site sewage disposal systems are required every three years.



The City has a policy which prohibits the new construction of on-site sewage disposal systems if sewer is available, and requires connection to sewers when made available. City ordinance also allows the City to assess additional charges if connection of existing system is not made within two years of sewer being made available.

Chapter 4 of the Washington County Development Code addresses corrective measures to be taken to address any pollution problems resulting from development activities or inadequate management of existing on-site sewage disposal systems.

Water Related Plans

Local Surface Water Management Plan

Bayport lies entirely within the jurisdictional area of the Middle St. Croix Watershed Management Organization (MSCWMO). It is the policy of the City of Bayport to carry out sound storm water management practices that are consistent with the MSCWMO Watershed Management Plan and city codes. The City's program is intended to promote, preserve, and enhance Bayport's natural resources from poorly sited development or incompatible land uses which may adversely impact the quality of water, land, and natural resources.

The City will continue to implement its Surface Water Management Plan for new development and intends to improve the overall quality of surface water runoff as development and redevelopment occurs. As new development occurs, development plans will need to be prepared to help ensure that increasing volumes of surface water are treated properly. Regional and on-site detention ponds and filtration systems are two potential methods to reduce direct water runoff into the St. Croix River and Perro Creek.

The Appendix of this Comprehensive Plan includes the City of Bayport's Storm Water Management Plan.

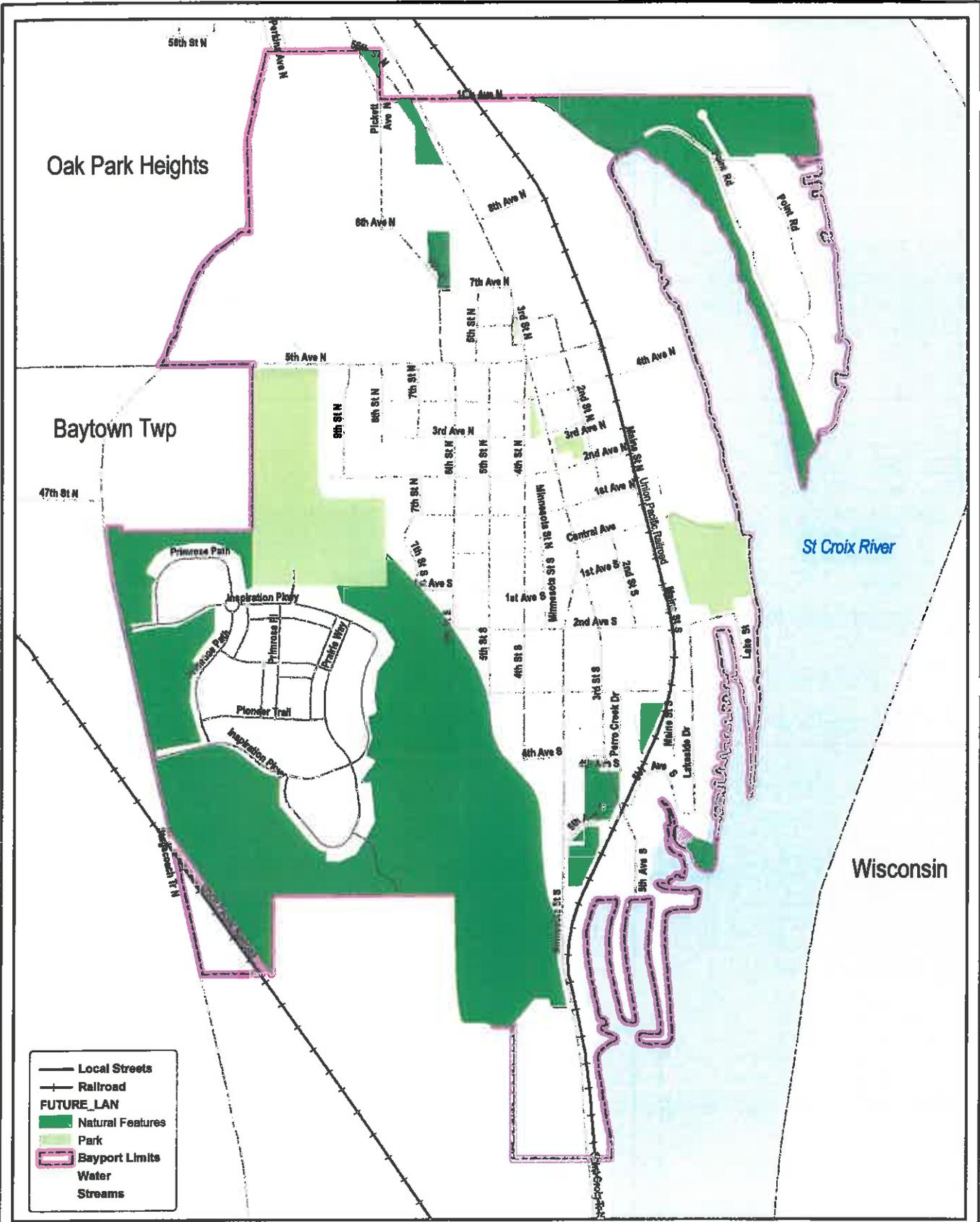
Water Supply Plan

Bayport prepared a Water Distribution System Analysis Report in 2004 to identify deficiencies in the existing system and to propose future improvements to serve the Inspiration Development and the prison site. The City as a part of its Capital Improvement Plan (CIP) will strive to improve its water system by implementing recommended improvements such as increasing the size of deficient water mains as street improvements occur. The City has also completed and submitted its State Mandated Water Emergency Conservation Plan to the Metropolitan Council and the Minnesota Department of Natural Resources as a separate document for their review and comment.

As developments occur in the easterly portion of Baytown Township, Bayport will consider the further extension of City water service to minimize drilling of multiple private wells in the TCE contaminated aquifer.

Stormwater/Erosion Control Ordinance

It is the policy of the City to carry-out sound storm water management practices which are consistent with the City's Storm Water Management Ordinance. The City of Bayport has adopted the Metropolitan Council's Model Storm Water Management Ordinance. The ordinance is intended to promote, preserve, and enhance Bayport's natural resources from poorly sited development or incompatible land use activities, which adversely impact and may potentially destroy water and land quality. As new development occurs, development plans will need to help ensure that increasing volumes of surface water are treated properly. Regional and on-site detention ponds, rain gardens, and filtration systems are three potential methods to reduce direct water runoff into the St. Croix River and Perro Creek.



Parks and Open Space

0 0.125 0.25 Miles
1" = 1/4 MILE



Implementation

Implementing the recommendations proposed in this plan can be accomplished using a variety of tools. The City can regulate land, offer incentives for its development, and undertake its own improvement projects. These powers fall into two categories:

- Official Controls
- Capital Improvement Program

Official Controls

The City's Zoning and Subdivision Ordinances are already in place and no text changes will be required to complete the Bayport Comprehensive Plan. Zoning map changes have been updated and are done on a case by case basis as approved by the City Council.

The City's Zoning Ordinance includes provisions for Planned Unit Developments which allow for increased flexibility in permitted uses, dimensional standards, and density. Proposals that seek flexibility from underlying zoning districts must demonstrate innovation in design through the incorporation of green built development and a commitment to the protection of Bayport's natural amenities.

The City supports housing development that respects the natural environment while accommodating a variety of housing types. The City has a variety of natural features which make it attractive to residents: steep wooded bluffs, the St. Croix River, and Perro Creek. Preserving these and the natural habitats they contain are a priority for the City because they define the community's character and distinctive nature.

The City has existing ordinances which impose significant restrictions on development in environmental protection areas. These should be monitored to help ensure enforcement and consistency with the overall Land Use Plan to prohibit soil erosion, loss of vegetation, and increased surface water runoff, particularly in the vicinity of the bluff, shoreline, and floodplain.

Other regulations that the City uses to control development include the Fire Code, Uniform Building Code, and other ordinances that seek to control building and sign construction. Storm water and utilities are regulated by the ordinances within the City Code.

Additional standards the City should consider include developing a historic preservation ordinance to preserve older housing as well as provide incentives for the construction of buildings that fall within the City's housing stock. To this end, the City should look at the developing design standards for its downtown area to preserve the unique character of Bayport and prohibit unwanted architectural styles.

The City may establish guidelines which encourage developments that are architecturally compatible with historic neighborhoods and in keeping with traditional design standards such as a street grid system, sidewalks, alleys,



residential elements and porches oriented to the streets with garages to the side or rear and traditional architectural style. Buildings should be designed or renovated to be in character and size with the surrounding nature of the neighborhood and City. Standards may be defined to regulate the bulk, height, density and area of new residential developments to fit into the character of existing residential neighborhoods. Furthermore, financial incentives may help in keeping the historical nature of the City.

Capital Improvement Program 2009 – 2012

The following table outlines the capital improvements proposed in this Comprehensive Plan, their approximate costs, and the general time frame to implement them. This plan is intended as a guide and does not commit the City to specific expenditures or dates. Note that certain improvements do not have exact cost estimates attached because they are too difficult to predict at this time.

	Public Works Equipment Fund	Water/Sewer Improvement Fund	Street Reconstruction Fund	Cemetery Capital Improvement Fund	Park Dedication Fund	Fire Equipment Fund	Police Equipment Fund
New fire hall						\$2 million	
Replace Pierce dash cab						\$500,000	
Replace two patrol vehicles							\$60,000
GIS parcel info system				\$20,000			
Radio meter reading system		\$70,000					
Acquire property for storm water treatment ponds			\$50,000				
Purchase compact pick-up	\$25,000						
Replace 1967 IHC tank truck	\$25,000						
Replace 1995 Ford 4x4 truck and snow plow	\$50,000						
Pavement mgt program			\$15,000				
Replace cemetery fence				\$20,000			
Pave cemetery road				\$40,000			
Perro Park master plan and improvements					\$110,000		
Barker's Alp's improvements					\$400,000		
N. 6 th Street Water Main & Street Construction			\$675,000				
2009-2012 Total	\$100,000	\$70,000	\$760,000	\$60,000	\$510,000	\$2.5 million	\$60,000



Appendix A

Local Surface Water Management Plan

The City has prepared this appendix of the Comprehensive Plan to serve as the City's Surface Water Management Plan and to summarize related programs that comprise the City's overall surface water management program. In addition to the information provided here, the City has adopted the Middle St. Croix Watershed Management Organization Plan (2006) by reference as its local surface water management plan along with adopting the elements of the Metropolitan Council relating to surface water management. Bayport's program will be consistent with goals and policies specified in the 2006 MSCWMO Watershed Management Plan and the City will continue to enforce the city standards for development and redevelopment projects.

This summary of the City's program consists of a brief discussion of some of the primary standards governing surface water management in the City and a summary table that presents these key standards and the various regulatory agencies involved.

Purpose

The City of Bayport's Plan is intended to support the goals and policies of the Middle St. Croix Watershed Management Organization (MSCWMO). The MSCWMO is a Joint Powers Watershed Management Organization composed of ten St. Croix Valley communities that was established under State Statute 103B to cooperatively manage water resources within the watershed. The ten member communities of the MSCWMO are: Afton, Bayport, Baytown Township, Lakeland, Lakeland Shores, Lake St. Croix Beach, Oak Park Heights, St. Mary's Point, Stillwater, and West Lakeland Township. Bayport appoints one manager and one alternate to serve on the ten-member WMO Board. Bayport represents about 9 percent of the 19.8 square mile MSCWMO watershed area.

The purpose of the WMO, and therefore this Plan, is to conserve natural resources through land use planning, flood control, and other conservation projects to order to ensure continued public health and welfare. The specific purposes of this Plan in conjunction with the WMO Plan are:

1. Cooperatively manage water resources in the watershed.
2. Inventory and assess the resources of the watershed.
3. Monitor the water quality of lakes and streams in the watershed.
4. Provide education on water related issues in the watershed.
5. Review development plans for stormwater management, erosion and sediment control, and provide wetland and shoreland protection.
6. Plan and implement capitol improvement projects that enhance the water resources of the watershed.



Land and Surface Water Features

The Middle St. Croix watershed is unique when compared to other watersheds in Washington County in that it lacks a major perennial stream channel and has a minimal number of surface water features. Also unique is that it consists of many parallel subwatershed drainages, all flowing individually to the St. Croix River, rather than to one distinct stream. There are a few of these smaller stream corridors in Bayport, with Perro Creek being the largest system.

Section 2.0 of the MSCWMO Plan includes a detailed assessment of the land and water resources found within the WMO. The City of Bayport refers users to the WMO Plan for this information. In addition, the MPCA's online mapping tool identifies the special and impaired waters information for the waters listed in Table A-1.

Table A-1. Special and Impaired Waters in Bayport

Water Body	Designation	Requirements
St. Croix River	ORVW: Restricted Discharge	NPDES Construction Permit Requires additional measures for: construction activities; water quality volume; and buffer zones.
St. Croix River	Impaired for Mercury (Hg) Impaired for PCB	Approved TMDL. Statewide implementation. No direct local requirements. TMDL not yet completed. No current local requirements. Fish consumption advisories apply to both impairments.

ORVW = Outstanding Resource Value Water

Protected waters are shown in Figure 2.11 of the MSCWMP Plan and the wetland areas within the City are illustrated in Figure 2.7 of the MSCWMO Plan. The St. Croix River is the only Protected Water that is within or that borders Bayport. Other important resources include several wetlands within the Inspiration Development and along the Perro Creek corridor.

The wetland areas shown in the MSCWMO Plan illustrate the extent of know wetlands within the City. Because this map may not identify all wetlands within the City, the City will follow a process to review proposed developments for potential wetland impacts. The process will be defined more fully in the revised ordinance and will require developers to complete a wetland delineation and functions and values assessment for the property subject to the development. Any downstream discharge points shall also be taken into consideration during this wetland assessment process. If wetlands are found, the City will require developers to follow the sequencing requirements of the Wetland Conservation Act.



Storm Water System

Surface water for the original part of the City drains from the bluffs, easterly to the urban areas in the valley and is then directed by open ditches and storm sewers to Perro Creek and ultimately into the St. Croix River. Because there are no retention ponds, except at the Prison, surface water is generally discharged directly to the river. Dense vegetation along the bluffs helps minimize heavy runoff.

