Local Surface Water Management Plan

City of Farmington

July 2008

Bonestroo

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July 14, 2008

Bonestroo

Mr. Kevin Schorzman
City Engineer
Farmington City Hall
325 Oak Street
Farmington, MN 55024

Re: Local Surface Water Management Plan
City of Farmington
Bonestroo File No.: 000141-06285

Dear Kevin:

Transmitted herewith is the City of Farmington's final updated Local Surface Water Management Plan (Plan). The Plan addresses water quantity, water quality, and wetland management issues and priorities.

This Plan incorporates comments from City staff, the Metropolitan Council, and the Vermillion River Watershed Joint Powers Organization. Consequently, the Plan represents a consensus among different levels of government on Farmington's approach to managing its local water resources as well as how Farmington's efforts fit with broader regional water resource management objectives. Equally important, the Plan meets the requirements listed under Minnesota Statute 103B, Minnesota Rules 8410, and applicable watershed organization rules.

Thank you for the opportunity to serve the City of Farmington. If you have any questions regarding the Local Surface Water Management Plan, please contact me at (651) 604-4706.

Sincerely,

BONESTROO

Emily Resseger
Project Engineer

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.

Daniel J. Edgerton, P.E.

Date: July 14, 2008 Reg. No. 19206

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Executive Summary

BACKGROUND

This Local Surface Water Management Plan will serve as a comprehensive planning document to guide the City of Farmington in conserving, protecting, and managing its surface water resources. This report builds upon previous Surface Water Management Plans and addendums completed by the City in 1985, 1997 and 2006. This plan may be periodically amended to remain current with local practices and policies.

This plan has been created to meet the requirements detailed in Minnesota Statutes 103B and Minnesota Rules 8410, administered by the Minnesota Board of Water and Soil Resources. This plan is consistent with the goals and policies of the Metropolitan Council's *2030 Water Resources Management Policy Plan.*

This plan is also consistent with the Vermillion River Watershed Joint Powers Organization (VRWJPO) Watershed Plan, adopted by the watershed in November 2005. The VRWJPO plan provides a summary of water and natural resources within the district, and recognizes the impact of urban development on the hydrology of the Vermillion River and adjacent resources. The City of Farmington shares in the benefits and responsibilities of addressing those issues.

GOALS

Farmington is a growing community. Development and changes in land use will continue into the future and have the potential to decrease water quality, increase flooding, impact water resources and increase public expenditures on surface water management. The goals identified in this LSWMP are to:

1) Provide effective and responsible local management of water resources.
2) Protect and enhance surface water quality in the City.
3) Provide flood protection for persons and property, and manage the rate and volume of runoff entering rivers, streams, lakes and wetlands within the City.
4) Protect groundwater quality and quantity to preserve it for sustainable and beneficial purposes.
5) Maintain and enhance the functions and values of wetlands within the City.
6) Preserve floodplains and manage adjacent uses to prevent flood damages.
7) Develop or improve recreational open space areas, fish and wildlife habitat, and public accessibility in conjunction with water quality improvement projects.
8) Protect and conserve water and natural resources by promoting sustainable growth and integrated land use planning.
9) Increase public awareness of the function and value of surface water resources and the impacts associated with human activities.
10) Maintain adequate funding for surface water management.

ORGANIZATION

This LSWMP is organized as follows:

Section 2 describes the physical environment; the natural resources and land uses within the City.

Section 3 summarizes the inventories, assessments and modeling completed for this plan, and provides a current assessment of surface water management in Farmington.

Section 4 lists the goals and policies identified to address surface water management needs in the City.

Section 5 summarizes current ordinances and capital projects planned to implement the goals and policies listed in Section 4.

Section 6 outlines the continued administration of this plan.

SUMMARY

The preparation of this plan included a hydrologic model of the current surface water system in Farmington. The City has been divided into seven major drainage districts as shown on Map 1. The map shows several existing and proposed regional ponds for stormwater management. The City has successfully implemented a regional ponding approach since the preparation of its first Storm Drainage Plan in 1985. The design of drainage systems continues to become more complex. Runoff reduction, infiltration, pollutant removal, groundwater recharge and stream protection are a few of the current goals in system design. Portions of the Vermillion River and its tributaries are designated trout streams, listed in Minnesota Rule 6264.005, Subpart 4. Listed sections and streams in and near Farmington are shown in Figure 2.2.3.

There are eight Public Waters wetlands within Farmington identified on Map 3. The City will enforce the requirements of the Wetland Conservation Act, including requirements for no net loss of wetland quantity, quality and biological diversity.

The MPCA's 2008 Impaired Waters List (still in draft form) includes new listings within Farmington, identified in Figure 2.2.1. Sections of the Vermillion River, North Creek, Middle Creek, South Creek and the South Branch of the Vermillion River are impaired for aquatic recreation by fecal coliform. The Vermillion River is also impaired for aquatic life by turbidity. The City will be required to update this surface water management plan to incorporate the findings of each completed TMDL study.

The City will maintain full authority for watershed management permitting of land alteration activities within the City. The VRWJPO adopted Watershed Standards in January 2007. This plan compares the regulatory controls of the two agencies and identifies specific City codes that must be updated to achieve consistency with the VRWJPO. Per State statute, City Codes will need to be updated within 180 days after adoption of this plan by the watershed.

The EPA's NPDES program required the City of Farmington to obtain permit coverage in 2003, by implementing a stormwater pollution prevention program. Many of the goals and policies discussed in this LSWMP are directly related to requirements listed in the NPDES program.

Surface water management activities in Farmington are funded through a combination of stormwater utility revenue and area charges for new development. The City will periodically review and update the schedule of utility fees and area charges to maintain adequate support for the stormwater management program.

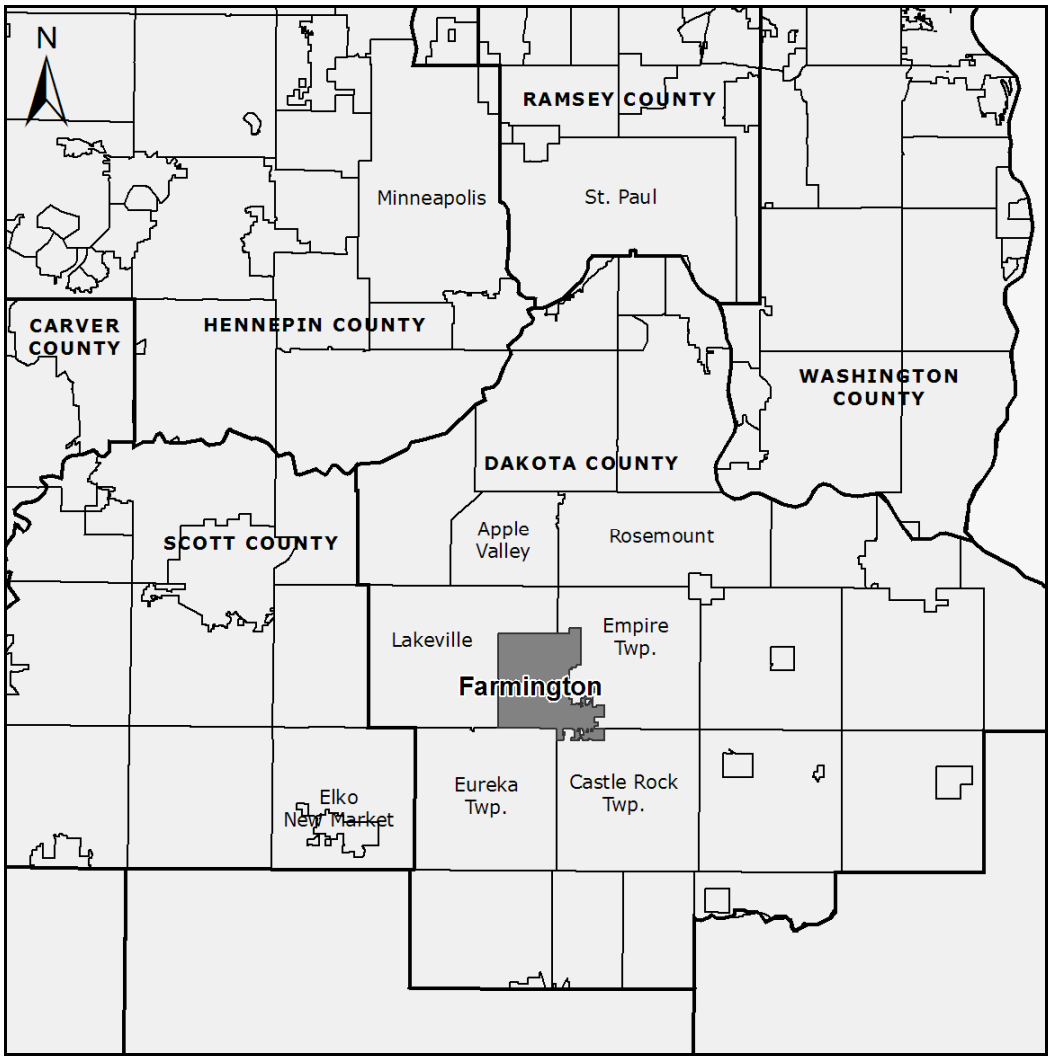
This Local Surface Water Management Plan will be incorporated into the City's 2008 Comprehensive Plan update and will be applicable until 2018, at which time an updated plan will be required. Periodic amendments may be required to incorporate changes in local practices.

Section 1 – Introduction and Purpose

1.1 LOCATION

The City of Farmington is located in central Dakota County, about 20 miles south of Minneapolis / St. Paul. Farmington is bordered on the north and west by the City of Lakeville, on the east by Empire Township, and on the south by Eureka Township and Castle Rock Township.

FIGURE 1.1 LOCATION MAP



1.2 PURPOSE & SCOPE

This Local Surface Water Management Plan will serve as a comprehensive planning document to guide the City of Farmington in conserving, protecting, and managing its surface water resources. This report builds upon previous Surface Water Management Plans and addendums completed by the City in 1985, 1997 and 2006. This plan may be periodically amended to remain current with local practices and policies.

This plan has been created to meet the requirements detailed in Minnesota Statutes 103B and Minnesota Rules 8410, administered by the Minnesota Board of Water and Soil Resources. This plan is consistent with the goals and policies of the Metropolitan Council's *2030 Water Resources Management Policy Plan.*

This plan is also consistent with the Vermillion River Watershed Joint Powers Organization (VRWJPO) *Watershed Plan*, which recognizes the impact of urban development on the hydrology of the Vermillion River and identifies these primary issues:

a) Vermillion River flow volumes have increased

b) Surface water quality is threatened or impaired

c) Vermillion River channel/corridor is impacted and sensitive to change

d) Sensitive resources are present and/or threatened or impaired

e) Groundwater quality is threatened or impaired

f) Additional development is expected

g) Data for making informed decisions is limited

h) Public awareness about water resources in the Watershed and appropriate stewardship is limited

1.3 PLAN ORGANIZATION

This plan is organized as follows:

Section 2 describes the physical environment; the natural resources and land uses within the City.

Section 3 summarizes the inventories, assessments and modeling completed for this plan, and provides a current assessment of surface water management in Farmington.

Section 4 lists the goals and policies identified to address surface water management needs in the City.

Section 5 summarizes current ordinances and capital projects planned to implement the goals and policies listed in Section 4.

Section 6 outlines the continued administration of this plan.

1.4 SUMMARY OF AGENCIES INVOLVED IN SURFACE WATER MANAGEMENT

1.4.1 CITY OF FARMINGTON

The Farmington Engineering Department is responsible for the planning and construction of infrastructure improvements and local administration of the Wetland Conservation Act. The Farmington Municipal Services Department monitors and maintains the drainage system.

The Farmington Planning Division manages comprehensive planning and administers the zoning code within the City. These City departments coordinate with outside agencies in water resource management and conservation.

1.4.2 DAKOTA COUNTY

The Dakota County Water Resources Office manages the County's well, shoreland, floodplain, feedlot and septic system regulating programs. The Water Resources Office provides educational outreach and coordinates these activities within other agencies.

In addition, the Water Resources Office monitors and analyzes groundwater to identify contaminants, their sources, and flow paths. Specific studies include the annual Ambient Groundwater Study and the Hastings Area Nitrate Study II.

The Water Resources Office is also the operational agent for the Vermilion River Watershed and collaborates with the Dakota Soil and Water Conservation District to monitor and analyze surface water flow and pollutant sources.

1.4.3 DAKOTA COUNTY SOIL AND WATER CONSERVATION DISTRICT (DSWCD)

In the 1930's, Soil and Water Conservation Districts were created in response to national concern over erosion and floods. These Districts were organized along county boundaries with the purpose of managing and directing conservation programs and assisting landowners in conserving soil and water resources. The Dakota County Soil and Water Conservation District was established in 1942 through State Statute 103C.

The DSWCD provides technical assistance to county residents, local government units, watershed organizations and other agencies. The DSWCD assists with implementation of natural resource management plans, the Wetland Conservation Act, natural resource education, and application of sound natural resource practices. DSWCD programs are funded through County allocation, grants, contracts with local government units, contracts with watershed organizations, and state and federal cost share.

1.4.4 VERMILLION RIVER WATERSHED JOINT POWERS ORGANIZATION (VRWJPO)

In 1982, the legislature approved the Metropolitan Surface Water Management Act, Chapter 103B of Minnesota Statutes. This act requires all metro-area local governments to address surface water management through participation in a watershed management organization (WMO). A WMO can be organized as a watershed district, as a joint powers agreement among local governments, or as a function of county government. There are 46 watershed management organizations within the metropolitan area.

The Vermillion River Watershed Joint Powers Organization (VRWJPO) was established in September 2002 through a joint powers agreement between Dakota and Scott Counties, to protect the water resources in the Vermillion River watershed. The Vermillion River originates in New Market Township in Scott County and travels east across Dakota County before dropping 90 feet at the falls in the City of Hastings. East of Hastings, the river splits: one branch flows north to the Mississippi River; the other flows south, paralleling

the Mississippi River through Ravenna and Welch Townships before joining the Mississippi River near the city of Red Wing in Goodhue County. All or parts of the following cities are in the Vermillion Watershed: Apple Valley, Burnsville, Coates, Elko, Farmington, Hampton, Hastings, Lakeville, New Market, Rosemount and Vermillion. All or parts of the following townships are in the Vermillion Watershed: Castle Rock, Douglas, Empire, Eureka, Hampton, Marshan, New Market, Nininger, Ravenna, and Vermillion. The Watershed includes approximately 335 square miles.

The current VRWJPO *Watershed Management Plan* was adopted by the watershed in November 2005. The Plan recognizes the impact of urban development on the hydrology of the Vermillion River and adjacent resources, including decreased water quality, streambank instability, loss of habitat, and groundwater contamination. The plan identifies goals, policies and implementation actions targeting these issues.

Cities and townships in the Watershed are required to bring their local surface water management plans into compliance with the Watershed Management Plan. This will provide consistency in efforts to improve water quality and help prevent conflicting programs and duplication of efforts.

The VRWJPO adopted Watershed Standards in January 2007, to implement specific policies identified in the *Watershed Management Plan*. The City of Farmington is required to implement codes and standards consistent with the Watershed Standards.

1.4.5 Metropolitan Council

Established by the Minnesota Legislature in 1967, the Metropolitan Council is the regional planning organization for the Twin Cities, seven-county area. The Council manages public transit, housing programs, wastewater collection and treatment, regional parks and regional water resources. Council members are appointed by the Minnesota Governor.

The Metropolitan Council reviews municipal comprehensive plans, including this local surface water management plan. The Council adopted the *Water Resources Management Policy Plan* in 2005, establishing the expectations to be met in local plans. The Council's goals focus on water quality standards and pollution control, "to reduce the effects of nonpoint source pollution on the region's wetlands, lakes, streams and rivers."

1.4.6 State Board of Water and Soil Resources (BWSR)

The Minnesota Board of Water and Soil Resources (BWSR) works through local government agencies to implement Minnesota's water and soil conservation policies. The BWSR is the administrative agency for soil and water conservation districts, watershed districts, watershed management organizations and county water managers. The BWSR is responsible for implementation of the Metropolitan Surface Water Management Act and the Wetland Conservation Act. Staff members are located in eight field offices throughout the state.

First established in 1937 as the State Soil Conservation Committee, the agency became part of the University of Minnesota in the 1950's, transferred to the Department of Natural Resources in 1971, then transferred to the Department of Agriculture in 1982. In 1987 the State Legislature established the current Board of Water and Soil Resources. The Board consists of 17 members, appointed by the governor to four-year terms. Multiple state and local agencies are represented on the Board.

In 1992, the BWSR adopted rules (8410), establishing the required content for local surface water management plans.

1.4.7 Minnesota Pollution Control Agency (MPCA)

The MPCA is the state's lead environmental protection agency. Created by the State Legislature in 1967, the MPCA is responsible for monitoring environmental quality and enforcing environmental regulations to protect the land, air and water. The MPCA regulates Farmington's management of wastewater, stormwater and solid waste.

The MPCA is the permitting authority in Minnesota for the National Pollutant Discharge Elimination System (NPDES), the federal program administered by the Environmental Protection Agency to address polluted stormwater runoff. The NPDES program required the City of Farmington to obtain permit coverage in 2003, by implementing a stormwater pollution prevention program (SWPPP) to address six minimum control measures:

1) Public education
2) Public involvement
3) Illicit discharge detection and elimination
4) Construction site runoff control
5) Post-construction runoff control
6) Pollution prevention in municipal operations

Farmington is subject to more stringent NPDES permit requirements where stormwater drains to the Vermillion River; which is a trout stream designated by the Minnesota Department of Natural Resources.

In addition to the NPDES program, the MPCA is required to publish a list of impaired waters; lakes and streams in the state that are not meeting federal water quality standards. For each water body on the list, the MPCA is required to conduct a study to determine the allowable Total Maximum Daily Load (TMDL) for each pollutant that exceeds the standards. The 2006 MPCA list of impaired waters identifies 2,250 TMDL reports needed for 1,297 lakes, rivers and streams in the state. Local governments will be required to incorporate completed TMDL studies into their surface water management plans.

In response to these multiple regulatory activities, the MPCA published the *Minnesota Stormwater Manual* (Version 1.1, 2006), providing stormwater management tools and guidance. The Manual presents a unified statewide approach to stormwater practices.