Surface water for the newer area of the City, the Inspiration Development, is collected by storm sewers or open ditches, and directed into retention ponds. The development has an elaborate “storm water treatment train” system of ponding and filtration that retains and treats runoff prior to discharge to the CSAH 21 ditch. This ditch ultimately drains to the Prison Pond and is discharged into Perro Creek and the St. Croix River.

Portions of the City are served by storm sewer as illustrated in the Figure provided at the end of this Appendix (also provided in the main section of the Comprehensive Plan). Some portions of the City have been modeled in detail including the Perro Creek system as part of the current work to improve the outlet system and reduce localized flooding. As new areas of system modeling are developed during development proposals, the City will review these models for consistency with standards. The City will also compile this modeling information for potential use in the future to develop a more comprehensive model of the City storm water system.

Surface Water Management Requirements and Standards

It is the policy of the City to carry-out sound storm water management practices which are consistent with the City's Storm Water Management Ordinance. As described above, the City has adopted by reference the goals and policies of the MSCWMO Plan to guide storm water management activities and requirements throughout the City. The City will update their current ordinances to match the standards identified in the MSCWMO Watershed Management Plan.

The City has also adopted the Metropolitan Council's Model Storm Water Management Plan and has adopted ordinances intended to promote, preserve and enhance Bayport's natural resources from poorly sited development or incompatible land use activities which adversely impact water and land quality. These ordinances are a summarized in Table A-2.

As stated previously, the City will follow a process to review proposed developments for potential wetland impacts. The process will be defined more fully in the revised ordinance and will require developers to complete a wetland delineation and functions and values assessment for the property subject to the development. Any downstream discharge points shall also be taken into consideration during this wetland assessment process. If wetlands are found, the City will require developers to follow the sequencing requirements of the Wetland Conservation Act.



Table A-2. Ordinances Relating to Surface Water Management

Ordinance Chapter	Description
Chapter 48	Stormwater Management (includes wetlands section)
Appendix A Section 7 7-9	Subdivisions Design Standards Stormwater Drainage
Appendix B Section 7 738	Zoning Design and Performance Standards, etc. Drainage
Appendix C	Lower St. Croix River Bluffland and Shoreland Management
Appendix E	Floodplain Management Ordinance

Bayport has adopted the State Wild and Scenic Rivers Management Program (SWSRMP), which includes special shoreland and bluffland management provisions for the St. Croix River Corridor. This program is not directly related to the State Shoreland Management Program. The City also participates in the National Flood Insurance Program and will continue to implement its floodplain management ordinance towards protecting life and property and reducing the potential damages from flooding.

City standards address surface water issues including storm water treatment and volume control, erosion and sediment control and groundwater management. Bayport will be the primary reviewer and regulator of activities that trigger plan review and/or permits. Where issues affect more than one unit of government, the City will look to the MSCWMO to maintain a coordination role.

Bayport will incorporate the MSCWMO performance standards into its existing processes, and will refer projects to the MSCWMO for full review when deemed necessary based on the activities listed below. Projects that require full review by MSCWMO will be subject to a \$250.00 fee, which shall be paid to the City of Bayport. The MSCWMO will then invoice the City of Bayport in the amount of \$250.00 for the full review. The City will adopt the MSCWMO review comments into its comments for each project.

1. Any project undertaking grading, filling, or other land alteration activities which involve movement of earth or removal of vegetation on greater than 10,000 square feet of land.
2. All major subdivisions. Major subdivisions are defined as subdivisions with 4 or more lots.



3. Any project with wetland impacts.
4. Any project with grading within the public waters.
5. Any project with grading within the wetland buffer as identified in the MSCWMO Plan.
6. Any project with grading within 40-feet of the bluff line.
7. Redevelopment on a site of 5 acres or more, where pervious surface is disturbed and final impervious surface, in aggregate, exceeds 1-acre or 5% of a site, which causes a change in runoff characteristics or removal of vegetation.
8. Development projects that impact 2 or more of the member communities.

Projects that do not trigger full review may still require staff level review by MSCWMO. The following language explains when this will occur:

Performance Standards in Section 5 of the WMP will apply to development within the Middle St. Croix watershed and focus on stormwater management, erosion and sediment control, and wetland protection. The Performance Standards will apply to all projects that trigger the MSCWMO review process. In addition, whenever a project requires a building permit that adds five hundred (500) square feet of additional impervious surface or a project requires a variance from the current local impervious surface zoning requirements for the property, the Performance Standards will apply. Building permits for new construction in an approved major subdivision that meets the requirements of the Performance Standards are exempt from the water quantity and quality standards as long as the individual property does not exceed impervious surface percentage approved for the given parcel in that subdivision. All projects regardless of whether public or private can be reviewed.

One of the most important aspects of the City's surface water management program is the implementation of permanent storm water treatment systems, like were installed in the Inspiration Development. The City supports and encourages low-impact development (LID) approaches that serve to reduce the volume of runoff from new development and redevelopment areas. However, since much of the City is also in an area that is susceptible to groundwater contamination (see Wellhead Protection Plan) infiltration practices must be sited and designed with these areas in mind. The City encourages the use of the Minnesota Storm Water Manual (MPCA) for more guidance on proper siting and design of these systems.

The erosion and sediment goal of the MSCWMO, and the City, is to prevent erosion and subsequent sedimentation from surface runoff within the watershed on construction sites; agricultural lands; and along stream banks, lakeshores, and roadsides. To achieve this, the City supports the MSCWMO goals and policies to:



1. Promote methods that prevent erosion
2. Intercept eroded material before it leaves the site
3. Require sedimentation basins or other areas for sediment to be safely controlled

As new development occurs, development plans will need to ensure that these standards are met and that runoff volumes are minimized and surface water runoff is treated properly. Regional and on-site detention ponds and filtration systems are two potential methods to reduce direct water runoff into the St. Croix River and Perro Creek.

Flooding along Perro Creek in the City of Bayport has been an ongoing problem. The City has participated in efforts with the MSCWMO to make improvements in this system and will continue to work towards minimizing potential for flooding. The Perro Creek Outlet Project is intended to alleviate some of the flooding within the city and is expected to be substantially complete by the end of 2009.

Groundwater Management

Groundwater provides all of the drinking water and the majority of water for commercial, industrial, and irrigation needs in Washington County. The protection and conservation of groundwater is critical to safe drinking water, a healthy ecosystem and economic vigor. Minnesota Statute 103B.255 requires all counties to have a Groundwater Plan. The Washington County Groundwater Plan 2003-2013 covers the protection and conservation of groundwater resources by coordinating with other governmental bodies, writing policies, regulation and education. Groundwater quality and quantity are the two main issues focused on in the plan.

Land use, surface geology and bedrock geology determine whether the groundwater is sensitive to contamination from pollution. Areas where water can travel easily from the ground surface into the aquifer have higher sensitivity. The Washington County Geologic Atlas indicates that groundwater sensitivity to pollution in Bayport is either high or very high throughout the city (see Figures 2.9 and 2.12 in the MSCWMO Plan). This means that polluted water moving down through the soil can contaminate the aquifer within a few hours to months or up to a year. There would be little time to respond to a pollutant spill and prevent contamination of the aquifer.

Minnesota Department of Health (MDH) identified a Special Well Construction Area (SWCA) located in the Middle St. Croix watershed due to trichloroethylene (TCE) and carbon tetrachloride (CCl₄) in the aquifers. In 2004, levels of TCE were detected in two of the municipal wells for the city of Bayport. One of the wells had levels approaching the maximum contaminant level. The City of Bayport has a Part 1 Wellhead Protection Plan to address this contamination. Owners of private wells within this area have installed granular activated carbon filters to filter out the TCE. The Bayport Water



Department and the Minnesota Department of Health routinely monitor for the presence of drinking water contaminants.

An air stripping treatment facility was installed in May 2007 to remove the TCE by volatilizing the pollutant from the water, resulting in non-detectable levels in the city's municipal water system in Spring 2008. Ongoing regulation, monitoring and treatment of the groundwater supply of Bayport will need to continue for public and environmental health, and economic growth and sustainability.

Washington County has provided the following recommendations from the Washington County Groundwater Plan that the City will consider as part of implementing a more comprehensive groundwater protection program:

- Assure coordination with other LGUs for groundwater sensitive areas, wellhead protection areas, water use contingency and allocation plans, and other groundwater issues where the plans may affect other jurisdictions.
- Adopt wellhead protection plan; create overlay districts and standards and incorporate into zoning ordinances and other related land use regulations.
- Develop land use regulations to protect groundwater resources based on completed studies and ranking of groundwater recharge areas
- Require a groundwater monitoring plan or groundwater protection plan as part of a permit application for businesses that store, use, or transport hazardous materials and for properties formerly used as a waste disposal site or waste transfer facility. Where available, use wellhead protection plans to assist with process.

Implementation Plan

The Implementation Plan is intended to provide guidance in carrying out the Plan goals and objectives. The implementation section summarizes capital improvement projects, studies and ongoing maintenance, inspection, monitoring and other management activities. This Plan is intended to serve the City for at least the next ten years and recognizes that the WMO Plan is intended to be in effect until 2014.

The key implementation activities and projects are summarized in Table A-3, along with planning-level cost estimates. These items were developed in part by assessing the current problems areas and issues of concern within the City. Additional items relate to recommendations of the review agencies responsible for surface and groundwater management in the area.

Because much of the City is developed and the drainage system of ditches and drainage swales is functioning well, no major problems with the drainage system have been identified.



The one exception relates to the project currently underway to modify the Perro Creek Outlet. Other efforts will primarily focus on getting the ordinances and review process up-to-date, refining the standards that apply to various project types and looking at how best to provide funding and maintenance for the long-term program needs.

The estimated costs are intended here as an order of magnitude estimate of the funding needed for the projects and activities identified in this Plan. The costs represented below do not account for the parts of the overall program implementation budget that include costs such as staff salaries, street sweeping equipment and sweeping disposal costs. The costs also do not include land acquisition costs (capital or legal) which may be necessary to implement the pond or water quality treatment BMPs recommended in the Plan.



Table A-3. Implementation Program Priority Projects and Activities

ID	Project Name	Description	Year	Cost
1	Perro Creek Outlet Project	Complete project construction.	2008-2009	\$1,600,000*
2	Update Stormwater Ordinance - Chapter 48 and related Sections in Appendices A and B	Incorporate MSCWMO Standards, Washington County Groundwater Plan, NPDES Standards, Wetland Conservation Act updates, and Wellhead Protection Plan	2009	\$8,000 one-time
3	Wellhead Protection Plan	Complete Part 2 of the Wellhead Protection Plan	2009-2010	\$10,000 one-time
4	Groundwater Plan Implementation	Coordinate with other LGUs regarding sensitive areas and incorporate standards and restrictions into zoning ordinance.	2009-2010	\$2,500
5	Storm Water Utility	Complete stormwater utility feasibility study	2009-2010	\$18,000 one-time
6	Storm Pond/BMP Maintenance	Clean out and maintenance for City Storm Ponds and BMPs	Annual	\$5,000
7	Water Supply TCE Treatment	Continue monitoring and treatment of the wells 2, 3, & 4 for TCE and other groundwater contaminants	Ongoing	
8	Storm Water System and Site Inspections	Site inspection coordination with Washington CD Staff	Annual	\$2,500
9	Support and Access Local Resources and Partnerships	Work with local agencies (MSCWMO, Washington Conservation District, etc.) where additional technical assistance or public informational efforts are needed or desired. Access to grants and funding options should also be considered on a regular basis	Ongoing	

** Funding provided through a special appropriation for the State Public Facilities Authority*

The City currently does not have a storm water utility (Surface Water Management Utility Fee) in place. This revenue source would be used to fund surface water management activities within Bayport. The charges and fees will be reviewed and adjusted annually, if needed, to ensure adequate funding for the activities set forth in this plan and those required by law. The City may evaluate this funding option by completing a feasibility report which would estimate the fees that would be needed from various land use categories to help fund the City's ongoing program.

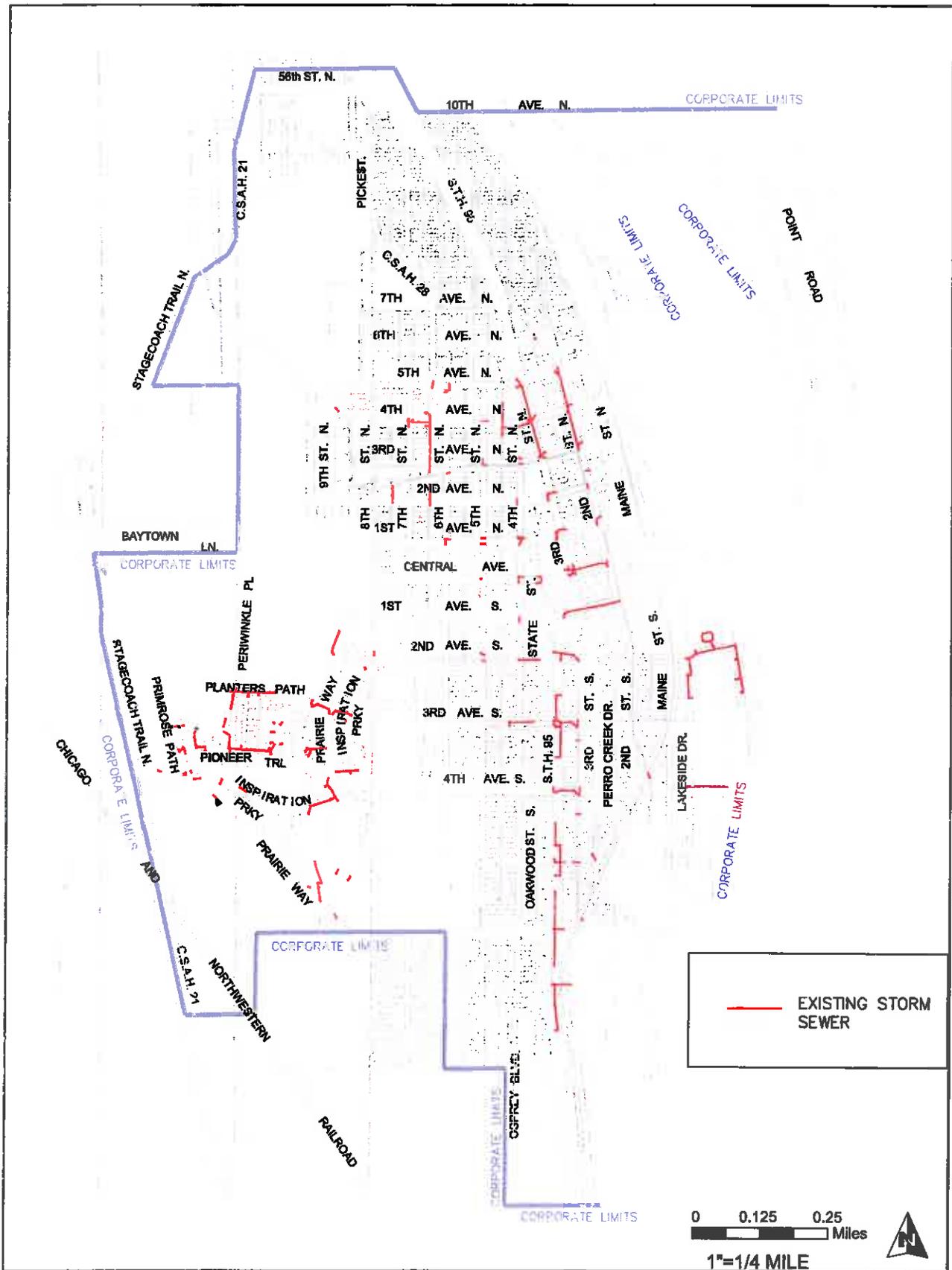


The City has a trunk fee system that is applied to new development, which would supplement a surface water utility fee. This trunk fee system is a one-time charge payable upon subdivision of a property. The connection charge varies depending upon if there is an on-site pond or no on-site pond. For the purpose of fee calculations are based on gross area.