1.4.8 Minnesota Department of Natural Resources (DNR)

Originally created in 1931 as the Department of Conservation, the DNR has regulatory authority over the natural resources of the state. DNR divisions specialize in waters, forestry, fish and wildlife, parks and recreation, land and minerals, and related services. The Division of Waters administers programs in lake management, shoreland management, dam safety, floodplain management, wild and scenic rivers, the public waters inventory (PWI), and permitting of development activity within public waters.

1.4.9 Minnesota Department of Health (MDH)

The MDH manages programs to protect the public health, including implementation of the Safe Drinking Water Act. The MDH has regulatory authority for monitoring water supply facilities such as water wells, surface water intakes, water treatment, and water distribution systems. The MDH also is responsible for the development and implementation of the wellhead protection program.

1.4.10 Minnesota Environmental Quality Board (EQB)

The EQB is comprised of five citizen members and the heads of ten state agencies that play an important role in Minnesota's environment and development. The EQB develops policy, creates long-range plans and reviews proposed projects that may significantly influence Minnesota's environment.

Farmington's 2006 AUAR for the Newland Annexation Area was completed to satisfy EQB requirements. The City is required to provide an update every five years to notify the EQB of the progress of development and mitigation in the area.

1.4.11 Minnesota Department of Transportation (Mn/DOT)

Within the City, Mn/DOT administers several state highway systems. Mn/DOT approval is required for any construction activity within state right-of-ways. Mn/DOT also administers a substantial amount of funding for transportation projects completed in the City. Anticipated activities of Mn/DOT are periodically published in their State Transportation Improvement Plan (STIP).

1.4.12 U.S. Environmental Protection Agency (EPA)

The EPA develops and enforces the regulations that implement environmental laws enacted by Congress; however the MPCA bears responsibility for implementing many of the resulting programs within Minnesota. The NPDES program and the Impaired Waters List are both the result of the Clean Water Act, administered by the EPA.

1.4.13 U.S. Army Corp of Engineers (USACE)

Under Section 404 of the Clean Water Act, including subsequent modifications, the USACE regulates the placement of fill into "Waters of the U.S.". In 1993, there was a modification of the definition of "discharge of dredged material" to include incidental discharges associated with excavation. This modification meant that any excavation done within a wetland required the applicant to go through Section 404 permitting procedures. In 1998, however, this decision was modified so that excavation in wetlands is now regulated by the USACE only when it is associated with a fill action. Recent court rulings, such as SWANCC in 2001 and Rapanos in 2006 limit the USACE jurisdiction to mostly those waters and wetlands that are traditionally defined as navigable waters and those adjacent to or connected to navigable waters. The USACE now makes jurisdictional determinations based on a significant nexus to navigable waters. Generally the USACE will not now assert jurisdiction over swales, road side ditches, and isolated wetlands.

1.4.14 Federal Emergency Management Agency (FEMA)

FEMA manages federal disaster mitigation and relief programs, including the National Flood Insurance Program (NFIP). This program includes floodplain management and flood hazard mapping. FEMA published the Flood Insurance Rate Map (FIRM) for Farmington in 1979.

1.4.15 Natural Resources Conservation Service (NRCS)

The Natural Resources Conservation Service (NRCS) is a division of the U.S. Department of Agriculture. Formerly named the Soil Conservation Service (SCS), the NRCS provides technical advice and engineering design services to local conservation districts across the nation. The *Soil Survey of Dakota County Minnesota* was published by the Soil Conservation Service in 1983. The SCS also developed hydrologic calculation methods that are widely used in water resources design.

1.4.16 U.S. Geological Survey (USGS)

The USGS provides mapping and scientific study of the nation's landscape and natural resources. USGS maps provide the basis for many local resource management efforts.

1.4.17 U.S. Fish and Wildlife Service (USFWS)

The USFWS works to conserve and protect the nation's fish, wildlife, plants and habitat. The USFWS developed the National Wetlands Inventory (NWI) beginning in 1974, to support federal, state and local wetland management work.

1.5 WATER RESOURCE RELATED AGREEMENTS

1.5.1 VRWJPO Joint Powers Agreement

The Vermillion River Watershed Joint Powers Organization (VRWJPO) was established in September 2002 through a joint powers agreement between Dakota and Scott Counties, to protect the water resources in the Vermillion River watershed. The *Joint Powers Agreement between Dakota County and Scott County for the Vermillion River Watershed* defines the authority and duties of the agency. In addition to meeting the requirements of State statutes, the purpose of this agreement is to jointly and cooperatively institute programs to conserve soil and water resources. A copy of the agreement is included in Appendix E for reference.

1.6 RELATED STUDIES, PLANS AND REPORTS

1.6.1 City of Farmington Surface Water Management Plan 1997

The last surface water management plan was completed by Farmington in 1997. The City completed an update to the plan in 2006 to include the Newland Annexation Area northeast of the City. The City also completed an addendum to that plan in February 2006, to include a developing area southeast of the City. Elements of these previous plans have been incorporated into this LSMWP.

1.6.2 Wetland Inventory 1997

Wetlands were field inventoried as part of the development of the Wetland Protection Ordinance in 1997. This inventory utilized the Minnesota Routine Assessment Method for Evaluating Wetland Functions (MnRAM) Version 1.0. Approximately half of the city was inventoried during this process.

1.6.3 Seed/Newland (Genstar) AUAR Update 2006

Westwood Professional Services provided wetland delineation boundaries and MnRAM data for the classification of wetlands on this large parcel of land in the City's northeast corner. A Wetland Replacement Plan was approved in 2007 and allowed for impacts to some of the wetlands on the site. The current wetland classification map reflects the remaining non-impacted wetlands on the site.

1.6.4 SWMP Addendum SE Area 2006

This addendum expanded the 1997 Surface Water Management Plan into areas southeast of the City limits. Approximately 37 additional wetland basins were identified and assessed in 2005 utilizing MnRAM 3.0. The subsequent classification and GIS data were added to the City's classification map.

1.6.5 VRWJPO WATERSHED MANAGEMENT PLAN 2005

The current VRWJPO *Watershed Management Plan* was adopted by the watershed in November 2005. The plan provides a summary of the water and natural resources within the district, and identifies several primary issues. The Plan recognizes the impact of urban development on the hydrology of the Vermillion River and adjacent resources, including decreased water quality, streambank instability, loss of habitat, and groundwater contamination. The plan identifies goals, policies and implementation actions targeting these issues.

1.7 SUMMARY OF ISSUES AND GOALS

Within the VRWJPO, surface water quality is already impaired in some local water bodies, and groundwater quality is threatened. Hydrology, channel stability and sensitive habitats in the Vermillion River have been impacted by previous land use and development. Section 3 of the VRWJPO Watershed Plan identifies the primary issues facing the watershed. The City of Farmington shares in the benefits and responsibilities of addressing those issues.

Farmington is a growing community. Development and changes in land use will continue into the future and have the potential to decrease water quality, increase flooding, impact water resources and increase public expenditures on surface water management. The goals identified in this Local Surface Water Management Plan are to:

1) Provide effective and responsible local management of water resources.

2) Protect and enhance surface water quality in the City.

3) Provide flood protection for persons and property, and manage the rate and volume of runoff entering rivers, streams, lakes and wetlands within the City.

4) Protect groundwater quality and quantity to preserve it for sustainable and beneficial purposes.

5) Maintain and enhance the functions and values of wetlands within the City.

6) Preserve floodplains and manage adjacent uses to prevent flood damages.

7) Develop or improve recreational open space areas, fish and wildlife habitat, and public accessibility in conjunction with water quality improvement projects.

8) Protect and conserve water and natural resources by promoting sustainable growth and integrated land use planning.

9) Increase public awareness of the function and value of surface water resources and the impacts associated with human activities.

10) Maintain adequate funding for surface water management.

Section 2 – Land and Water Resource Inventory

2.1 PHYSICAL ENVIRONMENT

2.1.1 TOPOGRAPHY

The City has two distinct types of topography. The western section of the City is characterized by moderate to steep slopes draining to the South Creek and Middle Creek tributaries of the Vermillion River. In contrast, the eastern portion of the City includes the flat floodplains of North Creek and the Vermillion River. Overall topography within the study area is shown in Figure 2.1.1.

2.1.2 SOILS

The Soil Conservation Service (SCS) published the Soil Survey of Dakota County Minnesota in 1983. The Soil Survey provides mapping and physical properties for soil types found in the area. The Soil Survey was added to the Soil Survey Geographic (SSURGO) Database in 2005, providing digital access to the information.

The Soil Survey assigns each soil type to a hydrologic soil group, according to the soil's ability to infiltrate water during long-duration storms. The four hydrologic soil groups are: Group A - high infiltration, Group B - moderate infiltration, Group C - slow infiltration, and Group D – very slow infiltration. Most of the soil types in Farmington are classified in hydrologic soil group B.

Figures 1.7, 1.8, 1.9 and 1.10 in the VRWJPO Watershed Plan provide maps of soil characteristics over the entire watershed. Farmington contains concentrations of hydric and high infiltration soils along the floodplains of North Creek Middle Creek. Hydrologic soils within the study area are shown in Figure 2.1.2.

2.1.3 GEOLOGY AND GROUNDWATER

The VRWJPO Watershed Plan provides detailed discussions of geology (Section 1.1) and groundwater resources (Section 2.3) in the watershed. Residents of the watershed obtain all of their drinking water from groundwater sources. The DNR manages water appropriation permits to protect and preserve groundwater water sources. The Dakota County Groundwater Protection Plan (2000) provides an inventory of groundwater resources and a management plan for protection.

In areas where surface water and groundwater interact, there is a high potential for groundwater contamination. Downstream from Farmington, the Vermillion River loses flow to the groundwater system; therefore water quality in the River potentially impacts groundwater resources in the eastern portion of the watershed.

Surficial and bedrock geology within the study area are shown in Figures 2.1.3.1 and 2.1.3.2. Wells and the City's wellhead protection area are shown in Figure 2.1.3.3. Environmental hazards that pose a risk for groundwater contamination are shown in Figure 2.1.3.4.

FIGURE 2.1.1 TOPOGRAPHY

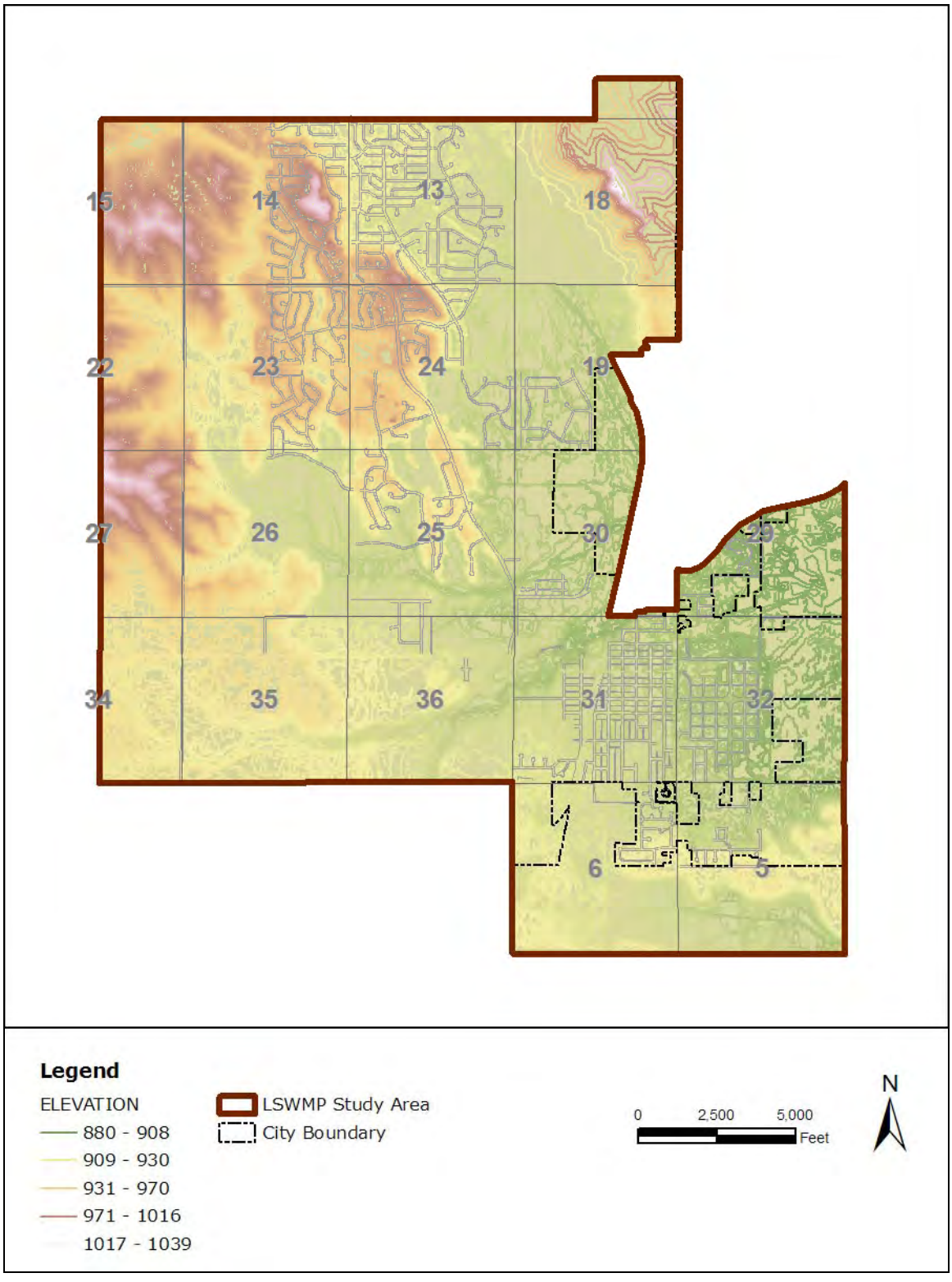


FIGURE 2.1.2 HYDROLOGIC SOIL GROUPS

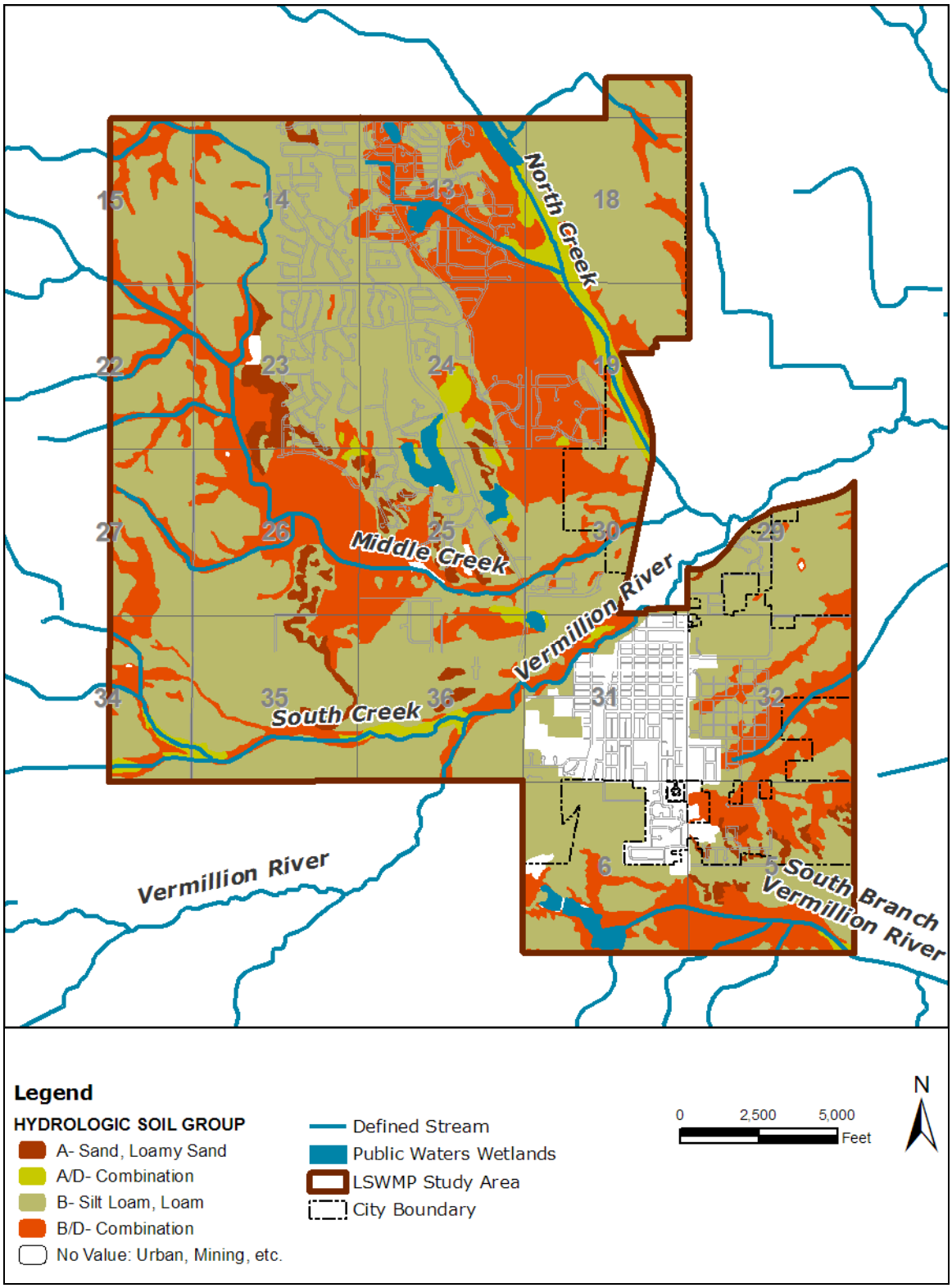


FIGURE 2.1.3-A SURFICIAL GEOLOGY

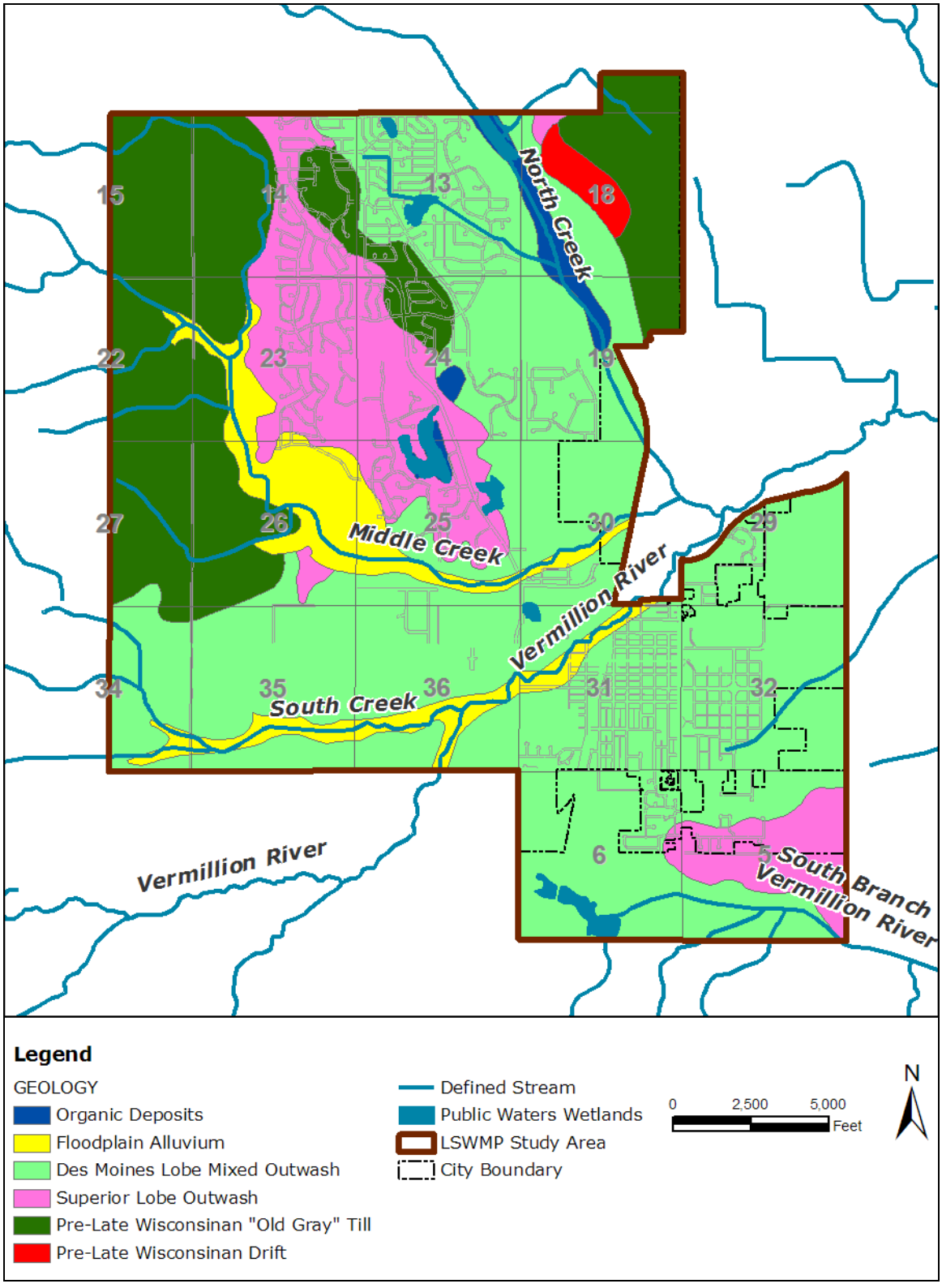


FIGURE 2.1.3-B BEDROCK GEOLOGY

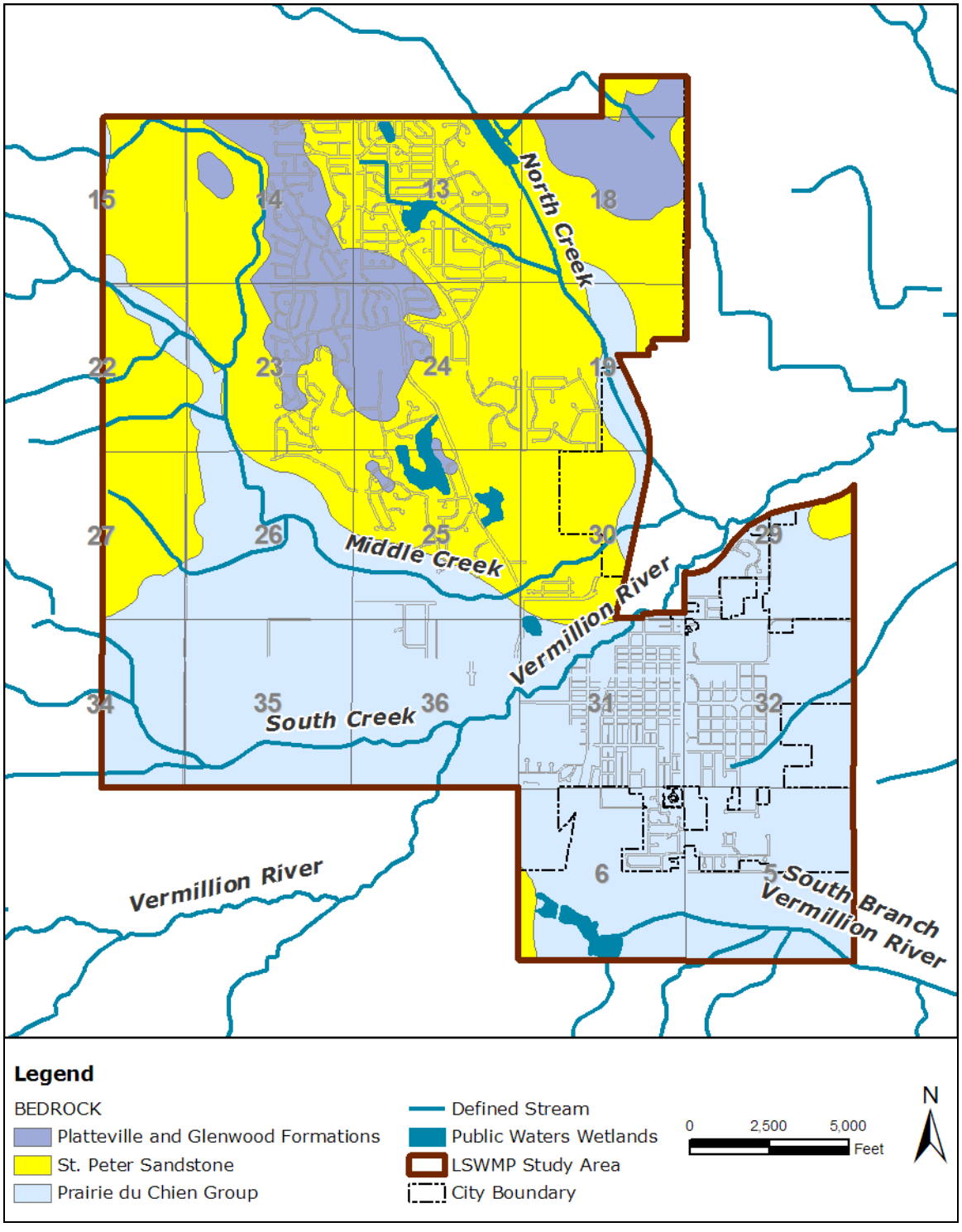


FIGURE 2.1.3-C WELL INVENTORY AND WELLHEAD PROTECTION AREA

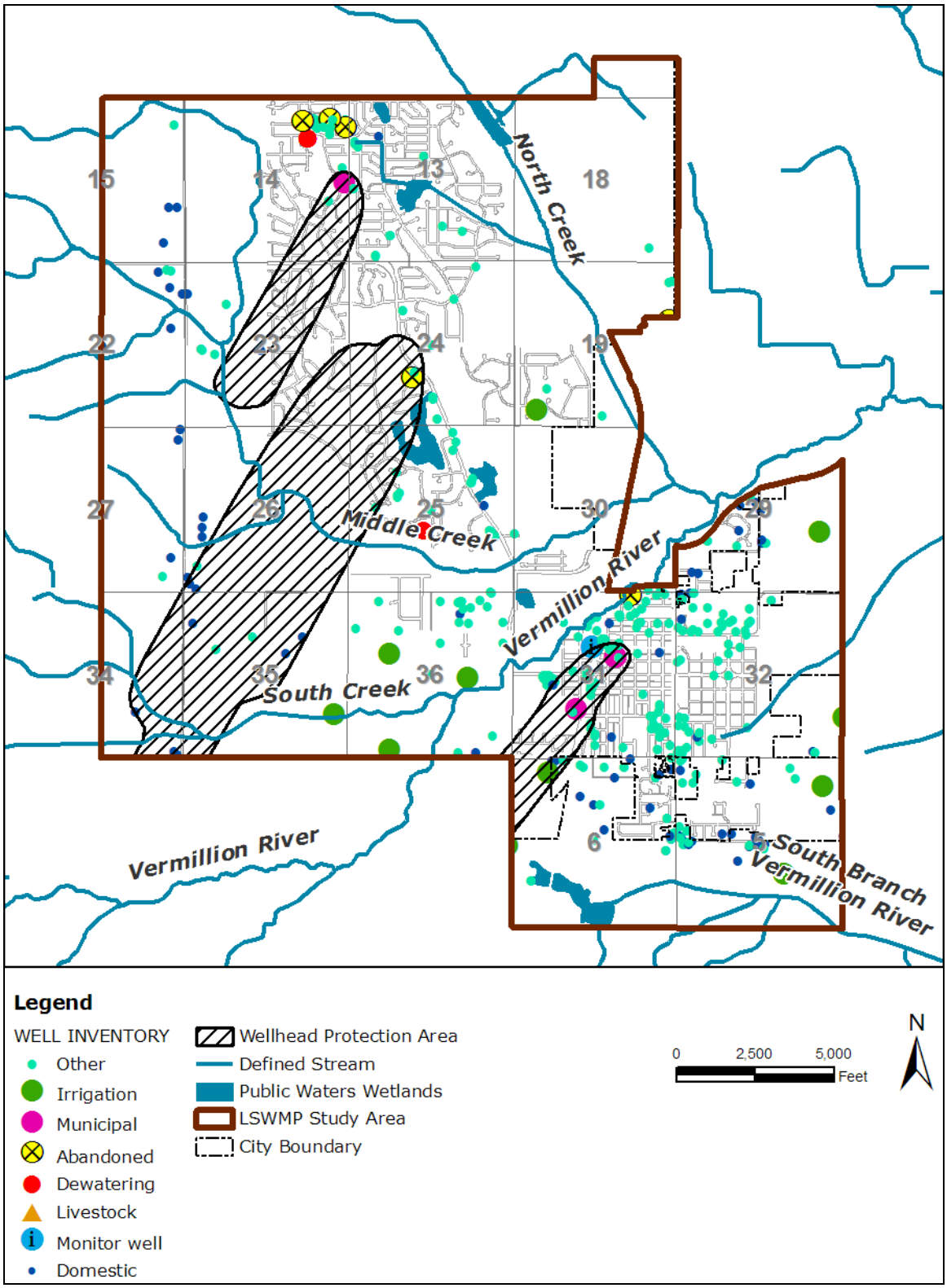
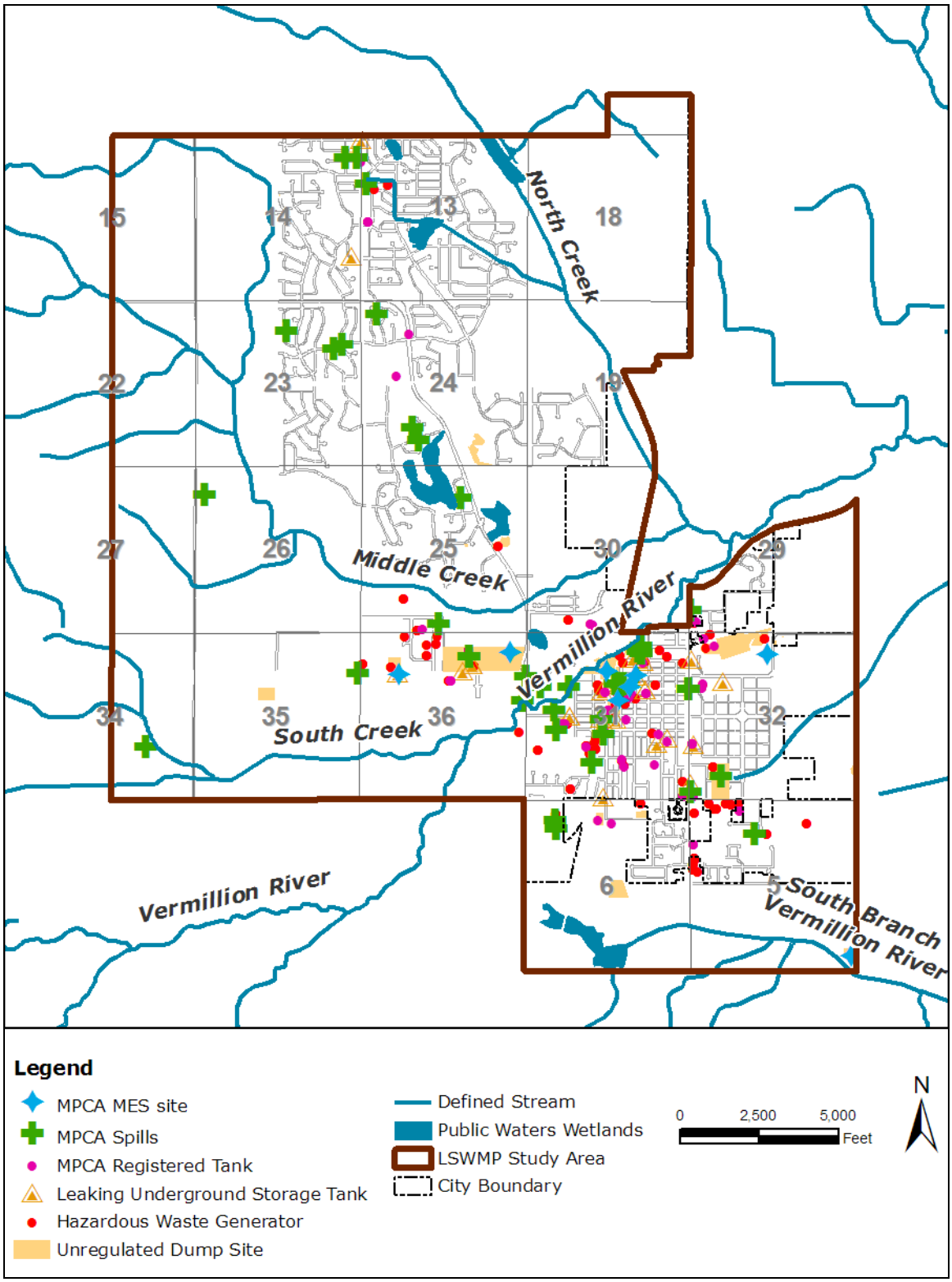


FIGURE 2.1.3-D ENVIRONMENTAL HAZARDS



2.1.4 CLIMATE

Climate data are published by the National Weather Service (NWS) station at Chanhassen, MN. The NWS is a branch of the National Oceanic and Atmospheric Administration (NOAA). Table 2.1.4-A provides a summary of average monthly precipitation data for Farmington.

Rainfall frequency estimates are used as design tools in water resource projects. Rainfall frequencies are summarized in Technical Paper No. 40, Rainfall Frequency Atlas of The United States, published by the U.S.

Weather Bureau in 1961. The U.S. Weather Bureau was combined with other agencies in 1970 to form the National Oceanic and Atmospheric Administration (NOAA). Table 2.1.4-B lists rainfall depth and frequency for 24-hour storms in Farmington.

TABLE 2.1.4-A FARMINGTON AVERAGE MONTHLY PRECIPITATION (INCHES), 1971-2000

JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
0.92	0.74	1.95	2.65	3.61	4.48	4.13	4.54	3.14	2.21	2.02	1.04	31.43

TABLE 2.1.4-B FARMINGTON 24-HOUR RAINFALL DEPTHS AND FREQUENCY

RECURRENCE INTERVAL (YRS)	24-HR RAINFALL DEPTH (IN)
1	2.4
2	2.8
5	3.6
10	4.2
25	4.8
50	5.4
100	6.0

2.2 WATER RESOURCES

2.2.1 PUBLIC WATERS

Public waters are all water basins and watercourses that meet the criteria set forth in Minnesota Statutes, Section 103G.005, Subdivision 15, that are identified on Public Water Inventory maps and lists authorized by Minnesota Statutes, Section 103G.201. Public waters wetlands include all Type 3, Type 4, and Type 5 wetlands (as defined in U.S. Fish and Wildlife Service Circular No. 39, 1971 edition) that are 10 acres or more in size in unincorporated areas or 2 ½ acres or more in size in incorporated areas (see Minnesota Statutes Section 103G.005, Subdivision 17b, Wetland Type). The Minnesota DNR utilizes county-scale maps to show the general location of the public waters and public waters wetlands (lakes, wetlands, and watercourses) under its regulatory jurisdiction. These maps are commonly known as Public Waters Inventory (PWI) maps. The regulatory "boundary" of these waters and wetlands is called the ordinary high water level (OHWL). Public Waters Inventory maps are available on a county-by-county basis. Public Waters watercourses are defined by the area between the banks of the stream, creek or river.

There are eight Public Waters wetlands within Farmington identified by the DNR Public Waters Inventory Map. These are identified by a PWI number in Figure 2.1.1 and on Map 2 attached to this report. Public watercourses include the main channels and tributaries of the Vermillion River, North Creek, Middle Creek and South Creek.

2.2.2 Impaired Waters

Per the requirements of the Clean Water Act, the Minnesota Pollution Control Agency maintains a list of impaired waters; lakes and streams in the state that do not meet federal water quality standards. For each water body on the list, the MPCA is required to conduct a study to determine the allowable Total Maximum Daily Load (TMDL) for each pollutant that exceeds the standards.

The 2006 Impaired Waters List does not include any water bodies in Farmington. The 2008 Impaired Waters List (still in draft form) includes new listings within Farmington, identified in Figure 2.2.1. Sections of the Vermillion River, North Creek, Middle Creek, South Creek and the South Branch of the Vermillion River are impaired for aquatic recreation by fecal coliform. The Vermillion River is also impaired for aquatic life by turbidity. The City will be required to update this surface water management plan to incorporate the findings of each completed TMDL study.