Plan Amendments

The surface water program activities will be reviewed and evaluated annually by staff in cooperation with the MSCWMO. For this Plan to remain current, an avenue must be available to implement new information, ideas, methods, standards, management practices, and any other changes which may affect the intent and/or results of the Plan. Amendment proposals can be requested any time by any person or persons either residing or having business within the City.

Proposed amendments are reviewed by staff, and if determined to be a reasonable and necessary amendment the need for a public hearing shall be considered at a regular or special City Council meeting. City Council and the MSCWMO have an opportunity to determine whether or not to approve of the proposed amendments.



Existing Storm Sewer

Appendix B
2002 Inflow/Infiltration Study – SE Quadrant



Inflow/Infiltration Study

SE Quadrant

Bayport, Minnesota

**City Project No. 02-2002-01
SEH No. A-BAYPO0202.00**

October 8, 2008

October 8, 2008

RE: SE Quadrant
Inflow/Infiltration Study
Bayport, Minnesota
City Project No. 02-2002-01
SEH No. A-BAYPO0202.00

Honorable Mayor and City Council
City of Bayport
294 North 3rd Street
Bayport, MN 55003

Attention: Wendi Lindquist

Dear Honorable Mayor and City Council:

Short Elliott Hendrickson Inc.[®] (SEH) is pleased to present this Bayport Inflow/Infiltration Feasibility Study for SE Quadrant. This plan outlines the activities that the City will undertake in order to have a successful I/I abatement program.

Furthermore, it is recommended that the City Council review these findings and make comments. Following the City Council review, this report should be presented at an upcoming Public Meeting for comments. After the Public Meeting, the City Council should officially adopt the recommendations. Upon adoption of these recommendations they should be incorporated into the Tier II Comprehensive Plan.

If you have any questions or require further information, please do not hesitate to call.

Sincerely,

Barry C. Peters, P.E.
Project Manager

Alva L. Rankin
I&I Team Leader

bcp
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SE Quadrant
Inflow/Infiltration Study
Bayport, Minnesota

City Project No. 02-2002-01
SEH No. A-BAYPO0202.00

October 8, 2008

I hereby certify that this report was prepared by me or under my direct supervision, and that I am a duly Licensed Professional Engineer under the laws of the State of Minnesota.

Barry C. Peters, P.E.

Date: December 23, 2002 Lic. No.: 14148

Reviewed by: _____
Date

Short Elliott Hendrickson Inc.
3535 Vadnais Center Drive
St. Paul, MN 55110-5196
651.490.2000

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Certification Page
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Appendix A Drawings
Appendix B Implementation Plan

Inflow/Infiltration Study

SE Quadrant

Prepared for City of Bayport

1.0 Introduction

During recent 2001 spring flooding of the St. Croix River, the St. Croix Valley Wastewater Treatment Plant in Oak Park Heights has been running at capacity. Floodwaters were entering the sanitary sewer pipes, significantly increasing the volume of clean water being sent for treatment. At one point, wastewater was flowing into the plant at a rate of more than 8 million gallons per day; nearly double the treatment plant's design capacity. Lift stations that pump the sewage to the plant were also running at design capacities to keep up with the large inflow of clean water. As many as 10 to 12 cities along the St. Croix River were asked to examine ways to keep floodwaters from entering the sanitary sewer pipes. The City of Bayport is one of the communities that the Metropolitan Council has directed to complete an Inflow/Infiltration (I/I) Study. During the spring floods, the peak infiltration into the City's sanitary sewer system increased the discharge to the treatment to approximately 6 times its normal flow.

The City has authorized SEH to prepare an I/I Study of the southeast quadrant of the City. The area is generally bounded on the north by South Second Avenue, on the west by TH 95, on the south by the Waterford on the St. Croix Condos, and on the east by the St. Croix River. This is the lowest area of Bayport and has been flooded to some extent when the river peaks. Figure 1 shows the study area

2.0 Scope

The purpose of this Study is to review existing flow information, review existing sanitary sewer television reports, gather information related to river elevations, precipitation, and to identify and describe methods which could be used to eliminate I/I into the City's sanitary

sewer collection system. The study includes both the City collection system and private sanitary sewer services.

The second part of the study is to determine costs associated the methods identified to eliminate I/I. With these costs, a cost benefit will be calculated (benefits must be considered) to assist the City in determining which program is the best to eliminate inflow and infiltration. An implementation plan is to be prepared, identifying the timeline and costs to eliminate I/I into the City's sanitary sewer system. The study is to identify funding that may be available to assist the City in paying for the I/I program.

3.0 Existing Conditions

Figure 2 shows the sanitary sewer collection system in the study area. The following table shows the size and linear feet of sanitary sewer laterals in the study area. The majority of the sanitary sewer collection system was constructed with Vitrified Clay Pipe (VCP). VCP sewers were not constructed with sealed watertight joints. Service pipes from these VCP mainlines to the houses are also constructed with VCP pipe, usually 6-inch in size. Five segments of newer sewer systems have been constructed in the study area in the 1990's. These sewers were constructed with Polyvinyl Chloride Pipes (PVC). PVC sewers are constructed with gasketed watertight joints. Residential services are 4-inch in size, constructed of PVC materials; the commercial services are 6-inch or 8-inch in size.

	VCP	PVC	Total
8"	5,073	1,569	6,642
18"	-	2,463	2,463
Total	5,073	4,032	9,105

There are 69 single-family homes, 4 duplex units, 1 apartment complex, and 2 commercial properties.

The Metropolitan Council of Environmental Services (MCES) has recorded high sanitary sewer flows during spring flooding of the St. Croix River. The St. Croix River levels correlate to the high sanitary sewer flows.

4.0 Objective

The objective of this I/I study is to review the existing sanitary sewer system and determine ways to prevent floodwater infiltration. This

objective is for both the collection system and for the private sanitary sewer systems. A second objective is to meet the requirements of the Tier II Comprehensive Sewer Plan as requested by the Metropolitan Council dated August 22, 2001.

5.0 Recommendations

5.1 The City's sanitary sewer collector system:

The first item to be considered in the I/I study is to determine the amount and location of infiltration that enters the City's system. To accurately determine the amount, the City should meet with the Stillwater Correctional Facility staff to determine the amount of flow the facility contributes to the Bayport flows. The prison discharges their sanitary sewer into the interceptor to the St. Croix Valley Treatment facility on the north side of the prison. The flows for the City of Bayport are measured after this connection. The prison has a meter station prior to discharge into the interceptor; however, it is not used to determine flows.

The Waterford on the St. Croix is located in this southeast quadrant of the City. They have a private collection system that drains to a lift station near the south end of the site. This lift station pumps into the City's collection system. It is recommended that permanent monitoring equipment be installed to determine the amount of sewage put into the City's system.

A third recommendation is to install 7 temporary wastewater meters in the collector system from February to November for collecting data. From this data, the City can determine the locations to start repairs on the collection system. Newer television inspections of the sanitary sewer lines should also be considered.

After the City has prioritized the highest infiltration areas, a plan should be prepared to address corrections methods. The sewer mains in the collection system that show the highest rates of infiltration should be repaired. Two types of repairs are currently used in sanitary sewer systems. The first is to excavate and remove the existing VCP and replace with PVC pipes. The second method of repairs would consist of placing a resin liner inside of the existing VCP. This type of lining is done without excavation, and is completed from inside of the existing manholes. These liners can be any length needed, allowing repairs on the total length of the main, or spot repairs at key locations showing the highest infiltration. One of the areas that appears to show significant infiltration is the main on Lakeside Drive.

A possible temporary fix would be the installation of valves in several locations to isolate high areas of infiltration. These valves, placed within the existing mains, would allow the City to shut off the infiltration, minimizing flow to the treatment facility. Prior to using these valves, the City would need to notify all residents along segments of sanitary sewers that they will no longer be permitted to use the facilities within their homes. For homes that remain above the flood elevations and are occupied during flooding, yet utilize sewers that are under concern, the City may need to supply temporary sewer service. There are several points on the downside to this as a temporary fix. First and foremost is the potential for private property damage as a result of the City closing the valves. Property damage caused during natural occurrences is considered "acts of God". The liability for damage caused by the City closing a valve needs a legal review. Secondly, the new proposed Sanitary Sewer Overflow (SSO) Rule that will amend the Clean Water Act (CWA) redefines SSOs as any wastewater that leaves the collector system. So if there were basement backups, they would be considered violations of the CWA, a federal offense. The City must carefully review the issues if this alternative is chosen.

It is recommended that the City inspect all manholes and make repairs. The City in the past has had a program for relining manholes. The manholes lined were block construction and had blocks missing, or voids in the mortar joints. The relining consisted of the removal of the top portion of the manhole, pouring a concrete liner to seal the voids and replacing the top section. If the manholes do not have a lot of voids in the block construction, manhole liners can be sprayed on to seal the manholes. The severity of the manhole will determine the type of repairs that would be recommended.

The City should also review the current sewer rates and the methodology for calculating the rates.

5.2 The private sanitary sewer lines connected to the collector system

The City should review the Sanitary Sewer Ordinance to assure that it has strength to enforce the disconnection of private property clear water connections. Next the City should develop a private property I/I inspection program. In this program private properties would be subjected to dye testing, smoke testing, closed circuit televising and internal inspection. Those properties found in non-compliance would be required to make repairs with a time limit specified by the City Sewer Ordinance.

The next step would be to hold a publicized neighborhood meeting to inform the citizens of the importance of the I/I inspection program and the activities that the City is undertaking to assure compliance with the program. Once the residents are informed of the program, the City should perform inspections to assure that the properties within this area are in compliance with the City program. The City should also develop a program to assure that properties remain in compliance with the Ordinance and Resolution.

6.0 Costs

6.1 The City's sanitary sewer collection System

The estimated costs for the activities listed above are as follows:

1. The cost for meeting with staff from the Correctional Facility will be the City staff time required. The Correctional Facility has a meter that can be used to measure its effluent. There will need to be an agreement on meter calibration, how and when flow measurement will be taken and how to handle any disputes over the flow measurements.
2. The estimated cost for the installation of a meter for the Waterford on the St. Croix is \$20,000.
3. The estimated cost for the installation, monitoring and reporting of the seven temporary meters - \$40,000.
4. The estimated cost for sanitary sewer removal and replacement is \$35 per foot. This is the cost for the pipe work alone and does not include costs for the street repairs. This type of repair should be done in conjunction with a street reconstruction project. The cost for a full-length lining is estimated at \$75 per foot. Short line repairs are estimated at \$275 per foot. With lining projects, there is minimal street repairs required.
5. The estimated cost for valves placed in mainlines is \$15,000 per valve. Three valves will isolate the VCP sanitary sewers from the PVC mains.
6. The cost for manhole repairs will depend on the condition of the manhole. The construction of new structures is estimated at \$1,500 to \$2,000 per manhole for standard depth structures (8' to 12' deep). The cost for relining as previously done by the

City is estimated at \$1,200 per manhole. The estimated cost for the spray lining is \$30 per manhole.

7. The estimated cost for a Rate Study is \$15,000.

6.2 The private sanitary sewer lines connected to the collector system:

1. The estimated cost to review City Ordinance and discuss with City personnel is \$1,000.
2. The estimated cost for the Private Property Inspection for southeast quadrant is \$20,000.
3. The estimated cost for public meetings is \$1,500 per each.
4. The estimated cost to perform inspections to ensure that properties are in compliance with the I/I program is dependent upon who performs the work.

7.0 Funding

Due to the current economic situation, there is very little funding available for this work. Metropolitan Council has some limited funding for planning, however, there is no funding for replacement or repair work. The true benefit of the available planning funds would need to be explored more fully. The Public Facility Authority has low interest loans that can be applied for. That process takes some time but has the potential to provide some financial assistance. One other avenue that can be explored is Community Development Block Grant funding. This is geared toward low and medium income areas of a community.

On the private side, the Minnesota Housing Finance Agency has a number of programs that can help individual property owners pay for repairs to their property. Representatives in the past have attended public meetings and provided information for property owners to review.

8.0 Conclusions

The high inflow and infiltration problem that the City of Bayport experiences is primarily due to high river levels. This problem is not directly related to rainfall precipitation events. The high river levels raise the water table enough to cause ground water to leak into the

sanitary collection system. Therefore, the recommendations that are being suggested deal with preventing this ground water from entering the collection system.