2.2.3 Trout Waters

Portions of the Vermillion River and its tributaries are designated trout streams, listed in Minnesota Rule 6264.005, Subpart 4. The designation references township section numbers and includes all tributary streams within the listed section. Listed sections and streams in and near Farmington are shown in Figure 2.2.3. The VRWJPO Watershed Plan includes a map of all designated trout sections of the Vermillion River.

The cold water aquatic habitat within trout streams is highly susceptible to impacts from urban runoff. As a result, water quality standards are higher in areas that drain to trout streams. The MPCA permits for construction activity and municipal systems both contain special regulations for trout waters.

2.2.4 Wetlands

As defined in MN Rule 8420.0110 Subpart 52, wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. Wetlands must have 1) a predominance of hydric soils, 2) be inundated or saturated by surface water or groundwater at a frequency and duration sufficient to support a prevalence of hydrophytic vegetation typically adapted for life in saturated soil conditions and 3) under normal circumstances, support a prevalence of hydrophytic vegetation.

Many people perceive wetlands to be open water with a fringe of cattail or other emergent vegetation. In actuality, this is just one type of wetland. The U.S. Fish and Wildlife Service classified eight wetland types found in Minnesota. Definitions are found in MN Rule 8420.0110 Subpart 54a.

In Farmington, many of the Type 1 and 2 wetlands which existed in pre-settlement times have been drained, via subsurface tiling or open ditches, for agricultural purposes. Other wetlands have been utilized for stormwater ponds. Currently the majority of wetlands remaining in the City exist along the Vermillion River, its tributaries, and other drainage channels. Section 3 of this LSWMP provides detailed information on wetlands within the study area. Map 3 attached to this plan shows all of the mapped wetlands within the City.

FIGURE 2.2.1 PUBLIC WATERS AND IMPAIRED WATERS

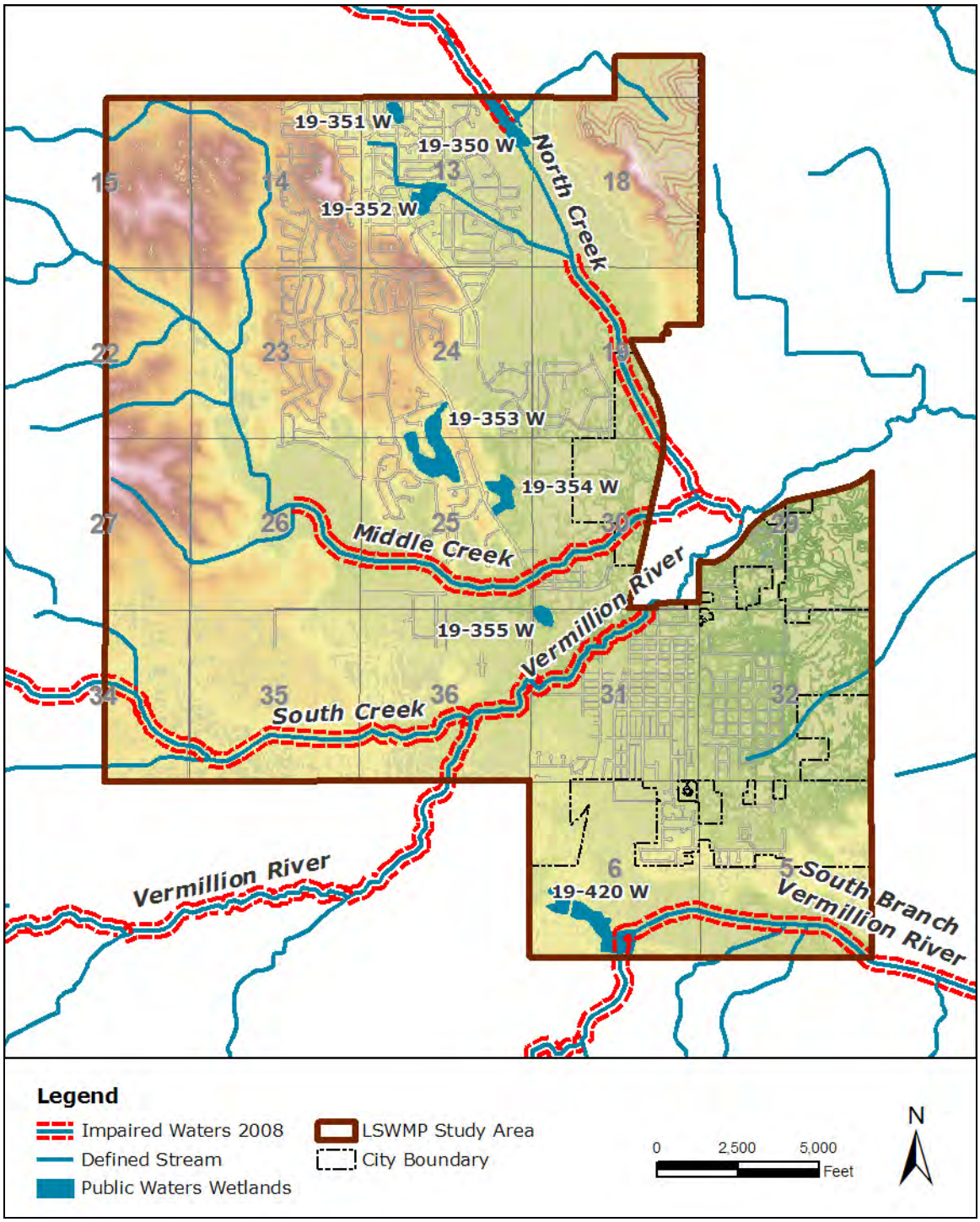
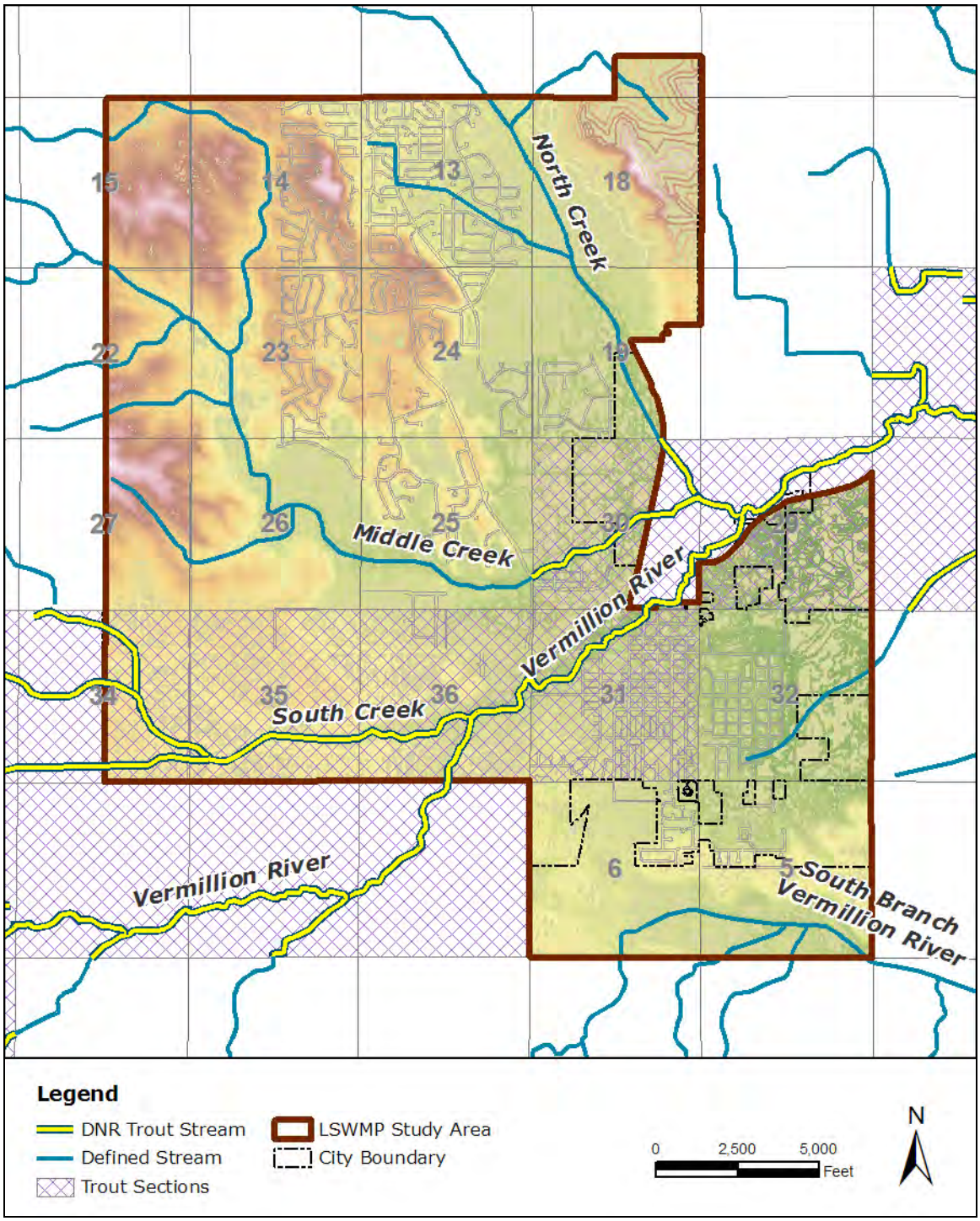


FIGURE 2.2.3 TROUT WATERS



2.3 POPULATION AND LAND USE

The City of Farmington is a developing City and has grown steadily, more than tripling its population since 1990. By the year 2030, the City is projected to grow to a population of 32,660 or 12,500 households. Recent development has centered in the northern part of the City along North Creek, as well as in the southeastern part of the City, and commercial and industrial growth is anticipated along the CSAH 50 corridor west of downtown. The City has experienced some expansion in the past through orderly annexation agreements. Table 2.3 shows Farmington's anticipated population through 2030.

TABLE 2.3 – CITY OF FARMINGTON POPULATION

Year	Population	Households
1990	5,940	2,064
2000	12,365	4,233
2007	20,768	6,991
2010	22,320	7,585
2015	24,920	8,575
2020	27,510	10,500
2025	30,110	11,500
2030	32,700	12,500

Sources: City of Farmington, U.S. Census, Metropolitan Council 2030 Regional Development Framework

Changes in land use lead to changes in stormwater runoff and the potential for flooding and water quality problems. Prior to European settlement, Farmington was predominantly prairie and forest. In the 1900's most of Dakota County was converted to agricultural lands. More recently, the rapid influx of people has quickly transformed portions of the county to urban uses. This transformation has brought with it an increase in urban storm sewers and runoff.

Proposed land uses for the City up to the year 2030 are shown in Appendix D. For the purposes of hydrologic modeling of ultimate development, areas currently shown as agricultural use were assumed to become low and medium density residential uses in the northwestern portion of the City, and commercial and industrial uses along CSAH 50.

The Vermillion River and its adjacent wetlands form the primary greenway through the City. Much of the Vermillion River greenway has been preserved. Secondary greenways have been established along North Creek, Middle Creek and South Creek. These secondary greenways have had some of their reaches impacted by agricultural activities. Impacts from agriculture can be more easily restored, because these only involve the transformation of pre-settlement vegetation to crops and pasture.

2.4 PUBLIC SEWERS

2.4.1 SANITARY SEWER SYSTEM

The MCES provides wastewater treatment at the Empire Wastewater Treatment Plant for the Lakeville, Apple Valley, Rosemount, Farmington, and Empire areas, and in the future will also provide treatment to Elko-New Market. Farmington connected to the Metropolitan Council Environmental Services (MCES) trunk sanitary sewer system in 1977, when the Empire Facility replaced the City of Farmington Wastewater Treatment Facility.

Farmington's *Comprehensive Sewer Policy Plan* was last updated and approved by the Metropolitan Council in May of 1996, and is currently being updated for the 2030 Comprehensive Plan. This plan determines the current and future sewer systems within the City of Farmington. The report serves as an inventory of existing facilities and a guide for the expansion of Farmington's trunk sanitary sewer system to serve its saturation population. The updated report utilized the latest land use and population data.

2.4.2 STORM DRAINAGE SYSTEM

As in many cities, Farmington began incorporating dry detention basins and wet ponds for storage of stormwater runoff in the 1970's, when it was clear that urban growth created new demands on traditional drainage systems. Water quality concerns later became the focus, and wet ponds were built specifically to intercept pollutants. Wetlands were often used for this purpose until the Wetland Conservation Act mandated protection of these areas in 1991.

The City has successfully implemented a regional ponding approach since the preparation of its first Storm Drainage Plan in 1985. Both large regional ponds and local water quality ponds are utilized in this system. Individual sites construct water quality ponds to treat stormwater runoff onsite, and these ponds are then routed to large regional ponds that are often more efficient at rate control than multiple smaller ponds. With the evolution of watershed management organizations, environmental regulations and water resource protection, the design of drainage systems continues to become more complex. Runoff reduction, infiltration, pollutant removal, groundwater recharge and stream protection are a few of the current goals in system design.

The City's drainage system is included on Map 1 attached to this report. The plan shows existing and proposed regional ponds for stormwater management.

2.5 DRAINAGE BOUNDARIES

2.5.1 DRAINAGE BOUNDARY DELINEATION

The City has been divided into seven major drainage districts that are all part of the Vermillion River Watershed. The seven major drainage districts and their abbreviation are shown in Table 2.5.1 and on Map 1 at the back of the report. Each major drainage district was further subdivided into minor drainage districts and subdistricts. The boundaries of the drainage districts are shown on Map 2 at the back of the report. Each subdistrict is identified by the abbreviation of the major drainage district in which it is located, followed by the letter A and the number of its minor drainage district and subdistrict. The numbering system starts at the upstream end of the district and numerically increases downstream.

TABLE 2.5.1 MAJOR DRAINAGE DISTRICTS

MAJOR DRAINAGE DISTRICT	ABBREVIATION
Farmington	F
Apple Valley	AV
Lakeville	L
Vermillion River	VR
Prairie Waterway	PW
Biscayne	B
South Branch	SB

2.6 MANAGEMENT ZONES

2.6.1 FLOODPLAIN

The City of Farmington regulates development activity within the Floodplain Overlay District; which is defined by the Flood Insurance Rate Maps adopted by FEMA in 1981. FEMA and Dakota County are currently in the process of updating the flood study and floodplain maps. Farmington will incorporate the updated maps after they are adopted by FEMA. The current floodplain is shown in Figure 2.6.1.

2.6.2 STREAM BUFFERS

The City is developing a connected greenway system that provides buffers and protection for wetlands and streams. Trails within the greenway system provide opportunities for Farmington residents to view and learn about the City's water and natural resources.

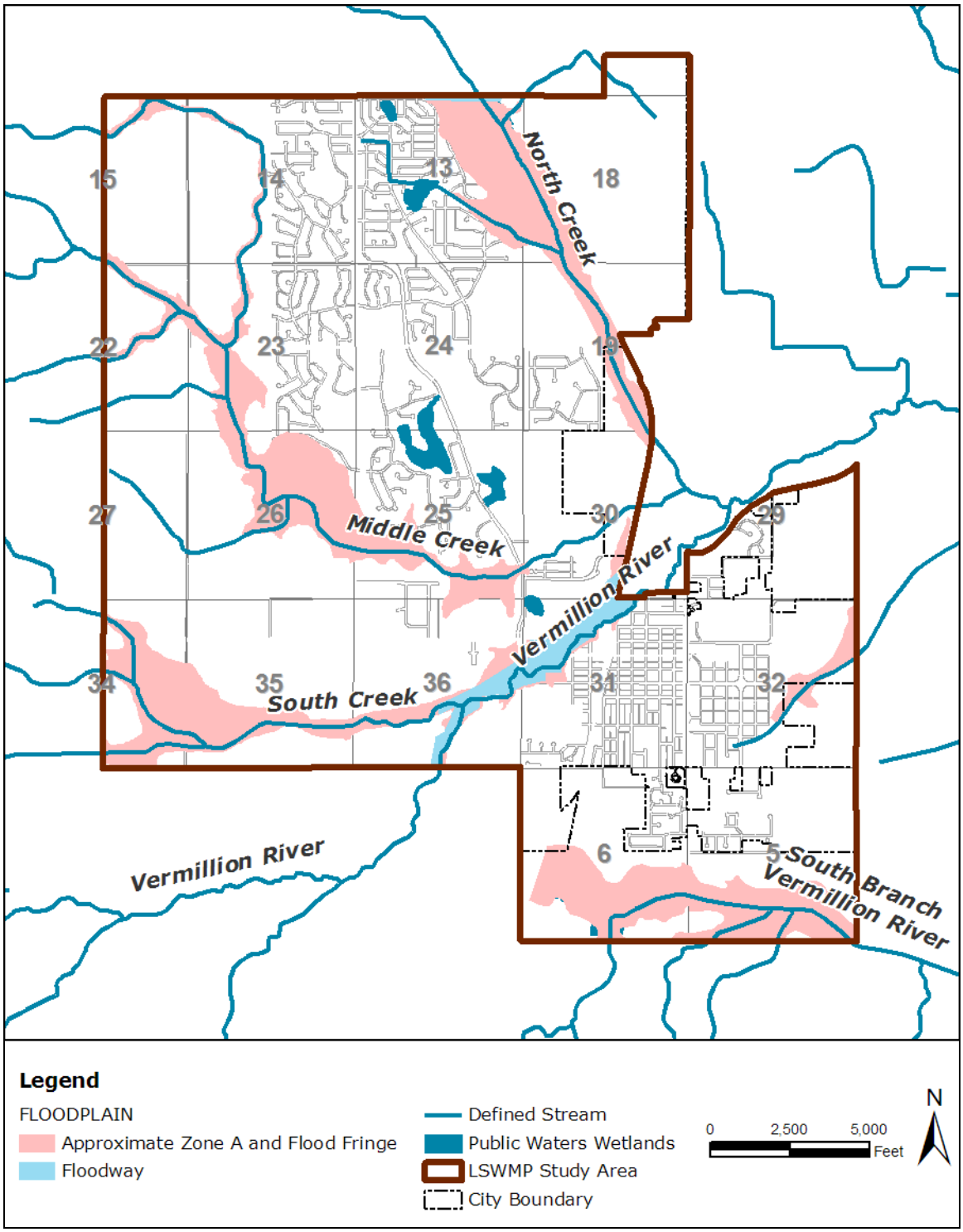
2.6.3 UNIQUE FEATURES AND SCENIC AREAS

Section 1.2 of the VRWJPO Watershed Plan provides a discussion of pre-settlement vegetation, sensitive habitats and natural communities in the watershed. Agricultural use and urban development have reduced these resources significantly in Farmington and surrounding areas. Opportunities exist for protection and restoration of natural resources, particularly along the corridors of the Vermillion River and tributary streams. Many of these areas have been protected as part of public or private open space, or are protected by the Wetland Conservation Act.

The Vermillion River within Farmington, as well as portions of its tributary streams, has been designated as trout waters by the DNR. Water temperature and habitat are suitable to support trout. As a result, these water bodies are protected by additional water quality regulations defined by the MPCA.

The Minnesota County Biological Survey was completed for Dakota County in 1994. This survey maps the location of natural communities and rare species. The Minnesota Land Cover Classification System (MLCCS) also provides a detailed inventory of vegetative cover within the County. Both of these resources provide a detailed reference within Farmington.

FIGURE 2.6.1 FLOODPLAIN



Section 3 – Current Assessment

3.1 COMPARISON OF REGULATORY STANDARDS

The VRWJPO adopted Watershed Standards in January 2007, to implement specific policies identified in the Watershed Management Plan. In order to maintain responsibility for all permitting within the City, Farmington is required to implement codes and standards consistent with the Watershed Standards. This section compares the regulatory controls of the two agencies and identifies specific City codes that must be updated to achieve consistency with the watershed.

3.1.1 City Codes

Development regulations in the City are contained in Title 10: Zoning, Title 11: Subdivisions and other code sections. The City code is constantly being updated, and is available online at http://www.ci.farmington.mn.us/Gov_Code.htm. The City has also developed Engineering Guidelines that contain performance standards for the design and construction of the City's infrastructure. These guidelines are updated once a year and are available from the City Engineer.

The City is the Local Government Unit (LGU), and staff has the decision making authority, for the Wetland Conservation Act and will continue to administer WCA permits. WCA regulations generally focus on the prevention or mitigation of wetland impacts, while watershed and city standards focus on wetland buffers and stormwater impacts. The City enforces wetland buffer and setback standards in the Wetland Protection Ordinance. The City is also required to adopt and enforce the VRWJPO wetland management standards.

Specific ordinances that pertain to development are described below.

10-5-25: Floodplain Overlay District – Maintains the community's eligibility in the national flood insurance program and helps minimize potential losses due to periodic flooding including loss of life, loss of property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety and general welfare.

10-6-17: Wetland Standards – Establishes buffer strip (undisturbed vegetated area adjacent to a wetland) and setbacks for wetlands based on the wetlands condition or ultimate goal for the wetlands condition. Prior to land conversion or development a wetland delineation report in accordance with the Federal Manual for Identifying and Delineating Jurisdictional Wetlands (1987) is required to be submitted to the City and the Corps of Engineers. An assessment of each wetland is required at the time of the wetland delineation. The City uses this assessment data to classify each wetland to determine buffer, setback, and water quality requirements.

10-6-18: Shoreland Management Regulations – Regulates subdivision, use and development of the shorelands of public waters and thus preserve and enhance the quality of surface waters, conserve the economic and natural environmental values of shorelands, and provide for the wise use of waters and related resources.

10-6-23: Site Plan Review – Establishes a formal site plan review procedure and provides regulations pertaining to the enforcement of site design standards.

10-6-27: Erosion Control Required – Sets out the minimum requirements a developer must meet to prevent soil erosion, damage to adjacent property, and control of surface water runoff.

11-4-5 Erosion Control and Turf Establishment – Details enforcement of the City's erosion and sediment control program for subdivisions.

11-4-7 Storm Drainage – Requires subdivision design to incorporate adequate provisions for storm water runoff consistent with the SWMP.

3.1.2 VRWJPO Standards

The VRWJPO adopted its most recent Watershed Plan in November 2005. In January 2007, the watershed adopted standards to implement the Watershed Plan's policies, objectives, and actions. These standards are intended to protect the public health, safety, welfare and natural resources of the VRWJPO by regulating the improvement or alteration of land and waters within the JPO to reduce the severity and frequency of high water, to preserve floodplain and wetland storage capacity, to improve the chemical and physical quality of surface waters, to reduce sedimentation, to preserve the hydraulic and navigational capacities of waterbodies, to preserve and protect channels and drainageways, to promote and preserve natural infiltration areas, protect groundwater, and to preserve natural shoreline features.

3.1.3 Consistency

As noted above, the City is responsible for implementation and enforcement of watershed management standards. Table 3.1 provides a comparison of the City's current standards with the VRWJPO standards. Gaps in the City's standards will be addressed through the following changes in City Codes and standards:

1. City Ordinance 10-5-25: Floodplain Overlay District will be updated to require easements over areas below the 100-year critical flood elevation of any public water, public waters wetland, or wetland, establish setbacks along major waterways, and allow projects that alter floodplain boundaries as long as no detrimental impacts result, or adverse impacts are mitigated.

2. City Ordinance 10-6-17: Wetland Standards will be updated to allow the BWSR replacement program for transportation projects, detail the requirements for allowing stormwater ponds in buffers, and require minimum and average buffer widths for Manage 3 wetlands that meet the VRWJPO's standards.

3. Major waterway buffers widths will be added to City Ordinance 10-6-18: Shoreland Management Regulations that meet the buffer widths in the VRWJPO's standards.

4. City Ordinance 10-6-27: Erosion Control Required will be updated to require compliance with the NPDES General Construction Permit requirements, as well as require conveyance channels be constructed to withstand velocities from a 10-year storm event without erosion.

5. City Ordinance 11-4-7: Storm Drainage will be updated to require a land alteration permit for most land disturbance activity, and will also include the VRWJPO's requirements for temperature control, water quality criteria, rate control, and volume control.

TABLE 3.1 COMPARISON OF REGULATORY STANDARDS

Floodplain Alteration	
VRWJPO	**City of Farmington**
1. Floodplain alteration or filling shall not cause a net decrease in flood storage capacity below the projected 100-year critical flood elevation unless it is shown that the proposed alteration or filling, together with the alteration or filling of all other land on the affected reach of the waterbody to the same degree of encroachment as proposed by the applicant, will not cause high water or aggravate flooding on other land and will not unduly restrict flood flows.	**Ordinance 10-5-25-F-2-c:** Adverse Impact: No use shall be permitted which will adversely affect the capacity of the channels or floodways of any tributary to the main stream, or of any drainage ditch, or any other drainage facility or system. "Adverse impact" is defined as an increase in the existing or future regional flood profile.
2. Where 100-year flood critical elevations have been established, all new structures shall be constructed with the low floor consistent with the minimum elevations as specified in State of Minnesota Rule Chapter 6120: Shoreland and Floodplain Management; Dakota County Ordinance No. 50: Shoreland and Floodplain Ordinance; or Scott County Zoning Ordinance 71: FP, Floodplain District; as applicable.	**1997 SWMP Goal 1, Policy 1:** Establish allowable elevations for the lowest floor of buildings adjacent to ponding areas and floodplains when drainage facilities are constructed for an area. Desired minimum freeboard of 2 feet above the 100-year high water level, or 1 foot above the emergency overflow elevation, whichever is less restrictive.
3. Projects involving development, redevelopment, or the subdivision of land, shall establish flood storage, flowage, and drainage easements over areas below the 100-year critical flood elevation of any public water, public waters wetland, or wetland.	
4. Setbacks for floodplain alterations, fill, and new underground utilities, such as water, sanitary and storm sewers and interceptors, gas lines, phone lines, and pipelines; shall be established and used along major waterways. These setbacks shall be established as follows. The exception is for utilities that need to reach or cross the major waterway, provided the minimum impact alignment is used. • Where a major waterway has a sinuous flow pattern and a meander belt can be identified, the setback for new underground utilities shall be setback 15 feet from the outer edge of the meander belt. • Where a sinuous flow pattern and meander belt are not readily identifiable because of past channel alterations and/or the geomorphology of the channel, the setback established for new underground utilities shall provide for the potential for restoration and a sinuous flow pattern as follows. • Where there are existing encroachments that limit full restoration of the stream to the meander widths appropriate for the stream type, the setback shall be 15 feet from the reasonably achievable restoration width for the meander belt given the existing encroachments. • Where full restoration is possible, the setback shall be 15 feet from a meander belt width established along the stream reach that has a width 10 times the bankfull channel width. An assessment of the stream type may be completed, and meander belt widths established according to the stream type, in place of using the above 10x formula. Note: the 1999 Vermillion River Assessment Report, available at the Dakota SWCD or the Dakota County offices of the VRWJPO, provide assessment of stream type for many reaches of the Vermillion River. • Where buffers are required, above ground encroachments, alterations, and fill shall be consistent with the prohibited and allowed uses and widths specified in the Buffer Standard.	
5. Projects that alter floodplain boundaries, such as bridge crossings and regional ponds that increase upstream high water levels are allowed provided that: • The applicant submits easements or other documentation in a form acceptable to the LGU or the VRWJPO demonstrating and recording the consent of the owner of any land affected by the increased high water levels, • The action is consistent with other portions of these Standards; and Local, State and Federal Regulations, and • The upstream impacts, riparian impacts and habitat impacts of the proposed action are analyzed and no detrimental impacts result, or adverse impacts are mitigated.	

TABLE 3.1 COMPARISON OF REGULATORY STANDARDS (CONTINUED)

Wetland Management	
VRWJPO	City of Farmington
1. Any drainage, filling, excavation, or other alteration of a public waters wetland or wetland shall be conducted in compliance with Minnesota Statues, section 103G.245, the WCA Minnesota Rules 8420, and regulations adopted hereunder.	**Ordinance 10-6-17-B-1:** No subdivision approval, or grading, permit to allow wetland disturbing activities shall be issued until approval of the wetland replacement plan application or a certificate of exemption has been obtained in strict conformance with the provisions of this section and the Minnesota Wetland Conservation Act.
2. In order to preserve WCA exemption or no loss determination, projects involving excavation in Types 1, 2, 6, and 7 wetlands must demonstrate a beneficial purpose, such as habitat or water quality improvements, and minimize loss of wetland function as determined by the VRWJPO or LGU.	**Ordinance 10-6-17-D-5:** When a wetland alteration permit is issued allowing dredging, excavating or grading in a wetland the following standards shall be followed: **a.** The dredging will not have a net adverse effect on the ecological and hydrological characteristics of the wetland. **b.** It shall be located as to minimize the impact on vegetation. Exceptions may be allowed in basins dominated by invasive exotic species such as reed canary grass (Phalaris arundinacea). **c.** It shall not adversely change water flow. d. The size of the dredged area shall be limited to the minimum required for the proposed action. **e.** Disposal of the dredged material is prohibited within the wetland area unless it is part of an approved wetland replacement plan. **f.** Disposal of any dredged material shall include proper erosion control and nutrient retention measures. **g.** Dredging in any wetland area is prohibited during waterfowl breeding season or fish spawning season, unless it is determined by the city that the wetland is not used for waterfowl breeding or fish spawning. **h.** Dredging in wetland areas will be required to be mitigated in accordance with requirements of this section if the activity results in a loss of functional wetland. Dredging to create water quality improvement basins may be allowed by the city where reasonable alternatives are not available or where the wetland is of low quality and designated for this purpose by the Farmington surface water management plan.
3. Wetlands on agricultural land enrolled in the Federal Farm Program retain the WCA exemption as long as wetlands are: **a.** not drained, excavated, or filled beyond that necessary to replace, maintain, or repair existing drainage infrastructure with a capacity not to exceed that which was originally constructed; or **b.** replaced at a ratio of 1:1 or greater under United States Department of Agriculture provisions as supported by documentation from the United States Department of Agriculture, which must be included as evidence to support this exemption.	**Ordinance 10-6-17-B-1**, see above
4. Per the WCA, if the activity would result in loss of eligibility or conversion to non-agricultural land within 10 years, the landowner cannot qualify for the exemption.	**Ordinance 10-6-17-B-1**, see above
5. A high quality (or equivalent value) public waters wetland or wetland (as determined by methods acceptable to the VRWJPO for vegetative diversity) may not be used for stormwater management and treatment unless the use will not adversely affect the function and public value of the wetland and other alternatives do not exist.	**Ordinance 10-6-17-D-6:** When a wetland alteration permit is issued allowing storm water runoff to discharge directly into a wetland, the permit will include requirements established by the Farmington surface water management plan. These requirements establish a maximum high water level bounce and allowable phosphorus loadings based on the city's wetland classification system.

6. Wetland replacement/mitigation siting must follow the priority order below: **a.** Mitigation on-site **b.** Mitigation within the same minor subwatershed as established by the Minnesota Department of Natural Resources for the "1979 Watershed Mapping Project" pursuant to Minnesota Laws 1977, chapter 455, section33, subdivision 7, paragraph (a). **c.** Mitigation within the JPO boundary **d.** Mitigation within Dakota or Scott County **e.** Mitigation within major watershed number 38: Mississippi & Lake Pepin, excluding minor subwatersheds 3800400, 3800500, 3800401, 3801700, 3800402, 3800200, 3800302, 3800600 3800800, 3800301, 3800300, 3800700, 3801601, 3800100, 3801800, 3801200, 3801100, 3801000, and 3800900, which are located in Goodhue County and are tributary to the Mississippi River instead of the Vermillion River.	**Ordinance 10-6-17-D-2:** Where it is found that avoidance of direct impact on a wetland is not feasible, wetland replacement shall be done as per agency (Corps of Engineers, Department of Natural Resources), and City (WCA) standards. Replacement wetlands shall be located within the city, if feasible; if a suitable location is not available preference shall be given to areas within the major watershed where the alteration is occurring. If no location is available within the watershed area, a replacement location should be found within Dakota County.
7. Transportation projects shall pursue wetland mitigation projects to the extent practical using the criteria above. However, this does not preclude the use of the BWSR Replacement Program.	

TABLE 3.1 COMPARISON OF REGULATORY STANDARDS (CONTINUED)

Buffers	
VRWJPO	City of Farmington
1. Where acceptable natural vegetation exists in buffer areas, the retention of such vegetation in an undisturbed state is required unless approval to replace such vegetation is received. A buffer has acceptable vegetation if it: **a.** Has a continuous, dense layer of perennial grasses that has been uncultivated or unbroken for at least 5 consecutive years; or, **b.** Has an overstory of trees and/or shrubs that has been uncultivated or unbroken for at least 5 consecutive years; or, **c.** Contains a mixture of the plant communities in 1 and 2 above that has been uncultivated or unbroken for at least 5 years.	**Ordinance 10-6-17-E-2:** Buffer area vegetation shall be considered adequate when the buffer has a continuous, dense layer of perennial grasses, flowers, trees and/or shrubs.
2. Buffers shall be staked and protected in the field prior to construction unless the vegetation and the condition of the buffer are considered inadequate. Existing conditions vegetation will be considered unacceptable if: **a.** Topography or sparse vegetation tends to channelize the flow of surface water **b.** Some other reason the vegetation is unlikely to retain nutrients and sediment	**Ordinance 10-6-17-E-1-c:** An orange fence shall be erected at the wetland buffer line during construction and shall not be removed until sod is installed on all lots adjacent to the wetland buffer.
3. Where buffer vegetation and conditions are unacceptable, or where approval has been obtained to replant, buffers shall replanted and maintained according to the following Standards: **a.** Buffers shall be planted with a native seed mix approved by MnDOT, BWSR, NRCS or the Dakota or Scott SWCD, with the exception of a one-time planting with an annual nurse or cover crop. Plantings of native forbs and grasses may be substituted for seeding. All substitutions must be approved by the LGU. Groupings/clusters of native trees and shrubs, of species and at densities appropriate to site conditions, shall also be planted throughout the buffer area. **b.** The seed mix and planting shall be broadcast/installed according to MnDOT, BWSR, NRCS or Dakota or Scott SWCD specifications. The selected seed mixes and plantings for permanent cover shall be appropriate for the soil site conditions and free of invasive species. **c.** Buffer vegetation (both natural and created) shall be protected by erosion and sediment control measures during construction. **d.** During the first five full growing seasons, except where the LGU has determined vegetation establishment is acceptable, the owner or applicant must replant buffer vegetation where the vegetative cover is less than 90%. The owner or applicant must assure reseeding/or replanting if the buffer changes at any time through human intervention or activities.	**Ordinance 10-6-17-E-2:** Vegetation shall be considered unacceptable if: **a.** It is composed of noxious weeds; or **b.** Topography or sparse vegetation tends to channelize the flow of surface water; or **c.** For some other reason the vegetation is unlikely to retain nutrients and sediment. **Ordinance 10-6-17-E-3:** Where buffer areas, or a portion thereof, are not vegetated or have been cultivated or otherwise disturbed within ten (10) years of the permit application, such areas shall be replanted and maintained according to each of the following standards: **a.** Buffer areas shall be planted with a seed mix containing one hundred percent (100%) perennial native plant species, except for a one time planting of annual nurse or cover crop such as oats or rye. **b.** The seed mix to be used shall consist of at least fifteen (15) pounds pure live seed (PLS) per acre of native grass seed and one pound PLS per acre of native forbs. Native grass and native forb mixes shall contain no fewer than four (4) and five (5) species respectively. **c.** The annual nurse or cover crop shall be applied at a rate of twenty (20) pounds per acre. **d.** Native shrubs may be substituted for forbs. Such shrubs may be bare root stock and shall be planted at a rate of sixty (60) plants per acre. Shrubs shall be distributed so as to provide a natural appearance and shall not be planted in rows. **e.** Buffer area plantings along the Vermillion River corridor or other areas of buffer area plantings along trout stream habitat shall follow planting guidelines included in the Farmington surface water management plan. **f.** Native grasses and forbs shall be planted by a qualified contractor by using a drill designed for native grass seeding or by broadcasting or hydroseeding at Minnesota Department of Transportation rates (1995 MNDOT standard specifications for construction). **g.** No fertilizer shall be used in establishing new buffer areas. **h.** All seeded areas shall be mulched immediately with clean straw at a rate of 1.5 tons per acre. Mulch shall be anchored with a disk or tackifier.
4. Where a buffer is required, the LGU shall require the protection of the buffer under a conservation easement, or include the buffer in a dedicated outlot as part of platting and subdivision approval, except where the buffer is located in a public transportation right-of-way. Buffer shall also be monumented to clearly designate the boundaries of all new buffers within new residential subdivisions. A monument shall consist of a post and a buffer strip sign approved by the LGU.	**Ordinance 10-6-17-E-1-a:** The wetland and buffer shall be platted as an outlot if established as part of a subdivision application. All other applications shall require dedication of a conservation easement over a wetland and buffer. **Ordinance 10-6-17-E-4:** Buffer areas shall be identified by permanent monumentation acceptable to the city at every other lot corner or every three hundred feet (300'), whichever is less, and at all angle points of lot.