The benefit to the City of Bayport in spending the money under the recommendations is the reduction of inflow and infiltration into the sanitary collection system. This will result in reduced treatment costs and will enhance the life of the system. In other words the City will not have to spend as much money in the future for capital improvements. In addition the City of Bayport will meet the requirements of Tier II Comprehensive Plan. This is significant, particularly if the City wishes to add on to its sanitary collection system. This type of benefit is not only financial but has also community enrichment potential.

SEH has the experience and expertise to work with the City in resolving these issues. SEH would provide the design services for any rehabilitation work that is needed in the collection system. SEH would provide assistance with the flow meter process to gather the necessary data for measuring I/I effectiveness. SEH would develop and hold a public information meeting. It is important to get all the issues out on the table prior to the start of any public action. SEH is willing and able to assist in the funding discussion. SEH could assist in the development of the private property inspection program. Finally, SEH would work with the City to assure on-going compliance with the I/I abatement plan. SEH looks forward to continue working with the City of Bayport on this important program.

9.0 Priority List

The following is a priority list of the recommendations that were discussed above. These are the activities that the City of Bayport will consider to address the Inflow/Infiltration issues that occur in the southeast quadrant of the City with the spring flooding of the St. Croix River. Also shown are the estimated total costs for the various recommendations and the assumptions that were used to determine the cost.

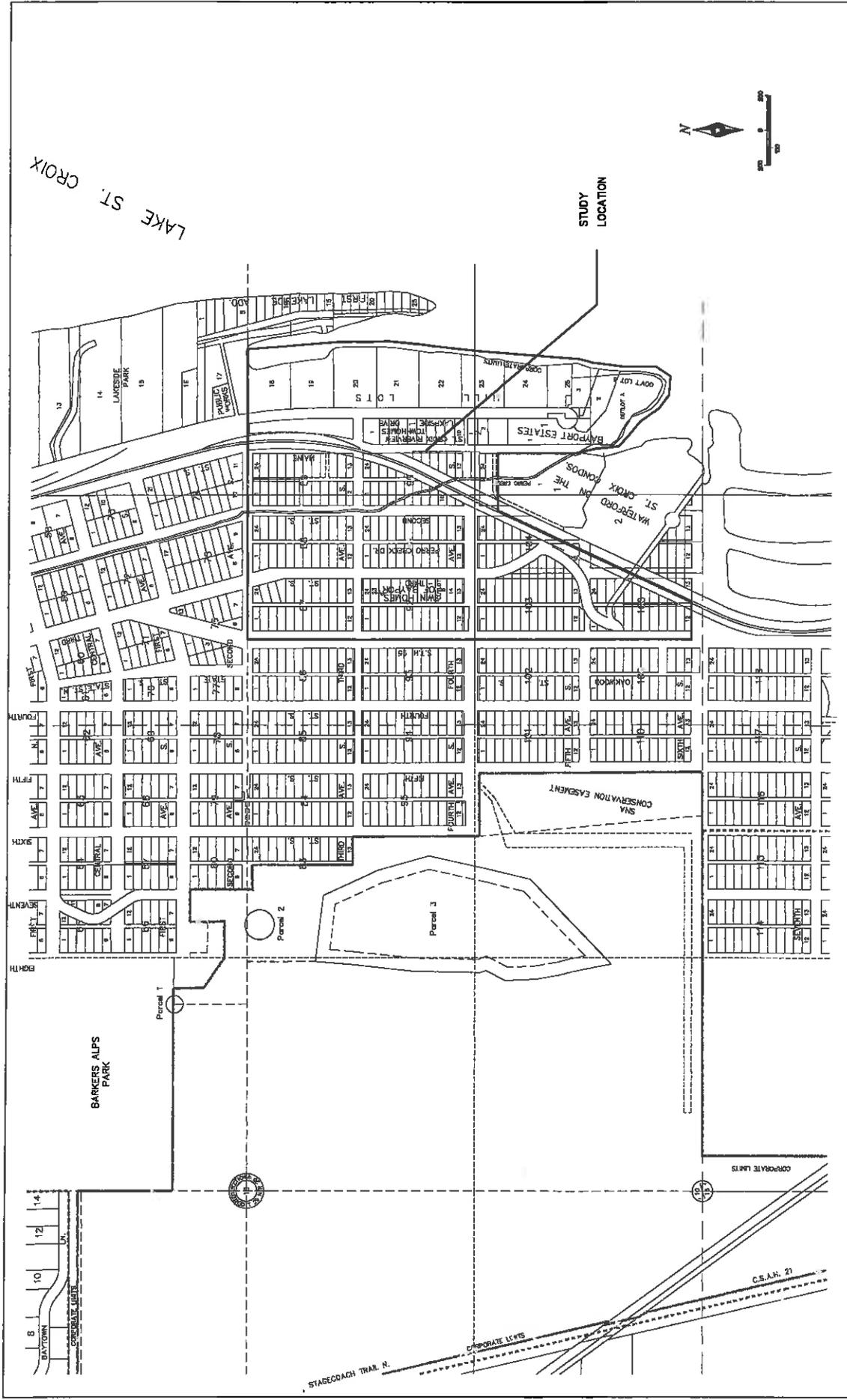
	Item	Total Est. Cost	Assumptions
1	Televising the non-PVC Sewer Lines Make necessary repairs	\$5,500 400,000	Assumes relining all non-PVC lines (5,333' @ \$75/ft)
2	Inspect all Manholes Repair Manholes	60,000	Done by City Staff Assumes relining 40 manholes @ \$1,500/manhole
3	Install 7 temporary flow meters	40,000	Assumes meters are installed February to November.
4	Install permanent meter for Waterford on the St. Croix	20,000	
5	Meet with Correctional Facility staff to determine how flows should be measured		Done by City Staff
6	Perform Rate Study	15,000	
7	Review City Ordinance as it relates to private property connections	1,000	
8	Hold Public Meeting	1,500	
9	Perform Private Property inspections	20,000	Assumes televising service laterals and visual inspections
OTHER ACTIVITIES			
A	Apply for PFA Funding		
B	Install shut-off valves in system	15,000/valve	Needs to be reviewed to determine liability to the City

10.0 Implementation Plan

Attached in Appendix C is the City of Bayport's Implementation Plan that will be utilized to reduce or eliminate I/I into the City's Sanitary Sewer System in the southeast quadrant of the City.

Appendix A

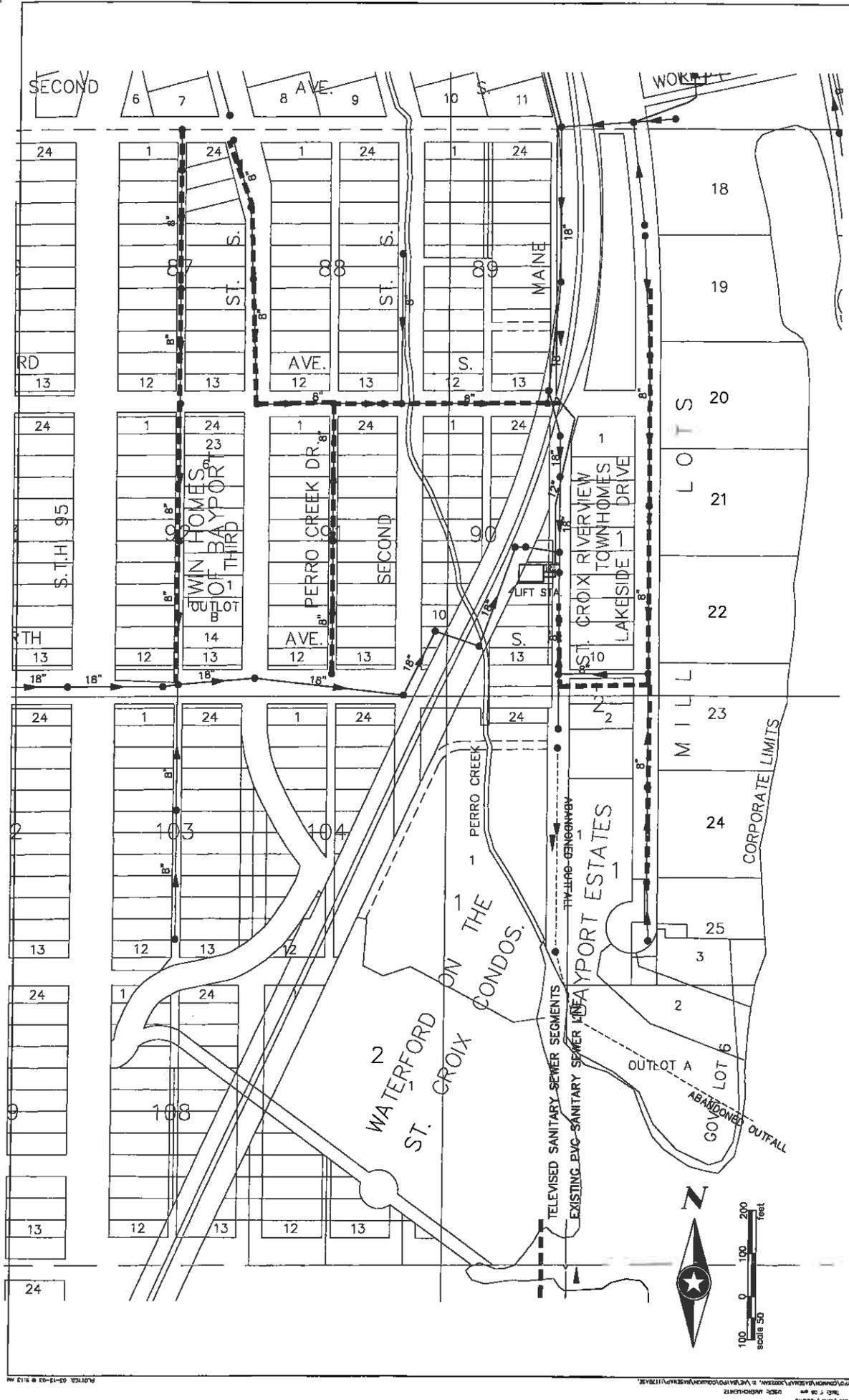
Drawings



DRAWN BY: MAM DESIGNED BY: MAM CHECKED BY: BCP DESIGN TEAM:	NO. 07 DATE:	REVISIONS:	FILE NO.: 0417000002.00 DATE: 03/19/03	PROJECT LOCATION: BAYPORT, MINNESOTA	BAYPORT MINNESOTA	1 2
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I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY SUPERVISION AND THAT I AM A duly LICENSED ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
 Barry G. Pihlak, P.E.
 No. 141458
 MARCH 19, 2003
 ST. PAUL, MN 55110

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FILE NO. AAAP00022.DWG	2
DATE 04/19/03	2
SANITARY SEWER SYSTEM TELEVIEWED AREAS BAYPORT, MINNESOTA	
BAYPORT MINNESOTA	
 PHONE: (651) 466-2200 575 WALSH CENTER DR. ST. PAUL, MN 55108	
DESIGNER: [Blank] DATE: [Blank] CHECKED BY: [Blank]	
DESIGN TEAM: [Blank]	
REVISIONS: [Blank]	

I HEREBY CERTIFY THAT THE INFORMATION CONTAINED ON THIS PLAN, DRAWING AND THE COMMUNICATIONS THEREON WERE PREPARED BY ME OR UNDER MY CLOSE PERSONAL SUPERVISION AND THAT I AM A LICENSED ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.
 Date: March 12, 2003 Reg. No. 14158
 Jerry C. Peltola, P.E.

Appendix B
Implementation Plan

**Implementation Plan
Bayport, Minnesota
SE Quadrant of the City**

	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	Total
1 Televis non-PVC Sewer Lines	5,500										5,500
2 Inspect All Manholes											
3 Install Permanent Meter for Waterford on the St. Croix	20,000										20,000
4 Meet with Correctional Staff to determine how flows should be measured											
5 Line non_PVC San. Sewer	40,000	41,200	42,436	43,709	45,020	46,371	47,762	49,195	50,671	52,191	458,555
6 Line Manholes	6,000	6,180	6,365	6,556	6,753	6,956	7,165	7,380	7,601	7,829	68,785
7 Perform Rate Study	7,500	7,500									15,000
8 Install 7 Temporary Flow Meters		20,000	20,600								40,600
9 Review City Ordinances for Private Connections	1,000										1,000
10 Hold Public Meeting	1,500										1,500
11 Perform Private Property Inspections	2,000	2,060	2,122	2,186	2,252	2,320	2,390	2,462	2,536	2,612	22,940
12 Apply for PFA Funding	1,000										1,000
Yearly Total without Valves	84,500	76,940	71,523	52,451	54,025	55,647	57,317	59,037	60,808	62,632	\$ 634,880
Yearly Total with Valves	129,500	121,940	116,523	97,451	99,025	100,647	102,317	104,037	105,808	107,632	\$ 679,880

Estimated time frame per year.

Costs over multiple years includes a 3% increase due to cost of living.

Implementation Plan

The following outlines the various implementation plan items:

1. **Televise non-PVC Sewer Lines** – The City will televise all non-PVC sanitary sewer mains to determine structural integrity of the mains. The televising will enable the City to determine infiltration probabilities and means of correcting deficiencies.
2. **Inspect All Manholes** – Many of the sanitary sewer manholes are constructed out of blocks and bricks. Inspections will determine the structural integrity and ability for I/I. From inspections, the City will determine means of correcting deficiencies.
3. **Install Permanent Meter for Waterford on the St. Croix** – Installing a flow meter will allow the City to determine the amount of sewage that is pumped into the City's sewer system from this private collection system.
4. **Meet with Correctional Staff to determine how flows should be measured** – The City will meet with the Stillwater Correctional Facility staff to determine the amount of flow that the prison contributes to Bayport's flows.
5. **Line non-PVC Sanitary Sewers** – From the television inspections, the City will determine which or how much of existing non-PVC sanitary sewers should be lined to correct deficiencies and reduce I/I.
6. **Line Manholes** – From the site inspections, the City will determine which or how many of existing sanitary sewer manholes should be lined to correct deficiencies and reduce I/I.
7. **Perform Rate Study** – The City will review the current sewer rates and methods for calculating the rates.
8. **Install 7 Temporary Flow Meters** – The City will install temporary flow meters in various areas of the City to collect data to assist in determining locations to start repairs on the sanitary sewer system.
9. **Review City Ordinances for Private Connections** - The City will review the Sanitary Sewer Ordinance to assure that it has strength to enforce the disconnection of private property clear water connections.
10. **Hold Public Meetings** - The City will hold public neighborhood meeting to inform the citizens of the importance of the I/I inspection program and the activities that the City is undertaking to assure compliance with the program.
11. **Perform Private Property Inspections** – Following the public meetings, the City will perform inspections to assure that the properties within are in compliance with the City program. The City will also develop a program to assure that properties remain in compliance with the Ordinance and Resolution.
12. **Apply for Funding** – The City will investigate funding possibilities to assist both the City and residents with costs incurred with improvements.

Appendix C
2007 Flow Monitoring Report



2007 Flow Monitoring Report

City of Bayport, Minnesota

SEH No. A-BAYPO0701.00

February 11, 2009

February 11, 2009

RE: 2007 Flow Monitoring Report
City of Bayport, Minnesota
SEH No. A-BAYPO0701.00

Mike McGuire
City Administrator
City of Bayport
294 North 3rd Street
Bayport, MN 55003-1027

Dear Mr. McGuire:

Short Elliott Hendrickson Inc.® (SEH) is pleased to present this Bayport 2007 Flow Monitoring Report. This report outlines the results from the data gathered over the 2007 flow monitoring period in order to identify potential I/I in the City's sanitary sewer collection system and determine the need for further I/I abatement measures to address the MCES surcharge program.

If you have any questions or require further information, please do not hesitate to call.

Sincerely,


Alva L. Rankin

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2007 Flow Monitoring Report

Prepared for Bayport, Minnesota

1.0 Introduction

The City of Bayport operates a sanitary sewer collection system designed to provide wastewater conveyance to the Metropolitan Council Environmental Services (MCES) regional interceptor system. The MCES is ultimately responsible for wastewater treatment in the greater Minneapolis/Saint Paul Metropolitan area. Each local community is charged a users fee by the MCES based on contributing wastewater flows determined through a network of flow meters across the greater Metropolitan area. The wastewater flow can include clear water from rain water or groundwater commonly referred to as inflow and infiltration (I/I) entering the sanitary sewer system through leaks in the publicly-owned sewer and manholes and from local and private property sources such as rain leaders, sump pumps, foundation drains and leaking house laterals. The MCES has evaluated its interceptors and treatment plants capacity for long-term metro area growth. The capacity taken up by the addition of I/I is a critical issue for MCES as it substantially impacts future capital expenditures. To meet the growing needs in the metro area, MCES is implementing surcharges to communities that produce significant peak hour inflow demands on the MCES interceptor collection and treatment system.

On August 26, 2005 the City of Bayport's inflow contribution was above the Peak allowable flow rates established by MCES and a surcharge of \$98,000 was incurred on the City. In August 2006, a work scope was provided by Short Elliott Hendrickson Inc. (SEH) to the city of Bayport that outlined work tasks to be performed during 2007 in order to determine the need for further I/I abatement measures.

1.1 Purpose

The purpose of the work performed during this 2007 study was to study the causes for inflow exceedence on August 26, 2005. This work was performed to begin the process of isolating areas of Bayport that produce I/I and provide recommendations for remedial actions that may reduce the likelihood of the production of additional MCES Surcharges.

2.0 Summary of Performed Tasks

Based on the August, 2006 work scope SEH provided to the City of Bayport laying out the tasks to be performed during the 2007 flow monitoring period SEH performed the following:

- SEH collected available historical information on the Bayport wastewater collection system.
- SEH reviewed and evaluated the MCES flow meter results to establish a wastewater base flow comparison volume and to establish a baseline for determining the magnitude of I/I entering the collection system.
- Set in place a flow monitoring program to determine, where feasible, which areas have a higher potential for I/I entering the system
- Installed Piezometers to monitor to monitor Groundwater elevations throughout the city.
- Installed a Rain gauge on the roof of the Bayport City Hall Building.
- Evaluated the flow monitoring data in order to establish recommendations for remedial work to be performed on Bayport's Sanitary Sewer Collection System.

3.0 Collection System Flow Metering

SEH installed portable flow monitoring devices in six selected areas of the collection system showing potential for contribution of inflow. Six Teledyne Isco 2150 Flow Meters were installed in March, 2007 and removed in early August, 2007 to collect potential snowmelt conditions and continual data for four months as can be seen in Table 1 below. The portable flow meters were installed and calibrated to establish a base flow for wastewater volumes and to measure the affect of storm events. The metering period lasted four months and was discontinued due to the lack of significant rain events leading to minimal data that could be compared to the surcharge data of 2005. A map of the location of each of these six meters is included in Appendix A.

**Table 1
Bayport Flow Meter Locations**

District No.	Location	Pipe Size (in)	Meter Type
1	East end of Prison parking lot located on East side of Picket St.	15	ISCO 2150
2	Third St S and Fourth Ave S.	18	ISCO 2150
3	Fourth St N and Fourth Ave N (SE corner)	10	ISCO 2150
4	Maine St N and Second Ave N	15	ISCO 2150
5	Maine St S 50' south of Third Ave S.	18	ISCO 2150
6	Second St N and Sixth Ave N (NE corner)	12	ISCO 2150

3.1 Groundwater Monitoring Well Installation

To evaluate the potential relationship among groundwater, I/I and depth of groundwater to sanitary sewer elevation, SEH hired Thein Well Co. to install three piezometers to monitor groundwater elevations around the City. The locations of these three piezometers are also included on the map in Appendix A. During the routine meter maintenance, SEH field staff retrieved water level readings from the three piezometers as well as a Public Works Monitoring well.

4.0 Collection System Flow Monitoring Results

The following section discusses the results of the five month flow monitoring period performed from early March, 2007 through early August, 2007. Over the period of flow monitoring performed by SEH there were only periodic rain events separated by relatively dry periods. Unfortunately the meters were removed before a surcharge event which occurred on September 20, 2007. The data gathered can be used to infer upon which districts were most likely to incur the most substantial amounts of I/I for this event.

4.1 Groundwater Fluctuations and Potential Impacts

Table 2 presents the results of the data obtained from each piezometer throughout the monitoring period. Unfortunately the period monitored in 2007 was not a particularly wet year and the potential for increased groundwater elevations was low. Piezometers PZ-1 and PZ-2 showed very slight increases in the groundwater levels over the monitoring period while Piezometer PZ-3 dropped slightly and the monitoring well at the Public Works building showed a significant drop in elevation of 6 feet. This drop is most likely due to its close proximity to the river. The well's downward trend mirrors the downward trend in discharge at the St. Croix River due to the annual spring thaw as recorded at Saint Croix Falls, Wisconsin. A copy of the mean discharge of the St. Croix River is located in Appendix B.

Table 2
Groundwater Monitoring Well Elevations

Piezometer Location				
	PZ-1	PZ-2	PZ-3	Public Works Monitoring Well
	Barkers Alps Park	Fourth Ave. North and Fourth St North	Perro Creek Dr. and Fourth Ave.	2nd Avenue South and Lakeside Drive
DATE	Depth to water (TOC)	Depth to water (TOC)	Depth to water (TOC)	Depth to water (TOC)
19-Mar-07	20.4	20.8	13.8	N/A
6-Apr-07	20.1	20.12	9.04	11.41
18-Apr-07	N/A	19.72	10.82	13.71
27-Apr-07	19.88	19.73	11.27	14.11
10-May-07	19.74	19.61	12.09	15.08
22-May-07	19.69	19.59	13.36	16.32
29-May-07	19.65	19.51	13.43	16.32
1-Jun-07	19.63	19.49	13.45	16.33
20-Jun-07	19.75	19.61	14.04	N/A
9-Jul-07	19.97	19.81	14.67	17.46

4.2 Rainfall Events for the Flow Monitoring Period

Table 3 shows the rainfall recorded by the rain gauge that was installed on the roof of the City Hall Building located on Third Street between First and Second Avenues North. The data gathered between the dates of June 17, 2007 and June 28, 2007 is inconsistent with other rain gauges in nearby communities showing signs that the gauge was recording erroneous measurements. Additionally these rain events were checked against the flow data from the temporary meters and there was no correlation with the rain events of the non-erroneous data. There were only a few storm events that showed response throughout the system. The most influential rain event occurred on May 23, 2007. This is most likely due to rainfall occurring on May 22 followed by the 23rd with a rain intensity of .75 inches in a half hour. Aside from May 22 the other events were of low intensity and spread out sporadically leading to them being inconsequential events. Unfortunately the rain gauge was removed before September 20, 2007 when there was a surcharge event. The data highlighted in grey is considered erroneous.

Table 3
Rainfall Events During Flow Monitoring Period
Rainfall (inches)

Event Date	Peak 30 Min.	Peak Hour	Daily 24-Hr Total
27-Apr-07	0.01	0.01	0.01
30-Apr-07	0.15	0.19	0.33
4-May-07	0.01	0.02	0.05
5-May-07	0.04	0.05	0.05
7-May-07	0.13	0.17	0.23
9-May-07	0.07	0.09	0.09
13-May-07	0.01	0.01	0.01
19-May-07	0.04	0.04	0.04
20-May-07	0.04	0.04	0.04
22-May-07	0.31	0.31	0.55
23-May-07	0.75	0.75	0.82
24-May-07	0.10	0.19	0.54
29-May-07	0.15	0.18	0.26
30-May-07	0.17	0.19	0.41
31-May-07	0.03	0.04	0.04
1-Jun-07	0.01	0.01	0.02
2-Jun-07	0.49	0.81	1.31
6-Jun-07	0.03	0.03	0.03
8-Jun-07	0.08	0.08	0.18
9-Jun-07	0.08	0.08	0.12
10-Jun-07	0.34	0.34	0.37
12-Jun-07	0.15	0.20	0.20
13-Jun-07	0.31	0.31	0.32
14-Jun-07	0.40	0.40	0.40
16-Jun-07	0.00	0.00	0.00
17-Jun-07	1.56	1.87	5.85
18-Jun-07	0.28	0.28	0.29
19-Jun-07	0.18	0.25	0.61

Table 3
Rainfall Events During Flow Monitoring Period
Rainfall (inches)

Event Date	Peak 30 Min.	Peak Hour	Daily 24-Hr Total
20-Jun-07	1.00	1.00	2.07
23-Jun-07	0.00	0.00	0.00
21-Jun-07	0.56	0.56	0.56
25-Jun-07	0.01	0.01	0.01
26-Jun-07	0.65	1.05	1.05
27-Jun-07	1.20	1.25	3.91
28-Jun-07	0.35	0.59	0.59
30-Jun-07	0.00	0.00	0.00
1-Jul-07	0.00	0.00	0.00
3-Jul-07	0.30	0.30	0.37
7-Jul-07	0.00	0.00	0.00
8-Jul-07	0.06	0.07	0.15
11-Jul-07	0.08	0.08	0.09
13-Jul-09	0.06	0.08	0.08
14-Jul-07	0.11	0.11	0.11
16-Jul-07	0.04	0.08	0.10
24-Jul-07	0.00	0.00	0.00
26-Jul-07	0.14	0.15	0.19
		Total Rainfall	22.47
Unreliable Data			

4.2.1 Peak Hour Storm Events

Peak hour rainfall totals are critical to determining inflow or I/I peak rates. Typically, the direct sources of inflow, such as storm sewer and downspout connections to the sanitary sewer, are the first to respond during a rainfall event. Sump pumps and foundation drains can also produce significant I/I initially under the right soil and groundwater conditions. The relationship between inflow entering the sanitary sewer and rainfall is not linear but in direct proportion to the intensity of the storm event. The large and quick responses to rainfall, such as immediate increases in wastewater flow rates in any sanitary collection system, typically means the storm water has entered the sanitary sewer from a direct source. The more intense storms, usually over a short period (one hour) are helpful in determining the amount of Inflow in a system. Of the rain events that occurred over the monitoring period the one that showed the greatest response throughout the system was that of May 23, 2007. The hourly intensity for this storm was .75 inches per hour. Hourly Flow Rate plots showing each district's response to this event are shown in Appendix C.

4.3 Measured Inflow/Infiltration Results

The following discusses the results found as a result of the flow monitoring within the Bayport sanitary collection system and the approach used to determine dry weather and wet weather flows. The results are shown in Table 4 below.

**Table 4
2007 Flow Metering Results**

Sewer District	Average Daily (1) Dry Weather Flow(mgd)	Daily Wet Weather (2) Flow (mgd)	Peak I/I Flow Rate (3) (mgd)	Ratio of Peak I/I Flow Rate vs. Dry Weather Flow
D1	0.338	0.410	1.592	4.7
D2	0.006	0.005	0.004	0.7
D3	0.041	0.040	0.101	2.5
D4	*0.073	0.074	0.125	0.8
D5	0.026	0.031	NID	-
D6	0.036	0.043	0.134	3.7
Total	0.520	0.603	1.956	

1. Based on average daily wastewater flows recorded during the week of July 4, 2007.
2. Based on the results of the rain event totaling .82" on May 23, 2007.
3. I/I peak rates based on the rain events that occurred on the dates of May 22 and May 23, 2007.
- * Number based on the daily wastewater flows recorded during the week of July 18 through July 25, 2007.

NID – None Identified

4.3.1 Dry Weather Flows

The dry weather flow was determined based on a relatively dry June and early July, 2007. As shown in column two of Table 4 dry weather flows of .52 mgd were recorded by the temporary meters installed throughout the sewer system. This flow rate is similar to that of the three year average flow found by MCES meter station M609 of .56 mgd.

4.3.2 Wet Weather Flows

Daily wet weather flows were determined using data from the portable flow meters throughout Bayport's sanitary collection system. The MCES flow meter data was used to study the entire sanitary sewer collection system and provide a method for checking the accuracy of the data collected from the portable flow meters. A number of rain events were used to determine the amount of I/I throughout the system (May 7, May 22, May 23, June 2, 2007). Each rain event was used due to the consistency of the flow data from location to location across the city.