5. Alterations, including building, storage, paving, routine mowing, burning, plowing, introduction of noxious vegetation, cutting, dredging, filing, mining, dumping, grazing livestock, agricultural production, yard waste disposal, or fertilizer application are prohibited within any buffer. Periodic mowing or burning, or the use of fertilizers and pesticides for the purpose of managing and maintaining native vegetation is allowed. Noxious weeds may be removed and mechanical or spot herbicide treatments may be used to control noxious weeds, but aerial or broadcast spraying is not acceptable. Prohibited alterations would not include plantings that enhance the natural vegetation or selective clearing or pruning of trees or vegetation that are dead, diseased or pose similar hazards, or as otherwise clarified in Criteria 6.	**Ordinance 10-6-17-E-5:** The clearing and removal of vegetation in the buffer area is prohibited, except for selective clearing and pruning of individual trees and shrubs which are dead, diseased, noxious weeds, or hazards.
6. The following activities shall be permitted within any buffer, and shall not constitute prohibited alterations: **a.** The following activities are allowed within both the minimum and average buffer width areas: • Use and maintenance of an unimproved access strip through the buffer, not more than 10 feet in width, for recreational access to the major waterway or wetland and the exercise of riparian rights. • Structures that exist when the buffer is created. • Placement, maintenance, repair, or replacement of public roads and utility and drainage systems that exist on creation of the buffer or are required to comply with any subdivision approval or building permit obtained from the municipality or county, so long as any adverse impacts of public road, utility, or drainage systems on the function of the buffer have been avoided or minimized to the extent practical. • Clearing, grading, and seeding is allowed if part of an approved Wetland Replacement Plan, or approved Stream Restoration Plan. • Construction of a multipurpose trail, including boardwalks and pedestrian bridges, provided it is constructed to minimize erosion and new impervious surface, and has an undisturbed area of vegetative buffer at least ten (10) feet in width between the trail and the wetland or public waters wetland edge, or the bank of the major waterway; or where needed to cross the major waterway, the minimum impact alignment is used. • The construction of underground utilities such as water, stormwater, and sanitary sewers and pipelines provided the minimum impact alignment is used, the area is stabilized in accordance with Criteria 2 above, and setbacks established in the Floodplain Alterations Standard Criteria 4 are met. **b.** The following activities are allowed within those portions of the average buffer width that exceed the minimum buffer width: • Stormwater management facilities, provided the land areas are stabilized in accordance with Criteria 2 above, and alterations prohibited in Criteria 5 above are upheld. • The area of shallow vegetated infiltration and biofiltration facilities, and water quality ponds not to exceed 50 percent of the pond area, adjacent to wetlands and major waterways may be included in buffer averaging provided the facilities do not encroach into the minimum buffer width, and the land areas are stabilized in accordance with Criteria 2 above, and alterations prohibited in Criteria 5 above are upheld.	**Ordinance 10-6-17-E-3-j:** A walking trail may be established within a wetland buffer area. The trail should be constructed to minimize erosion. An undisturbed area of vegetative buffer at least ten feet (10') in width should remain between the trail and the wetland edge. **Ordinance 10-6-17-E-11:** For roadways, trails, and driveways, or portions thereof, that are routed across wetlands and are subject to WCA replacement requirements, no buffer areas shall be required. Public trails that are routed through wetlands for specific interpretive purposes shall also be exempted from this requirement.
7a. A wetlands functional assessment for vegetative diversity will be completed with each wetland and public waters wetland, delineated for a project and buffers established according to the following: Exceptional Quality Wetland: 50' avg, 30' min High Quality Wetland: 40' avg, 30' min Medium Quality Wetland: 30' avg, 25' min Low Quality Wetland: 25' avg, 16.5' min	**Ordinance 10-6-17-E-8:** The following buffer area sizes are minimum requirements: Protect: 75' avg, 75' min (avg=100' in designated trout stream sections) Manage 1: 50' avg, 30' min Manage 2: 25' avg, 20' min Manage 3: 0' avg, 0' min

7b. Buffers shall be established adjacent to major waterways as shown and classified on Map 1 attached to the VRWJPO Standards, and as described for the various classifications below. Conservation Corridor: Lower Reach (Vermillion River downstream of Biscayne Avenue) – 150-foot average, 100-foot minimum measured from the edge of the meander belt of the river. Upper Reach (Vermillion River upstream of Biscayne Avenue and South Branch Vermillion River) – 150-foot average, 100-foot minimum measured from the edge of the meander belt of the river. Aquatic Corridor – Principal Connector: Required buffer width 100-foot average, 65-foot minimum measured from the edge of the meander belt of the river. Aquatic Corridor – Principal Connector with Trout Stream Designation: 100 foot, no averaging, as required by the General Permit Authorization to Discharge Storm Water Associated With Construction Activity Under the National Pollutant Discharge Elimination System/State Disposal System Permit Program Permit MN R100001 (NPDES General Construction Permit) issued by the Minnesota Pollutant Control Agency, August 1, 2003. Aquatic Corridor – Tributary Connector: 50-foot average, 35-foot minimum: plus 2 feet for every 1 percent of slope measured from the edge of the meander belt of the tributary. Water Quality Corridor: 30-foot average, 20-foot minimum where there is a flow path for concentrated surface runoff measured from the center line of the flow path.	**Ordinance 10-6-18-E-3-h:** Minimum Buffer Areas: The following buffer sizes are minimum requirements. Classification of shoreland areas and buffer sizes are consistent with the city's wetland buffer standards. Trout Stream: 100', no averaging Manage 1: 50' avg, 30' min Manage 2: 25' avg, 20' min Greenway corridors: 25' avg, 20' min

TABLE 3.1 COMPARISON OF REGULATORY STANDARDS (CONTINUED)

Stormwater Management	
VRWJPO	City of Farmington
Construction Erosion Control Criteria	
1. Erosion and sediment control measures shall be consistent with Best Management Practices (BMPs), and shall be sufficient to retain sediment on site.	**Ordinance 10-6-27-A**: A property owner or contractor who removes substantial vegetative growth for any reason including landscaping, excavates for a building foundation or other purpose, or adds soil or other fill on property within the city shall adhere to erosion control measure standards and specifications contained in the Minnesota pollution control agency publication "Protecting Water Quality In Urban Areas", as may be amended, the city of Farmington comprehensive plan and official controls, and any applicable water management plan of the city or other governmental units. Except as other measures are required by the above documents and plans, property owners and contractors shall take the necessary precautions, outlined below, to prevent soil erosion, damage to adjacent property and control of surface water runoff. The city may impose additional erosion control requirements if, in the opinion of the director of public works or designee, said measures are necessary to protect adjacent properties and manage surface water runoff.
2. All temporary erosion and sediment controls shall be installed on all down gradient perimeters before commencing the land disturbing activity, and left in place and maintained as needed until removed per LGU approval after the site had been stabilized. All permanent erosion control measures shall be installed and operational per the design and as required by the LGU.	**Ordinance 11-4-5-A-1:** No land shall be developed and no use shall be permitted that results in water runoff causing flooding, erosion, or deposit of sediment on adjacent properties. Such runoff shall be properly channeled into a storm drain, watercourse, ponding area, or other public facilities subject to the review and approval of the director of public works or designee. Appropriate erosion control measures shall be taken throughout the construction process. They include, but are not necessarily limited to, the use of erosion control fences, wood fiber blankets, rock construction entrances, seeding and/or mulch. Other techniques or combinations of the above may be used. The erosion control measures shall be maintained and repaired throughout construction and until such time as the property has been either sodded or a seeded vegetative cover has taken hold. All temporary erosion control devices including silt fence, gravel, hay bales or other measures shall be removed from the construction site and properly disposed of or recycled. This removal and disposal must occur within thirty (30) days of the establishment of permanent vegetative cover on the disturbed area.
3. Erosion and sediment controls shall meet the standards for the General Permit Authorization to Discharge Storm Water Associated With Construction Activity Under the National Pollutant Discharge Elimination System/State Disposal System Permit Program Permit MN R100001 (NPDES General Construction Permit) issued by the Minnesota Pollutant Control Agency, August 1, 2003, as amended for projects disturbing more than 1 acre.	
4. Final stabilization of the site must be completed in accordance with the NPDES General Construction Permit requirements.	
5. All on-site stormwater conveyance channels shall be designed and constructed to withstand the expected velocity of flow from a 10-year frequency storm without erosion.	
6. If the activity creates more than 1 acre of disturbed area, and the activity is taking place on a site where soils are currently disturbed (e.g., a tilled agricultural site that is being developed), areas that will not be graded as part of the development and areas that will not be stabilized according to the timeframes specified in the NPDES General Construction permit Part IV.B.S, shall be seeded with a temporary or permanent cover before commencing the proposed land disturbing activity.	**Ordinance 11-4-5-A-3:** No dirt piles or spoil banks shall remain exposed without a protective cover to prevent erosion for a period longer than seven (7) days. No soil surface shall remain exposed without seeding, if allowed, or sodding or by mulching or covering or other equivalent control measure for a period longer than seven (7) days. Seed shall be a blend of rye grass or other fast germinating seed in addition to perennial grasses suitable for the soil and the exposure of the area to sunlight. All seeded areas shall be mulched and disc anchored, or covered with a Minnesota department of transportation approved fiber blanket, as necessary for erosion protection and seed retention. The contractor should recognize that time is of the essence in controlling erosion.

7. The VRWJPO or LGUs may at their discretion use turbidity measurements as an indicator of potential non-compliance with these Standards. If NTU measurements taken at a point of site stormwater discharge exceeds 50 NTUs (25 NTU for trout stream) a construction erosion control inspection of the site shall be completed. Enforcement procedures and timeframes to correct noncompliant conditions shall be as specified by these Standards and NPDES General Construction Permit. Exceedence of the turbidity indicator alone shall not constitute non-compliance. Sampling and analysis of turbidity shall be completed as follows: **a.** Samples should be taken from the horizontal and vertical center of the outflow, and care should be taken to avoid stirring bottom sediments. **b.** A written narrative of site-specific analytical methods and conditions used to collect, handle and analyze the samples will be completed and kept on file, and a chain-of-custody record kept if the analysis is performed at a laboratory. **c.** All sampling shall be collected by "grab samples" and the analysis of these samples must be conducted in accordance with methodology and test procedures established by EPA method 180.1 or Standard Method 2130B.d. Other sampling protocol include: • Sample containers should be labeled prior to sample collection. • Samples should be well mixed before transferring to a secondary container. • Sample jars should be cleaned thoroughly to avoid contamination. • Sampling and analysis of receiving waters or outfall below the minimum detection limit should be reported at the detection limit.	
Post Construction Water Quality Criteria	
1. Post construction stormwater runoff quality measures shall meet the standard for the General Permit Authorization to Discharge Storm Water Associated With Construction Activity Under the National Pollutant Discharge Elimination System/State Disposal System Permit Program Permit MN R100001 (NPDES General Construction Permit) issued by the Minnesota Pollution Control Agency, August 1 2003, as amended; except where more specific requirements are provided in paragraphs 2, 3, 4, and 5 below.	
2. Infiltration/filtration options, and Credits described under Runoff Volume Control Criteria 2, are the preferred approach to satisfying the water quality treatment requirements of the NPDES General Construction Permit in areas that drain to the trout stream portions of the Vermillion River and its tributaries where such areas do not first drain to a waterbody with 10 or more acres of open water.	
3. Ponds with permanent wet pools are allowed in areas tributary to the trout stream portions of the Vermillion River and its tributaries where such areas do not first drain to a waterbody with 10 or more acres of open water, if the applicant demonstrates: **a.** No net increase in the temperature of the discharge for the 2-year 24-hour event with the use of alternative technologies and has met the Volume Control requirements of these Standards; or, **b.** That the wet pond is designed for zero discharge for the 2-year, 24-hour storm; or, **c.** That the Volume Control requirements of these Standards are met and the following measures are used to the extent practical in order of decreasing preference: • The wet pond is designed with a combination of measures such as shading, filtered bottom withdrawal, vegetated swale discharges, or constructed wetland treatment cells that will limit temperature increases. • Additional volume control measures and credits are used beyond that required to meet the Runoff Volume Standards as a means of limiting the frequency and duration of discharges from the pond.	
4. The water quality control volumes necessary to meet the NPDES General Construction Permit that are satisfied using infiltration or filtration technologies (filtration only on Type C and D soils) can count toward the Volume Control requirements of these Standards.	
5. Ponds with overflows or outlets located below the seasonally high water table are allowed only where it can be demonstrated that there is a reasonable need for such an outlet to control seepage damage to existing structures.	

6. Redevelopment (see definitions) projects are required to incorporate water quality BMPs to the extent practical.	**1997 SWMP Goal 2, Policy 7**: Limit phosphorus levels in runoff from redevelopment of existing sites to predevelopment concentrations when feasible and required by the City based on the SWMP.
Runoff Temperature Control Criteria	
1. Post construction runoff criteria for controlling temperature increases relies on the establishment of buffers as specified in the Buffer Standard; the prioritization of temperature sensitive BMPs such as infiltration and filtration, and the designation of temperature sensitive wet pond design approaches in the Post Construction Water Criteria above; and the control of runoff volume increases and the use of credits with the Runoff Volume Control Criteria below. No additional specific temperature criteria are incorporated since these other areas of the Standards emphasize approaches sensitive to runoff temperature. However, since these other areas of the Standards allow flexibility, and in some cases waivers: permit applications involving the creation of one or more acres of new impervious surface in the trout stream portions of the Vermillion River and its tributaries where such areas do not first drain to a waterbody with 10 or more acres of open water;a. Must include a narrative description of the temperature sensitive practices incorporated; and,b. The LGU or the VRWJPO may limit or deny waivers, or may require additional runoff temperature BMPs, if the LGU or the VRWJPO finds that the site design does not minimize the potential for runoff temperature increases.	
Peak Runoff Rate Control Criteria	
1. A hydrograph method based on sound hydrologic theory will be used to analyze runoff for the design or analysis of flows and water levels.	
2. Runoff rates for proposed activities, and development shall: **a.** Not exceed existing runoff rates for the 1-year, and 10-year critical duration storm events. **b.** Be implemented by Cities and Townships such that peak runoff rate controls keep future peak flood flows for the Vermillion River 100-year, 4-day event from increasing above existing conditions peak flows. (While the VRWJPO works to develop numerical Standards at a subwatershed scale, the Standard will be implemented as follows: Runoff rates for proposed activities, and development shall not exceed the existing rate for the 100-year critical duration storm event.)	**1997 SWMP, Section 2.2.2** **1.** The 100-year, 24-hour duration rainfall event is identified as the critical storm event for the management sectors. **2.** Peak discharge rates from the management sectors or the Vermillion River shall be guided by those rates identified in the Vermillion River Watershed Management Plan **Seed/Newland (Genstar) AUAR Update:** **1.** The 2-year storm event peak discharge rates should be less than or equal to pre-agricultural conditions (assumed CN=58). However, the recommended minimum outlet diameter is 6 inches due to plugging susceptibility and would supersede the rate control criteria if necessary. **2.** The 100-year storm event peak discharge rate should be less than existing conditions.
3. Detention basins with permanent wet pools are allowed in area's tributary to the trout stream portions of the Vermillion River provided Post Construction Water Quality Criteria 3 above is met.	
Runoff Volume Control Criteria	
1. Development that creates one acre or more of new impervious surface must incorporate volume control practices into the design sufficient to hold the runoff volume for the 2-year 24-hour storm at pre-development conditions. Determination of the necessary control volume to achieve this Standard can be completed by the LGU on a regional basis and included in an approved Local Water Plan, or calculated on a site-by-site basis for each individual proposal.	
2. Credits for site design are the preferred methods for meeting the Volume Control requirements and shall be considered prior to the design of infiltration or filtration facilities.	
3. The water quality control volumes necessary to meet the NPDES General Construction Permit that are satisfied using infiltration or filtration technologies (filtration only on Type C and D soils) can count toward the Volume Control requirements of these Standards.	

4. When using infiltration for volume control,a. Infiltration volumes and facility sizes shall be calculated: • Using the appropriate hydrological soil group classification and saturated infiltration rate shown below: Hydrologic Soil Type A: 0.30 inches/hour Hydrologic Soil Type B: 0.15 inches/hour Hydrologic Soil Type C: 0.07 inches/hour or, • Using documented site specific infiltration or hydraulic conductivity measurements completed by a licensed soil scientist or engineer, or • Using the method provided in the Minnesota Stormwater Manual Volume 2 (MPCA 2005) pages 18 through 21 of Chapter 12-INF, andb. The design shall consider the infiltration rates of the least permeable horizon within the first five feetbelow the bottom of the infiltration practice, andc. The system shall be capable of infiltrating the required volume in 72 hours.	
5. Constructed infiltration facilities, such as infiltration basins and trenches: **a.** Can only be used if there is pretreatment of stormwater runoff designed to protect the infiltration system from clogging with sediment and to protect groundwater quality; **b.** Cannot be used within 400 feet of a municipal or other community supply well or within 100 feet of a private well unless specifically allowed by an approved wellhead protection plan; **c.** Cannot be used for runoff from fueling and vehicle maintenance areas and industrial areas with exposed significant materials; **d.** Cannot be used on areas with less than 3 feet vertical separation from the bottom of the infiltration system and the seasonal high water table; **e.** Cannot be used in Type D soils.	
6. Infiltration areas must be fenced or otherwise protected from disturbance before the land disturbing activity starts.	
7. Volume control amounts may be waived by the LGU or the VRWJPO for sites with predominately Type C and D soils, or where a shallow water table prevents construction of infiltration systems, provided the following are met in order of decreasing preference: **a.** Credits and site design practices to minimize the creation of connected impervious surfaces are used to the extent practical. **b.** Underdrains are used to promote filtration instead of infiltration.	
8. Vegetation used in conjunction with infiltration systems must be tolerant of urban pollutants, and the range of soil moisture conditions anticipated.	