4.3.2.1 Measured Peak I/I Flow Rates by District

For prioritization of future work activities and to establish a baseline for effectiveness of I/I removal, the peak flow rates were determined from the flow metering data. The final section reviews the methods used in determining the peak I/I flow rates and evaluates the potential for MCES surcharges and how the findings will be used by the City to continue with potential sewer rehabilitation.

4.3.2.2 Peak I/I flow Estimates

Based on the storm events of May 7, May 22, May 23, and June 2, 2007 the peak I/I flow rate at each portable flow metering location was determined. The initial peak rate recorded immediately after the most intense period of each storm event was subtracted from the previous weeks flow rate. If

rainfall occurred during that previous week, two week's prior flow rate was used, but only if the data was consistent with similar readings during the corresponding dry period. The storm events were used because of the nature of the rainfall, either because the event was somewhat isolated from other events or because the intensity of the rain event in question caused a notable reaction throughout the system.

The peak I/I rates were determined and then divided by the peak hour rainfall total for each storm event. The peak I/I rates per inch of rain were then averaged to determine a typical peak I/I rate by sewer district for each inch of rainfall expected during a peak hour event. The peak hour rainfall event was based on the storm maximum event recorded on May 23, 2007 when .75 inches fell over an hour period. The results are shown in Table 4. Sewer districts D1 and D6 had the largest I/I to dry weather flow peak ratios. District D1 has a much larger peak I/I flow rate than any other district during rain events. This high I/I flow rate is useful when attempting to point out the district with the highest potential impact on Bayport's flow through MCES Meter Station M609. District D1 is also closest in proximity to Meter Station M609 resulting in a small travel time for blunting to occur. Flow district D1 also stands out because it constitutes 80 percent of the average peak I/I flow rate measured over Bayport's entire sanitary sewer system.

The Peak I/I flow rate column sums to 1.96 mgd which at first glance might appear as though it exceeds the peak allowable flow for the city of Bayport. However, it should be noted that the rate shown in Table 4 is based on a Peak I/I flow rate found using instantaneous 15 minute flow rates and is not hourly rates. If this rate was gathered using the MCES method for determining the I/I ratio the peak would be blunted. The method used in this analysis meant to highlight the areas of the city with high I/I potential and not for direct comparisons with the MCES peak hourly allowable flow. When the city is broken up into many metering districts it is necessary to look at the flow rates on a 15 minute scale because in some cases the response from small storms such as those of this monitoring period are difficult to see on the hourly scale but for the purposes of locating problem areas the 15 minute scale is well suited.

4.4 Current vs. Historical Events.

This study was performed as the first step in addressing the issue of I/I in Bayport in response to the MCES Surcharge of August 25, 2005. The 2005 Surcharge was .28 mgd over the peak allowable flow of Bayport. Unfortunately, the monitoring being performed in this study ended before another surcharge event occurred on September 20, 2007 of .34 mgd. From MCES meter station M609, a plot of this event as well as the May 23, 2007 is included in Appendix D. The peak I/I flow rates gathered in this report were not significant enough to cause a surcharge. However, they do provide the appropriate data for pursuance of other I/I investigative procedures or remedial measures in particular areas.

5.0 Conclusions

- The results of the 2007 flow monitoring period indicate that of the I/I conveyed to the MCES interceptor system a vast majority of it originated from district D1. This monitoring period was relatively dry and the

groundwater levels were likely affected by this. The groundwater levels in the monitoring well located at the Public works went down nearly 5 feet from the beginning of the monitoring period to the May 22, 2007 event. It may be useful to note that if a similar event occurred earlier in the year the response in districts D5 and D6 may have been more significant.

- After the 2007 flow monitoring period ended the City of Bayport experienced a surcharge of .34 mgd at 7: 00 pm on 9/20/2007.

6.0 Recommendations

- Based on the results from this flow monitoring period performed for the City of Bayport a further investigation into the sources of I/I in district D1 would be the most prudent place to begin. Removing I/I from district D1 should show a dramatic decrease in the quantity of I/I conveyed to MCES Meter station M609. Other districts to look into are districts D6 and D3.
- A variety of I/I investigative techniques can be employed for the pursuance of I/I removal. Upon further consultation any one or combination of the following may be pursued:
 - Smoke testing
 - Consists of blowing a non-toxic mineral smoke to the sanitary system and inspecting storm sewer connections.
 - Dye Testing
 - Manhole inspections
 - Closed Circuit Televised (CCTV) inspection of the sanitary sewer lines during rain events and/or during high groundwater table conditions.
 - Inspection of private property
 - Includes televising service laterals and visual inspection

Appendix A
Sanitary Sewer Layout

Appendix B

Saint Croix Falls Discharge (2006-2007)



Water-Data Report 2007

05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI

St. Croix Basin
Lower St. Croix Subbasin

LOCATION.--Lat 45°24'25", long 92°38'49" referenced to North American Datum of 1927, in SW ¼ NW ¼ sec.30, T.34 N., R.18 W., Polk County, WI, Hydrologic Unit 07030005, St. Croix National Scenic Riverway, on left bank, 1,500 ft downstream from powerplant of Northern States Power Co., in St. Croix Falls, and at mile 52.2. Gage Address - 211 South River St.

DRAINAGE AREA.--6,240 mi², (revised 1982; previously 5,930 sq mi), from topographic map.

SURFACE-WATER RECORDS

PERIOD OF RECORD.--January 1902 to current year. Prior to January 1910, monthly discharge only, published in WSP 1308. Prior to October 1939, published as "near St. Croix Falls." Monthly average data were published outside the period of daily data collection. These monthly data are not included in the monthly mean statistics.

REVISED RECORDS.--WSP 1115: 1929. WDR WI-82-1: Drainage area.

GAGE.--Water-stage recorder and crest-stage gage. Datum of gage is 689.94 ft above NGVD of 1929. Prior to July 1905, gage heights and discharge measurements were used by Loweth and Wolff, consulting engineers of St. Paul, Minn., to determine the flow. July 1905 to February 1940, records were computed from power generation at the St. Croix Falls Powerplant. February 1940 to Sept. 30, 1979, water-stage recorder at site 300 ft downstream at same datum.

REMARKS.--Records good except those for estimated daily discharges, which are fair. Diurnal fluctuation caused by St. Croix Falls Powerplant 1,500 ft upstream. Gage-height telemeter and data-collection platform at station.

Water-Data Report 2007

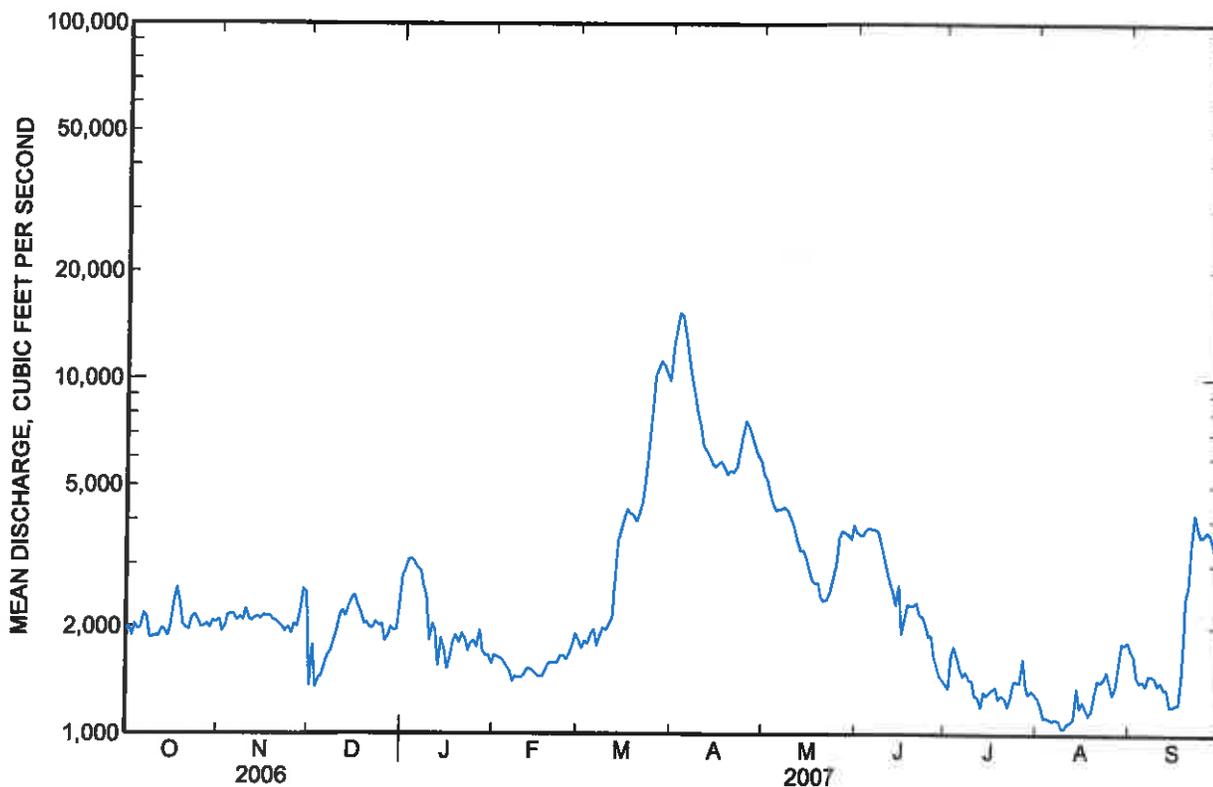
05340500 ST. CROIX RIVER AT ST. CROIX FALLS, WI—Continued

SUMMARY STATISTICS

	Calendar Year 2006		Water Year 2007		Water Years 1902 - 2007	
Annual total	1,193,370		1,013,430			
Annual mean	3,270		2,777		4,365	
Highest annual mean					8,569	1986
Lowest annual mean					1,754	1934
Highest daily mean	18,800	Apr 4	15,100	Apr 3	59,500	Apr 26, 2001
Lowest daily mean	1,120	Jul 18	1,050	Aug 9 ^a	75	Jul 17, 1910
Annual seven-day minimum	1,160	Jul 18	1,080	Aug 6	754	Jul 29, 1934
Maximum peak flow			15,400	Apr 3 ^b	60,900	Apr 25, 2001
Maximum peak stage			8.23	Apr 3	25.88	Apr 25, 2001
10 percent exceeds	6,690		5,440		8,930	
50 percent exceeds	2,270		1,990		2,800	
90 percent exceeds	1,470		1,320		1,580	

^a Also occurred Aug. 10.

^b Also occurred Apr. 4.