TABLE 3.1 COMPARISON OF REGULATORY STANDARDS (CONTINUED)

Drainage Alteration	
VRWJPO	City of Farmington
1. Outlets from landlocked basins with a tributary drainage area of 100 acres or more will be allowed, provided such outlets are consistent with other portions of these Standards, State and Federal regulations, and the downstream impacts, riparian impacts, and habitat impacts of such outlets have been analyzed and no detrimental impacts result. The analysis and determination of detrimental impacts shall: **a.** Use a hydrograph method based on sound hydrologic theory to analyze runoff for the design or analysis of flows and water levels; **b.** Ensure a hydrologic regime consistent with the Peak Runoff Rate Control Criteria and the Runoff Volume Control Criteria of these Standards; **c.** Ensure the outlet does not create adverse downstream flooding or water quality conditions, or materially affect stability of downstream major waterways; **d.** Maintain dead storage within the basin to the extent possible while preventing damage to property adjacent to the basin; **e.** Ensure that the low floors of new structures adjacent to the basin are set consistent with the Floodplain Alterations Standards; and, **f.** Ensure that proposed development tributary to the land-locked basin has incorporated runoff volume control practices to the extent practical.	
2. Artificial drainage, flow obstruction, and diversions involving waterways, public waters, public water wetland, wetlands with drainage areas of 640 acres or more will be allowed provided such alterations or diversions are consistent with other portions of these Standards, State and Federal regulations, and the downstream impacts, riparian impacts and habitat impacts of such alterations or diversions have been analyzed and no detrimental impacts result. Proposals for drainage alterations and diversions shall demonstrate that: **a.** There is a reasonable necessity for such drainage alteration or diversion to improve or protect human health and safety, or to improve or protect aquatic resources; **b.** Reasonable care has been taken to avoid unnecessary injury to upstream and downstream land; **c.** The utility or benefit accruing to the land on which the drainage will be altered reasonable outweighs the gravity of the harm resulting to the land receiving the burden; and **d.** The drainage alteration or diversion is being accomplished by reasonably improving and aiding the normal and natural system of drainage according to its reasonable carrying capacity, or in the absence of a practicable natural drain, a reasonable and feasible artificial drainage system is being adopted.	
3. Drainage alterations, diversions, and landlocked basin outlets shall be provided with stable channels and outfall.	

3.2 SYSTEM ASSESSMENT – SURFACE WATER QUANTITY MODELING APPROACH

The preparation of this plan included a hydrologic model of the current surface water system in Farmington. Maps of the physical system were updated to establish watershed subdistricts and runoff paths. Subdistrict boundaries were delineated using two-foot contour topography provided by Dakota County, 1-foot contours generated from Dakota County's LIDAR data where available, development grading plans, and Farmington's record drawings to verify the storm sewer system layout. This information was used to update the City's hydrologic model of the City, which is maintained using HydroCAD modeling software. The City first created a citywide model for the 1997 SWMP, and has kept the model updated as new development has occurred to be aware of any new problems that arise. The modeled subdistricts and system layout are shown on Map 2 attached to this plan.

HydroCAD stormwater runoff hydrographs were calculated in accordance with NRCS TR-20 methodology. Hydrograph routing through channels and detention basins is performed using the Storage-Indication-Translation Method or the Simulation Method. The Natural Resource Conservation Service (NRCS) 24-hour, Type II rainfall distribution was used for the analysis. Runoff curve numbers for each basin were estimated using the Soil Survey and land uses shown in the City's Comprehensive Plan.

A 100-year frequency storm event was used for the SWMP modeling of current surface water system and pond design. A 100-year frequency storm has a 1% chance of occurring or being exceeded in any given year.

Inter-community flows from Lakeville enter Farmington at several locations, as shown on Maps 1 and 2. Runoff hydrographs for these inter-community flows from Lakeville's 1996 SWMP model were used in developing Farmington's SWMP. The runoff hydrographs modeled an SCS Type II, 24-hour, 100-year storm event.

The City of Lakeville has not updated its hydrologic modeling since 1994. The Vermillion River Watershed Joint Powers Organization (VRWJPO) is currently developing a watershed-wide model to guide community discharge rate restrictions. Lakeville will begin development of an updated hydrologic model in 2008 to account for changes that have occurred in the City within the last 13 years and to meet VRWJPO standards once this watershed-wide model is compete. Due to the to the large number of discharge points from Lakeville into Farmington, the updated peak discharges from Lakeville are important for Farmington's own modeling effort and surface water planning.

When the VRWJPO and Lakeville model updates are complete, the City will need to update Farmington's model to include these updated flows. It is likely that the existing and ultimate flows at the discharge points from Lakeville into Farmington will change with Lakeville's updated modeling because of changes in the City that occurred in the last 13 years, as well as updated requirements from the VRWJPO. This will have an impact on HWLs and flows in the City of Farmington. An amendment to this SWMP may be required.

Ponding areas, drainageways and pond to pond storm sewer are shown on Map 1. A drainageway consists of a stream channel and its floodplain. Ponds are identified by the abbreviation of the major drainage district in which they are located followed by the letter P and the number of the minor drainage district and subdistrict. For example, Pond F-P1.15 is in the fifteenth subdistrict of minor drainage district A1 located in the Farmington District. Pond data including tributary area, pond area, storage volume, normal and high water levels, and peak outflow are presented in Appendix B. The storage volume and outflow rate of each pond is important to preserve for each ponding area in order to successfully maintain the integrity of the

storm drainage system. Pond areas and water levels may change in the final design of the ponding area in order to best suit the proposed development, but care must be exercised so that the outflow rates do not exceed the capacity of the downstream drainage facilities.

3.3 SYSTEM ASSESSMENT RESULTS

Stormwater ponding areas are an essential part of a storm drainage system. Ponds provide storage of runoff, resulting in reduced downstream flow, minimized flooding and reduced size and cost of downstream drainage systems. Stormwater ponds also improve water quality by removing sediment, nutrients and other pollutants from urban runoff.

Consistent with previous surface water planning in Farmington, this LSWMP assessment focuses on the development of regional ponds for water quantity management. Regional ponds offer the following benefits: (1) utilize existing stream corridors for ponding, (2) reduce the necessity for every development to construct ponds, (3) focus pond construction and maintenance tasks within the City, (4) provide an environmental and recreational benefit to the community by restoring natural stream and wetland systems within the City, and (5) focus funding of ponds for the environmental and recreational benefit of the entire community.

This approach requires that individual developments make effective use of regional ponds by providing acceptable stormwater conveyance routes, on-site erosion control and energy dissipation measures. In addition, each development will be responsible for constructing local water quality ponds to remove sediment and nutrients from runoff prior to discharge into a regional pond. At the City's discretion, typically in redeveloping areas with no room available for ponding, a development may make a cash contribution in place of constructing a water quality pond equal to the estimated construction cost as estimated by the City. The funds would then by used by the City to construct water quality ponds in alternative locations.

To align with the VRWJPO's requirements, volume control will be incorporated into regional ponding basins when possible with the use of side-slope infiltration, infiltration shelves, etc. If development occurs upstream of a regional basin that does not include volume control, or volume control is not possible in a regional basin, volume control will be required onsite for individual developments. The HydroCAD model did not include any volume control assumptions in order to be conservative.

Appendix A lists the acreage for each subdistrict in the City. Appendix B lists the areas, normal water level, 100-yr high water level, storage volume and peak outflow of existing stormwater storage ponds and proposed regional ponds in the City.

Specific Districts are discussed in more detail below.

3.3.1 FARMINGTON DISTRICT

The Farmington District is the largest major drainage district in the study area, consisting of approximately 4,640 acres. The topography is generally rolling hills with drainage to the Middle Creek tributary of the Vermillion River. The upstream drainage area into the Farmington District is located within the City limits of Lakeville. Lakeville refers to the upstream drainage area, approximately 3,410 acres, as the Farmington Outlet District in their 1996 SWMP. This area is outside Lakeville's 2010 MUSA and proposed stormwater

improvements will likely occur with development. The total drainage area of the Middle Creek is approximately 8,050 acres.

The 1996 SWMP for Lakeville proposes a peak discharge into the Farmington District of approximately 652 cfs at ultimate development. The 1996 existing peak discharge into the Farmington District is approximately 2,850 cfs. These values were found by summing the hydrographs for each subdistrict flowing directly into Farmington. Hydrographs for existing and proposed conditions were provided by the City of Lakeville. The runoff hydrographs modeled an SCS Type II, 24-hour, 100-year storm event.

A summary of some of the special concerns within this major drainage district is presented below:

The drainageways carrying flow west of Flagstaff Avenue tend to be fairly steep with a potential for erosion. In the future, the stability and capacity of the existing channels should be reviewed and potential solutions studied to reduce erosion. Erosion control costs are not included as part of this SWMP and should be determined after further study when this area begins to develop.

The existing outlet of Pond F-P1.4 consists of two 10'x 5' box culverts (upstream invert 950.5') and a HWL of 959.0'. Once rate controls are established in Lakeville, one of the box culverts is proposed to be abandoned to reduce the peak discharge. The detention basin forming F-P1.4 would be very adaptable to the creation and restoration of wetlands for wildlife habitat and the generation of wetland banking credits.

Pond F-P1.13 is proposed to be created when 190th Street is extended west to Flagstaff Avenue, crossing the ravine and Middle Creek. Depending on when 190th Street is extended, the backwater ponding would be substantial and will affect the design and cost of extending 190th Street west. In order to pass the 1 to 2-year storm events with a minimal amount of ponding at ultimate development, a 6'x 5' box culvert was the designed outlet. It is the smaller but more frequent flow events that carry the majority of sediment in streams, and using a smaller outlet that creates a ponding situation for these flow events will likely lead to excessive sediment deposition and the potential loss of dry storage capacity for Pond F-P1.13. In addition, the increase in energy at the outlet of Pond F-P1.13 associated with a smaller outlet and loss of sediment transport will increase the downstream potential for scour and erosion of Middle Creek. The proposed outlet will pass the small flow events with minimal ponding, but will act to reduce peak discharge rates for the larger storm events.

Proposed Pond F-P2.1, with a surface area of 2 acres, will require excavation, and 190th Street will need to be raised to provide freeboard for the road. Under existing conditions, approximately 1 foot of water will flow over 190th Street during a 100-year storm event.

Pond F-P2.8 currently outlets through two 8'x 5' box culverts (invert 923.8') under Flagstaff Avenue. Under existing conditions, approximately 2 feet of water will flow over Flagstaff Avenue during a 100-year storm event. Under ultimate development, a weir is proposed to elevate the NWL to 926.5' to create a pond and restore a wetland for wildlife habitat and generate wetland banking credits. Some excavation will be required. The potential for upstream erosion may require periodic maintenance of the pond.

Proposed Pond F-P3.4 will require excavation. The outlet is designed to be a two-stage outlet consisting of a 30" culvert at the normal water level and a 60" orifice (drop inlet) at or slightly higher than the high water level. Both will drain into an existing 60" RCP culvert draining east under Flagstaff Avenue. The purpose of the pond is to prevent overtopping of the road and reduce downstream erosion.

Existing Ponds F-P5.2 and F-P5.6 have established HWLs of 936' based on the 1985 SWMP. However, the modeled HWL for each pond is 934.5' and 932.3, respectively. Raising the NWL of each pond and utilizing the existing storage capacity would increase the water quality benefits of each pond and increase their aesthetic value to nearby residents (especially for Pond F-P5.6).

Proposed Pond F-P6.1 requires excavation and the addition of a rate control outlet just upstream of an existing 42" culvert, draining north under CSAH 50. The rate control outlet is proposed to be a 33" culvert placed in front of the existing 42" culvert.

Ponding area F-P6.4 was created when Pilot Knob Road (CSAH 31) was extended south with four 12'x5' box culverts serving as F-P6.4's outlet. The peak 100-yr discharge is currently 1530 cfs. Once property and ponding easements are purchased, two of the culverts should be plugged and abandoned. Under existing conditions, with two 12'x 5' box culverts serving as the outlet, the peak discharge would be reduced to 1,070 cfs with a HWL of 910.6'. Ultimately, a single 12'x 5' box culvert will function as the primary outlet (bankfull channel). The second 12'x 5' box culvert is proposed to have a head wall placed in front of the culvert to an elevation of 909.3' so that the culvert will only be used during large storm events in order to maintain a HWL of 910.5. Once farming ceases within the ponding basin of F-P6.4, the natural restoration of wetlands will begin to occur, especially with the restriction of flow in the Middle Creek and ponding of water. A wetland complex could be constructed within the ponding basin relatively easily, if the City so chooses. Directing developers who need fill for other developments to excavate portions of the ponding basin that is presently farmed upland would account for some of the necessary excavation.

A private road to a farm residence crosses the Middle Creek at the drainage divide between Subdistricts F-A7.6 and F-A7.8. This dirt road with a 60" CMP to pass flow from Middle Creek has a significant impact on the upstream 100-year floodplain elevation due to the backwater effects created by the road (elevation of approximately 904.5'). It is recommended that this road be removed when another access is to the residence is available.

Proposed Pond F-P8.9 will require extensive excavation. The excavated material is proposed by the City to be used to elevate the surrounding topography for development purposes. The resulting pond is proposed to be incorporated into the City's park plan.

Wetlands F-W7.2 and F-W8.6 on Map 3 are DNR protected waterbodies.

3.3.2 Apple Valley District

The Apple Valley District lies in the northeast corner of the City and includes approximately 2,195 acres. The topography gently slopes to the North Creek running south just west of a Soo Line railroad line. The flat topography impedes drainage resulting in land that drains poorly. Its proximity to the North Creek results in extensive areas of hydric soils with the ground water table near the soil surface.

The 1996 SWMP for Lakeville proposes a peak 100-year flow rate for the North Creek into the Apple Valley District of approximately 1,033 cfs at ultimate development. The existing peak flow rate from Lakeville into the Apple Valley District is approximately 1,280 cfs. Hydrographs for existing and proposed conditions were provided by the City of Lakeville. The runoff hydrographs modeled an SCS Type II, 24-hour, 100-year storm event.

An addendum to the 1997 SWMP as well as an AUAR were completed in 2006 for the Seed/Genstar (Newland) Annexation Area located in the northeast portion of the City. The majority of this area is

contained in the Apple Valley District, while a small portion is contained in the Vermillion District. This area was outside the area covered by the 1997 SWMP.

The purpose of the SWMP addendum was to provide a reliable, environmentally sensitive, and economical drainage system for the area. The Seed/Genstar area discharges to North Creek, which had previously been identified as a greenway corridor. With the Seed/Genstar AUAR and SWMP update the City's goal was to preserve the Creek's 100-year floodplain, protect associated wetlands and promote channel stability. For this reason several unique steps were taken to ensure protection of the North Creek corridor, including restricting the 2-year peak discharge rate to less than or equal to the pre-agricultural condition and requiring infiltration/filtration of stormwater volume to meet existing conditions for the 10-year storm event.

A summary of some of the special concerns within this major drainage district is presented below:

Existing pond AV-P1.2 currently drains into pond AV-P1.3. AV-P1.3 does not have the storage capacity for the AV-P1.2 discharge. Pond AV-P1.2's outflow is proposed to be routed south to an existing 54" storm sewer just east of the intersection of Pilot Knob Road and Upper 182nd Street West.

Wetlands AV-W1.3, AV-W1.9 and AV-W1.10.5 on Map 3 contain DNR protected waterbodies.

3.3.3 Lakeville District

The Lakeville District lies in the southwest corner of the City and includes approximately 980 acres. The topography is generally rolling hills with drainage to the South Creek Tributary of the Vermillion River.

Lakeville's 1996 SWMP proposes a peak discharge of approximately 1,643 cfs into the Lakeville District at ultimate development. The existing peak flow rate from Lakeville into Farmington is approximately 2,681 cfs. These values were found by summing the hydrographs for each subdistrict flowing directly into Farmington. Hydrographs for existing and proposed conditions were provided by the City of Lakeville. The runoff hydrographs modeled an SCS Type II, 24-hour, 100-year storm event.

A summary of some of the special concerns within this major drainage district is presented below:

Existing pond basin L-P1.4 outlets through two 8'x 5' box culverts and under existing conditions has a HWL of 932.6'. With proposed rate control in the City of Lakeville, the outlet for pond L-P1.4 is proposed to be reduced to one 8' x 5' box culvert and the available storage volume increased through excavation.

Existing ponding basins L-P1.6 and L-P1.7, just west of Flagstaff Avenue, are separated by a ridge line and field road. Under existing conditions, a 100-year storm event will cause pond L-P1.7 to top the ridge line (approximate elevation of 926.5') at Flagstaff Avenue and spill into pond L-P1.6. Pond L-P1.6 will overtop Flagstaff Avenue (approximate overflow elevation at 925.8') by over a foot during a 100-year storm event. In the future, once the City of Lakeville has implemented the rate control measures outlined in their SWMP, the high water levels for L-P1.6 and L-P1.7 will be reduced to 924.6 and 926.3' respectively. To lower the HWL of L-P1.7 to 924.9' under future conditions (rate control in the City of Lakeville), two 48" culverts running parallel to the existing box culvert will be necessary. The inverts of the culverts are proposed to be approximately 2 feet above the box culvert in order to make the existing box culvert the main channel and reduce potential sedimentation within the culverts. No significant rate reduction occurs with these ponds despite their significant size due to the volume of runoff from the upstream watershed.