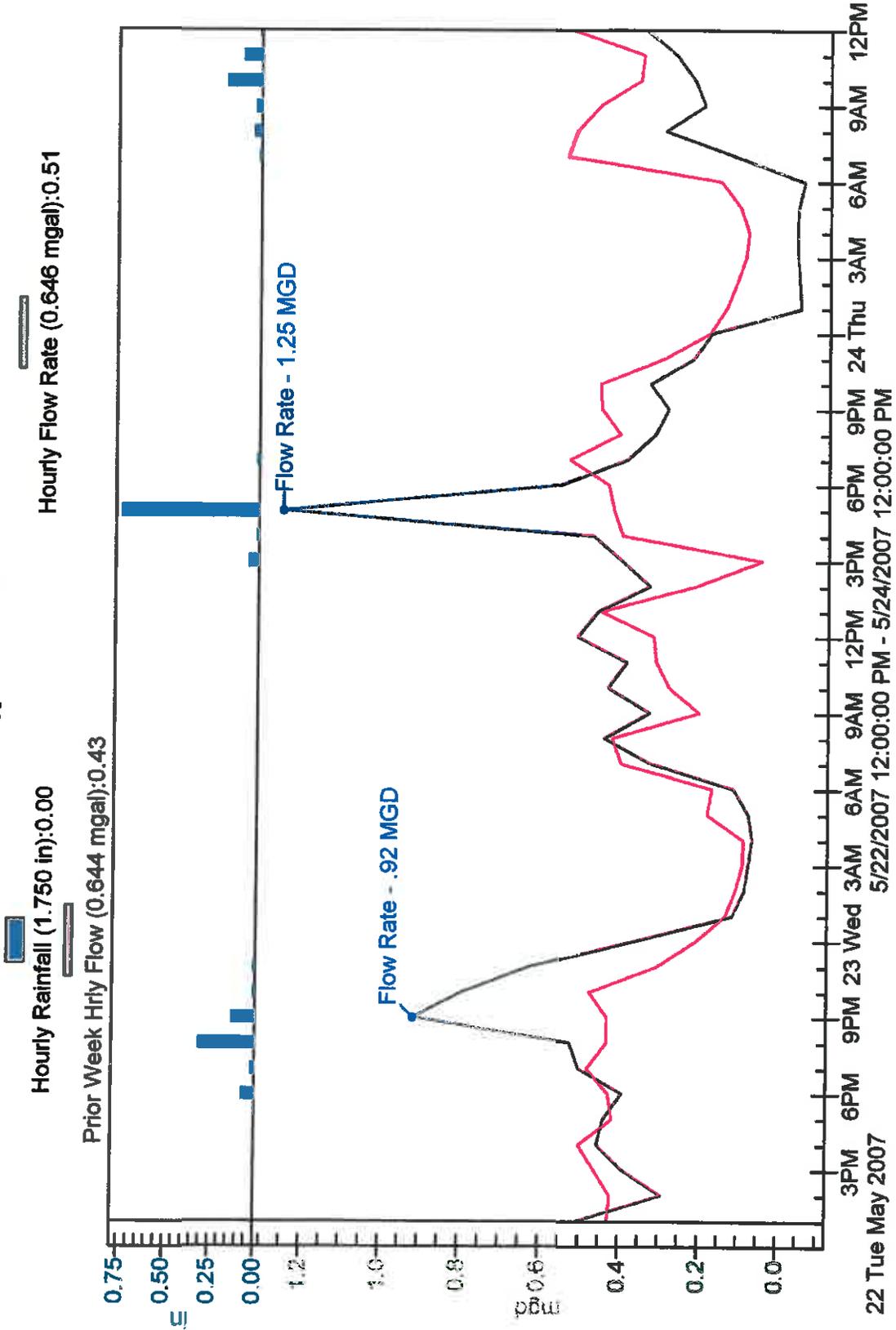


Appendix C

Peak I/I Flow Rate Hydrographs

BAYPO DISTRICT 1

Bayport, Minnesota



22 Tue May 2007

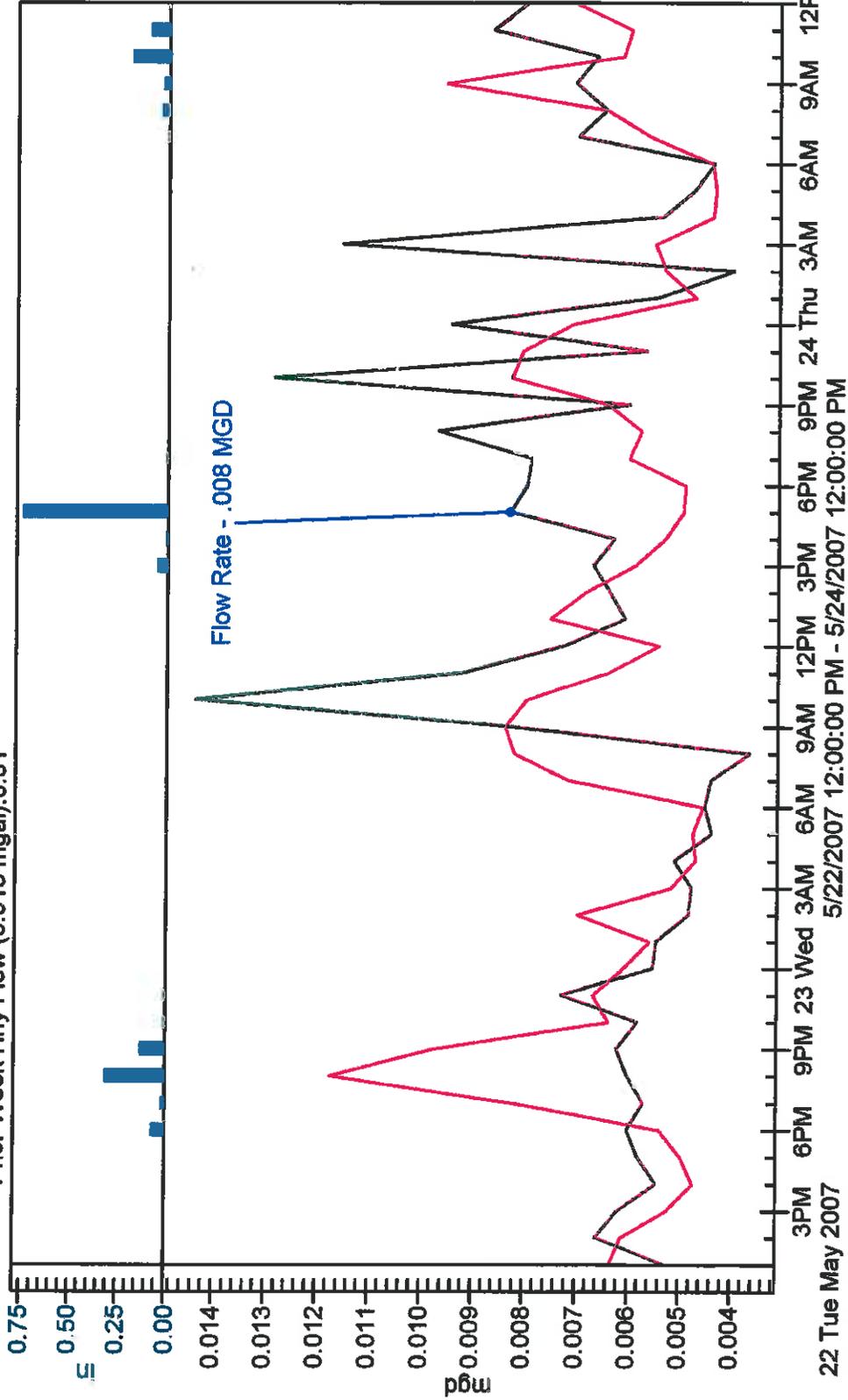
BAYPOD #2

Bayport, Minnesota

Hourly Flow Rate (0.013 mgal):0.01

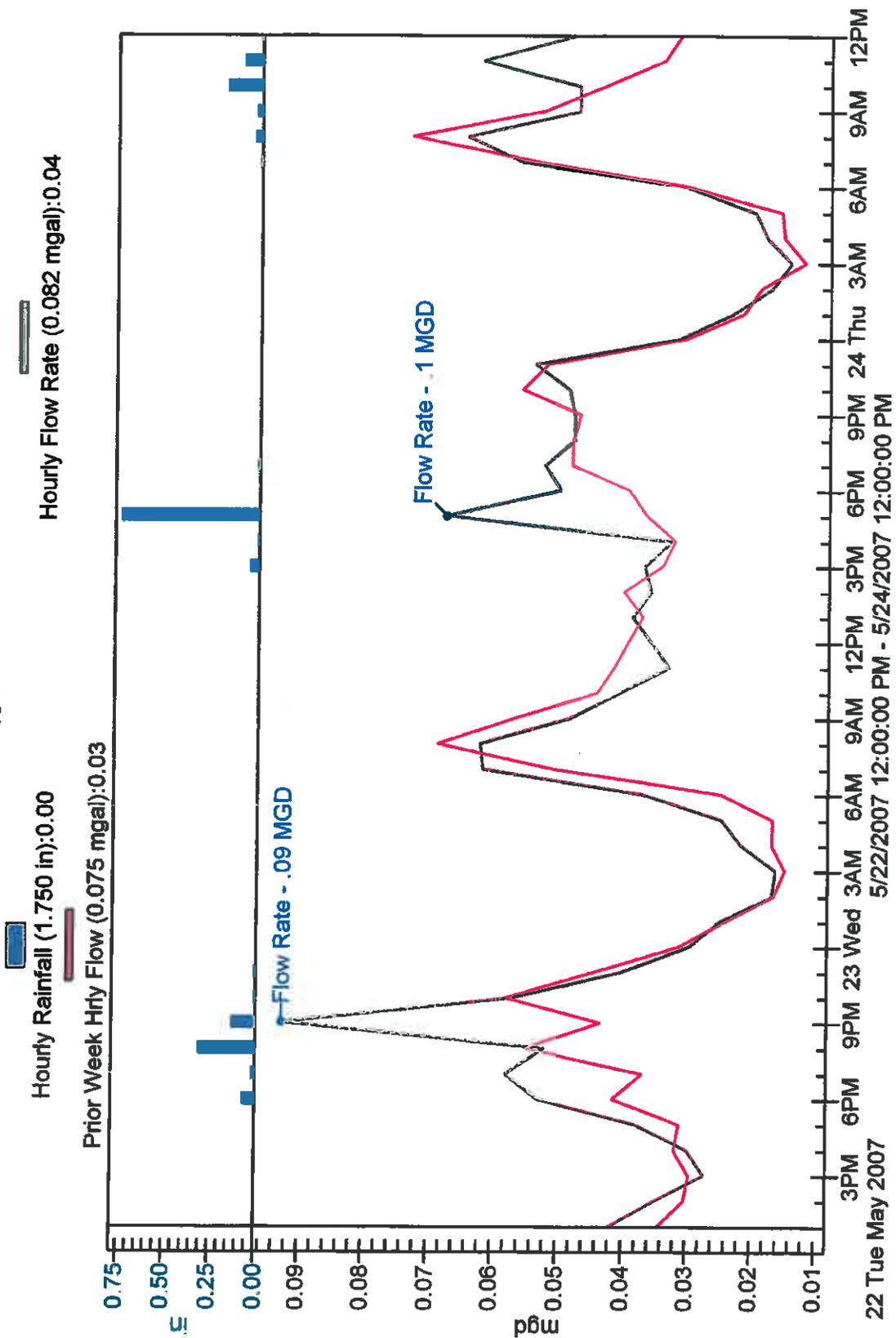
Hourly Rainfall (1.750 in):0.00

Prior Week Hrly Flow (0.013 mgal):0.01



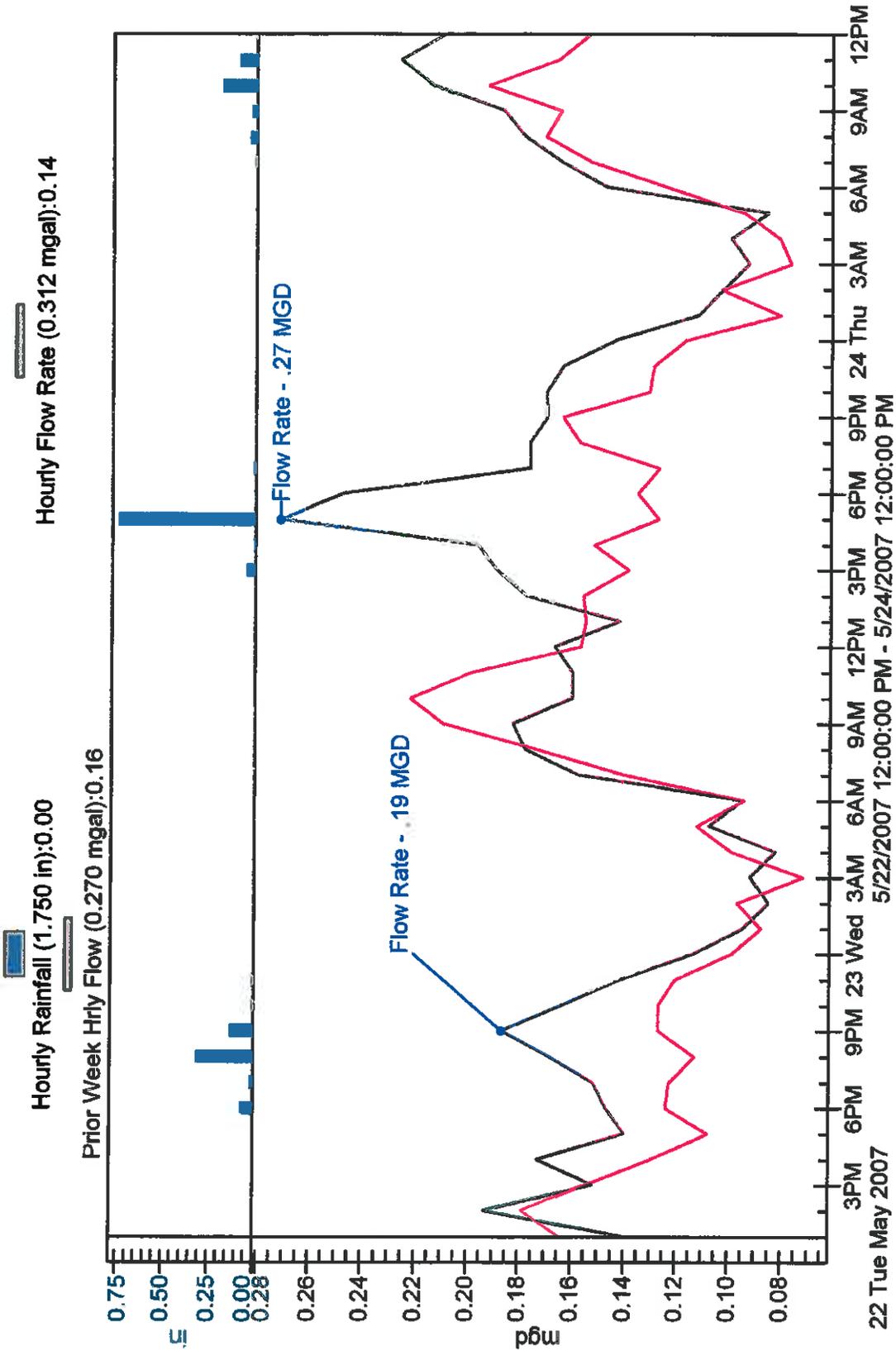
BAYPO D #3

Bayport, Minnesota



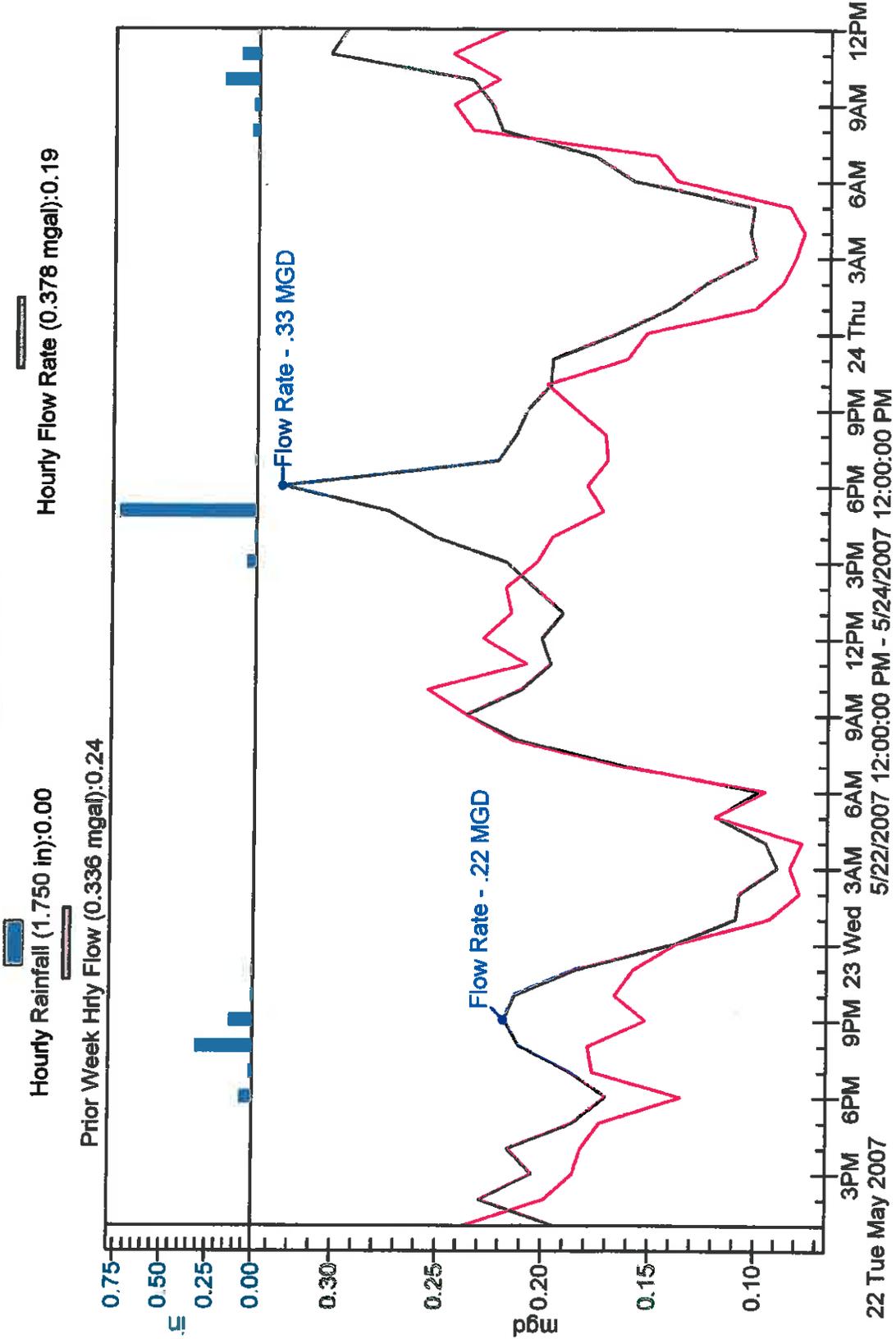
BAYPOD #4

Bayport, Minnesota



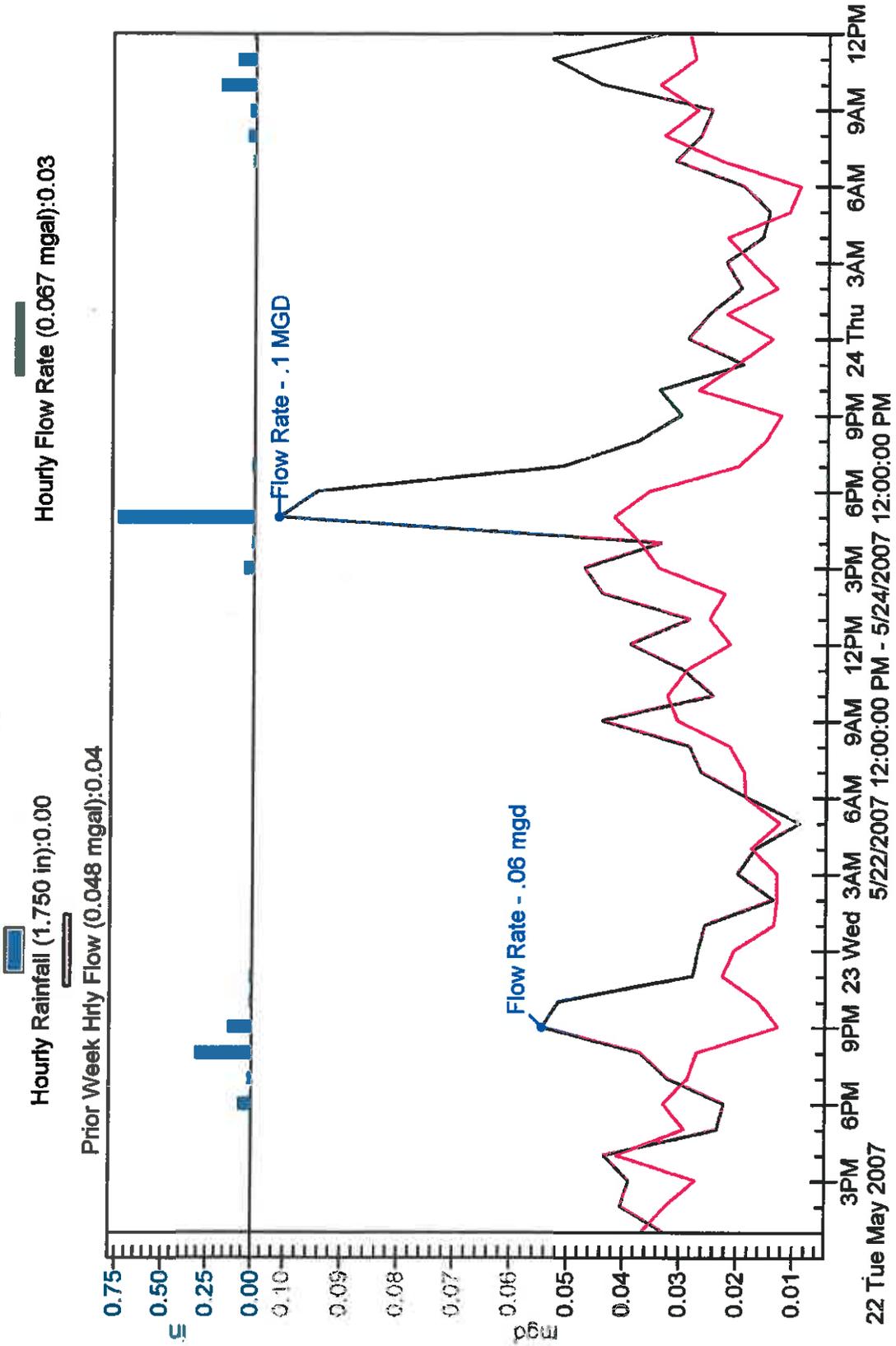
BAYPO D #5

Bayport, Minnesota



BAYPO D#6

Bayport, Minnesota



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Appendix D

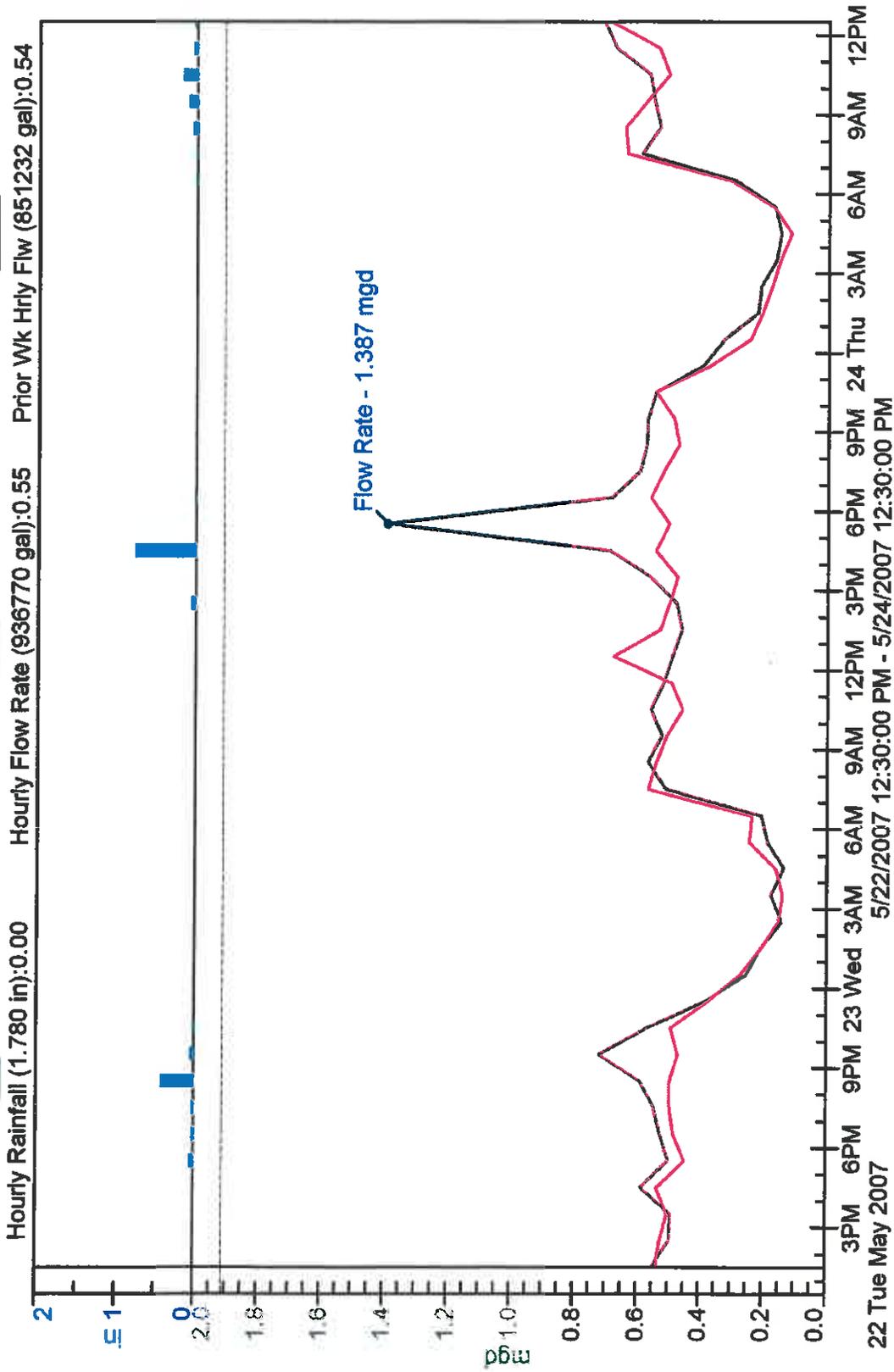
MCES Meter Station M609 Hydrographs

11

11

MCES Meter Station M609

Bayport, Minnesota



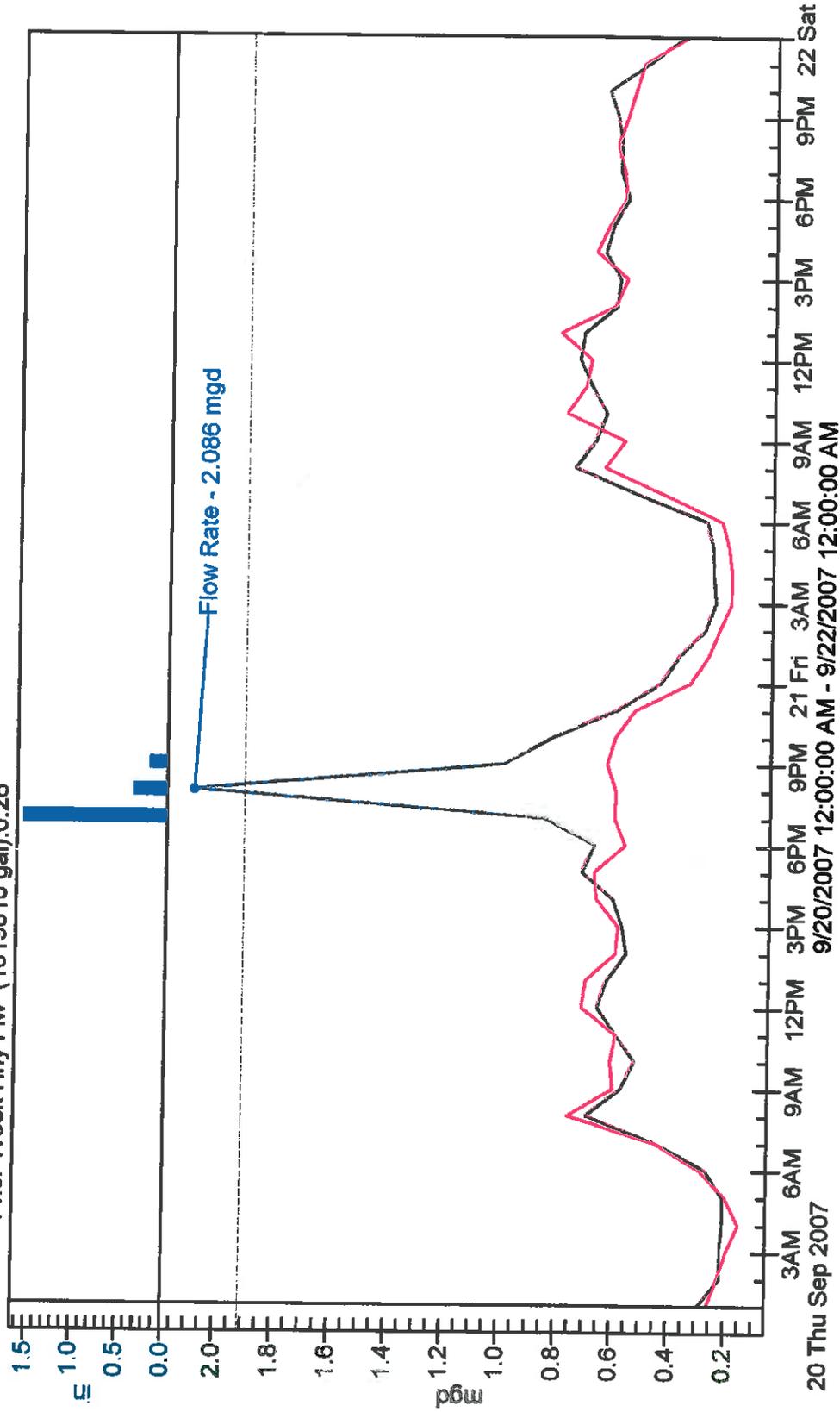
MCES Meter Station M609

Bayport, Minnesota

Hourly Rainfall (2.130 in):0.00

Hrly Flow Rate (1143580 gal):0.29

Prior Week Hrly Flw ('1019010 gal):0.26



Amendments

February 6, 2012

Page 27 – Bicycle and Pedestrian Requirements
Page 28 – Parks, Existing and Proposed Trails,
Sidewalks and Paths

Description: Amendment to comply with the
Metropolitan Council's 2030 Policy Plan
(acknowledge the Middle St. Croix Valley
Regional Trail Search Corridor and conform to the
Regional Parks Policy Plan)