Proposed pond L-P2.3 will be created when Pilot Knob Road (CSAH 31) is extended south of CSAH 50 to 220th Street. The proposed outlet is one 12'x 7' box culvert and two 10'x 5' box culverts. The 12'x 7' box

culvert is proposed act as the main channel for the South Creek. The 10'x5' box culverts are proposed to be two feet above the invert of the center 12'x7' box culvert. Under existing conditions, the 100-year HWL would be 920.6', and with upstream rate control in Lakeville, as proposed in their SWMP, the HWL would drop to 918.4'. When Pilot Knob Road is extended south, the culvert design should be reviewed at that time. The South Creek is a designated trout stream and concerns will be raised about ponding water upstream of CSAH 31 and its effect on water temperatures for the creek. The capacity of these culverts is very large so that minimal ponding will occur with the more frequent and smaller storm events which are felt to have the greatest impact on trout waters. Only during the very large and infrequent storm events will there be temporary ponding.

3.3.4 Vermillion River District

The Vermillion River District includes approximately 1110 acres. The district borders and drains to the Vermillion River. The area is mostly developed and includes the downtown business section and the older residential section of the City. The upstream drainage area of the Vermillion River enters this district from the southwest and contains approximately 39,700 acres. 115 acres of the district are in the northeast portion of the City in the Seed/Genstar Area and discharge to the Vermillion River through Empire Township

No hydrograph was constructed or available for the Vermillion River at the point of entry into the City of Farmington. Thus, it was not possible to model Farmington's contribution to the peak flow of the Vermillion River. The runoff from the Vermillion River District is almost entirely direct runoff and will not have a significant contribution to the peak flow of the Vermillion River. The peak runoff from this district will have entered the Vermillion River and traveled downstream before the peak flow of the Vermillion River reaches this district.

A summary of some of the special concerns within this major drainage district is presented below:

The Vermillion River passes through three 12' x 7' box culverts where 220th Street crosses the Vermillion River. These culverts are currently experiencing silting and reduction of available flow capacity. The probable reason that sediment is accumulating is because of a reduction of flow velocity and associated sediment transport capacity of the Vermillion River where the three culverts act as the river channel. The width/depth ratio of the bankfull channel has likely been increased where the culverts act as the channel, thus, decreasing the bankfull shear stress and causing sediment deposition. To correct the situation problem two options are available:

1) A sedimentation pond could be constructed immediately upstream of the culverts to trap sediment. The pond would need to be periodically dredged to remove sediment deposits.

2) One of the culverts could be designated as the bankfull channel by constructing weirs in front of the remaining two culverts with a spillway elevation a few feet above the inverts of the culverts. The two culverts would only be used during storm events producing runoff greater than the capacity of the existing bankfull channel of the Vermillion River.

Pond VR-P1.4 is an existing wetland that overtops Spruce Street by almost a foot during a 100-year storm event. The low point of the road is approximately 902.1'. The adjacent pond VR-P1.4.1 could be expanded west along the existing parking lot to increase storage volume and treat runoff from the entire parking lot. However, increasing the pond volume would have no significant effect on the wetland HWL at this time.

3.3.5 Prairie Waterway District

The Prairie Waterway District is located in the southeastern portion of the City. The topography is relatively flat and drained by the Prairie Waterway. The drainage area is approximately 1,120 acres. The drainage area includes small parts of Castle Rock and Empire Townships.

Pond PW-P1.2 has been proposed by the City and Dakota County Fairgrounds to be created by using dikes and existing topography in the northeast corner of the fairgrounds parking lot. The outlet structure will be a catch basin and 12" storm sewer to be connected to the storm sewer line running east along Ash Street (210th Street West). A curve number of 60 was used to model the existing cover type (good grass cover) and hydrologic condition (sandy, non-compacted soil) of the fairgrounds. Should the land use and/or cover type change, the pond will need to be enlarged to account for the increase in runoff.

A summary of some of the special concerns within this major drainage district is presented below:

Two existing catch basins are located at the low point on Hickory Street near the intersection with Hwy. 3 that collect runoff from Subdistrict PW-A1.9. These catch basins were designed for infiltration and are not connected to the storm sewer system. During large storm events the City must pump out the catch basins to alleviate flooding. It is proposed that the City install storm sewer from these catch basins under Hwy. 3 into wetland PW-1.10.1 north of the Farmington Mall which will be expanded to provide rate control. An outlet pipe will be installed that connects the wetland to existing storm sewer at the intersection of Hickory Street and 10th Street. This storm sewer collects runoff from the East Farmington Development prior to discharge into PW-P1.11.3.

3.3.6 Biscayne District

The Biscayne District is located in the southeast corner of the City, and is largely contained within the Townships of Empire and Castle Rock. The topography is relatively flat and well-drained by agricultural ditches, which provide opportunity for wetland restoration. The groundwater is relatively near to the surface (1 – 8 feet below the surface). Because of the high groundwater table, it is anticipated that developments may construct large groundwater ponds to mine for fill. These ponds would be situated within the groundwater table, and their normal water level will vary throughout the year depending on the groundwater elevation. The drainage area is approximately 1,430 acres.

A summary of some of the special concerns within this major drainage district is presented below:

Wetland B-P1.1 is categorized as a Restore wetland and is currently landlocked with no culvert under Hwy 50 found to provide a drainage outlet. Consequently, during large storm events water levels will rise until they are high enough to discharge overland to the east into Wetland B-P1.2. A piped outlet is proposed to provide a lower outlet combined with excavation to lower the wetland. Both measures are necessary to protect Hwy 50 and adjacent roads and properties from flooding threats. The existing wetland will be excavated and restored at a lower elevation in conjunction with flood mitigation improvements. If the HWL was allowed to increase 1 foot above the design HWL in Appendix B, then the pond/wetland footprint could be reduced to approximately 7 acres and the allowable discharge near 13 cfs.

Pond B-P1.10 is a proposed groundwater pond that will be located upstream of an existing 48" CMP under 210th Street. The proposed outlet for this pond is 2 feet higher than the existing culvert invert. The higher invert elevation was selected in order to promote infiltration/retention and conversion of the downstream ditch (north of 210th St) into a shallower swale to improve the hydrology of the wetlands along the ditch.

Pond B-P1.11 is located upstream of a small Manage 3 wetland along 210th Street that is itself currently drained by a 24" culvert under 210th Street, just east of the future Biscayne Ave alignment. A new culvert is proposed under 210th Street, west of Biscayne Ave, to route runoff north into subdistrict B-A1.12. The routing may improve the hydrology of the downstream wetland, will facilitate drainage design across potential property and corporate boundaries and likely follows the historical drainage pattern that was interrupted by 210th St.

Wetland B-P1.12 is categorized as a Manage 3 wetland and is currently drained by a 24" culvert under Biscayne Ave. The wetland fringe will be lowered to improve hydrology and facilitate drainage into the wetland from B-P1.11. The replacement culvert is both smaller and approximately 1 foot higher in elevation. The increase in the outlet elevation will allow the culvert to drain at the existing ground surface assuming the downstream ditch through the Protect wetland in subdistrict B-P1.13 will be abandoned in the future.

3.3.7 South Branch District

The South Branch District is located just south of the existing Farmington border in Castle Rock Township, south to 230th Street. This district was incorporated into this plan due to the possibility of an orderly annexation agreement between Castle Rock and Farmington prior to 2030. A large portion of the district is occupied by the floodplain of the South Branch of the Vermillion River which flows through this district. Consequently the district is fairly flat and poorly drained. The South Branch is a warm water tributary to the Vermillion River and development is not subject to the trout stream requirements. The drainage area is approximately 720 acres.

3.4 WETLAND ASSESSMENT

Many of Farmington's wetlands were field inventoried in 1997 with the creation of the Wetland Protection Ordinance. A detailed discussion of the field inventory methods and how wetlands were classified is presented in the Ordinance. The goal behind the assessment was to determine the sensitivity of the wetlands to impacts which can occur from urban stormwater. There are many types of wetlands, each determined by its hydrology, vegetation, soils, topography and chemistry.

Map 3 attached to this plan shows the current inventory of wetlands in Farmington. The Wetland Protection Ordinance specifies that any new development must provide a wetland assessment of the property prior to development. Therefore, numerous wetland areas have been inventoried and added to the City's wetland classification map during the last 10 years. Wetlands within the Southeast Study Area were inventoried in 2005. Additional wetlands were inventoried in 2007 as part of this report. The 2005 and 2007 wetland inventories utilized MnRAM V3.0.

The goal of wetland management is to maintain or enhance the ecological integrity of wetlands within the City, as the City continues to grow. Wetland management classifications and protection strategies are based on a wetland's susceptibility to stormwater impacts (i.e., water fluctuation, inundation period, and nutrient loading) and its location in association with greenways and parks. Wetland susceptibility to stormwater impacts is determined by the type of wetland and the quality of the plant communities. Wetlands within the City were grouped under the four management classifications defined in the Wetland Protection Ordinance. Table 3.4 provides the current total acreage of each classification in the study area.

TABLE 3.4 TOTAL WETLAND AREA PER MANAGEMENT CLASSIFICATION

MANAGEMENT CLASS	TOTAL ACRES
Protect	335
Manage 1	207
Manage 2	574
Manage 3	125
TOTAL	1240

Figure 3.4 below shows the process that was used to determine the protection strategy for wetlands within the City. All wetlands within the City will continue to be protected by state and federal regulations which protect wetlands from being filled, drained, and excavated. The strategy presented in Figure 3.4 protects wetlands from stormwater impacts which are not under federal and state regulation.

Greenways are located around the rivers, streams and parks of the City. Degraded wetlands found within greenway corridors were labeled as "Potential Wetland Enhancement and Banking Sites". Restoring these wetlands will help protect waterways from both quantity and quality impacts and enhances City parks. For these wetlands, the landowner has the following two options for treatment of stormwater prior to discharge into the wetland: 1) Meet the requirements for a 'Manage 2' or 2) Meet the requirements for a 'Restore', which includes no quantity requirement and providing pretreatment to limit influent phosphorus concentrations to 225 ppb. A cash contribution to the City based on the difference in construction cost between the upstream water ponding required for discharge to a Manage 2 and Restore requirements

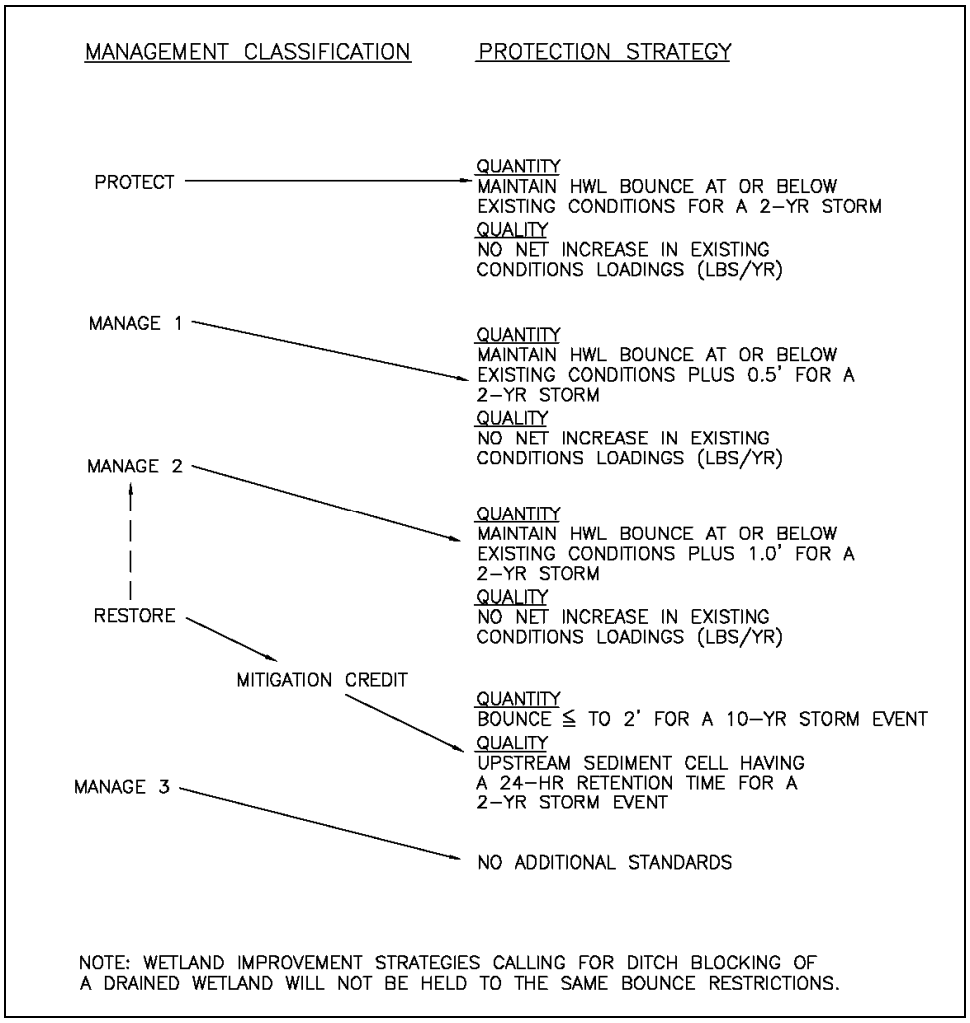
would be required for the City's wetland and stream restoration fund. These funds will be used for the enhancement or the purchase of land adjacent to wetlands and streams within the city.

The City may, at their discretion, require development to meet more stringent criteria when it is determined that it is necessary to maintain the integrity of water quality in downstream wetlands and waterbodies. The management classifications are color coded on Map 3.

Geographical Information System (GIS) and database records were used to aid in the inventory and final mapping of wetlands within the study area. This provides the City with an electronic database that can be easily integrated with other mapped data, and easily updated. The electronic data includes an estimate of the wetland boundary, management classification, and National Wetland Inventory data.

As needed, approximate wetland boundaries were field-rectified on the plotted maps, for subsequent incorporation in the GIS layer. Note that these boundaries are field estimates, and do not replace official jurisdictional wetland delineations.

FIGURE 3.4 WETLAND MANAGEMENT DECISION TREE



3.5 NPDES PERMIT

The EPA's NPDES program required the City of Farmington to obtain permit coverage in 2003, by implementing a stormwater pollution prevention program (SWPPP) to address six minimum control measures:

1) Public education
2) Public involvement
3) Illicit discharge detection and elimination
4) Construction site runoff control
5) Post-construction runoff control
6) Pollution prevention in municipal operations

The City's SWPPP contains 60 best management practices categorized by the listed control measures. These were identified using a self-evaluation and input process with City staff.

BMP 4d-1 in the City's SWPPP describes the procedure implemented for site plan reviews. The City requires all site plans, including single site new construction, redevelopment, and new development plans, to be reviewed for erosion control. Review ensures that erosion control methods identified in City Specifications and Standard Detail Plates (described in BMP 4i-1 in the City's SWPPP) are being utilized fully, correctly, and in the right locations. For new construction, site plan review must occur prior to the issuance of building permits. For re-development and new development, site plan review is a condition of the required Development Contract. As outline in BMP 4b-1 in the City's SWPPP, the Development Contract allows the City to impose additional erosion control requirements if it is determined that the methods implemented are insufficient to properly control erosion.

In addition to complying with the requirements of the NPDES Phase II MS4 Permit, the City's SWPPP has several unique best management practices. Under the public education minimum control measure, a wetland and wetland buffer brochure, residential contractor erosion control meeting, and utility billing storm water survey are noted. An adopt-a-pond program and an annual citywide pond clean-up day are two public involvement initiatives new to the City's 2006 permit.

Many of the goals and policies discussed in this local surface water management plan are directly related to requirements listed in the NPDES program. As a result, the implementation section of this plan repeatedly references items listed in the City's SWPPP.

3.6 SUMMARY FINDINGS AND STATEMENT OF ISSUES

Farmington is a growing community. Over the past decade the City has invested a significant amount of money in stormwater infrastructure, which has served the City well. Development and changes in land use will continue into the future and have the potential to decrease water quality, increase flooding, impact water resources and increase public expenditures on surface water management, while the aging infrastructure in downtown Farmington will demand a larger amount of funds set aside for stormwater management.

The VRWJPO will continue to focus on protecting the Vermillion River and its tributaries by reducing peak flows and volumes and promoting greater water quality. These goals will continue to have an affect on the

City through tighter rules and standards. The MPCA will complete local TMDL studies that will lead to challenging implementation projects throughout the City.

Surface water management issues within the City are primarily defined by the requirements of current or pending programs. The goals and policies outlined in this plan are grouped by their relationship to the key issues defined below:

1. Provide effective and responsible local management of water resources.
2. Protect and enhance surface water quality in the City.
3. Provide flood protection for persons and property, and manage the rate and volume of runoff entering rivers, streams, lakes and wetlands within the City.
4. Protect groundwater quality and quantity to preserve it for sustainable and beneficial purposes.
5. Maintain and enhance the functions and values of wetlands within the City.
6. Preserve floodplains and manage adjacent uses to prevent flood damages.
7. Develop or improve recreational open space areas, fish and wildlife habitat, and public accessibility in conjunction with water quality improvement projects.
8. Protect and conserve water and natural resources by promoting sustainable growth and integrated land use planning.
9. Increase public awareness of the function and value of surface water resources and the impacts associated with human activities.
10. Maintain adequate funding for surface water management.

Section 4 – Goals, Policies and Actions

This section provides the goals, policies and actions that define this Local Surface Water Management Plan. The outline for this section is based on the local plan template provided by the VRWJPO. The goals, policies and actions apply specifically to the City of Farmington.

GOALS – are the long term objectives to be achieved.

POLICIES – are the statements of philosophy or principle that support the goals.

ACTIONS – are specifically defined to implement policies.

4.1 FARMINGTON'S ROLE IN WATERSHED MANAGEMENT

The VRWJPO recognizes that control and determination of land use within the watershed is the responsibility of Local Government Units. Section 7.1 of the VRWJPO Watershed Plan discusses the relationship of local plans to the watershed plan. Per Minnesota Statutes 103B.235, Local Government Units are responsible for adopting Local Water Plans that are in conformance with the Watershed Plan.

GOAL – Effective and responsible local management of water resources.

POLICY 4.1.1

The City of Farmington will maintain full authority for watershed management permitting of land altering activities within the City.

ACTION 1 – The City will maintain consistency with the VRWJPO Watershed Plan by amending its ordinances, regulations and permitting processes, to implement and enforce the standards and rules of the watershed.

ACTION 2 – The City will continue to actively implement the Stormwater Pollution Prevention Program defined in the NPDES-MS4 permit, in compliance with MPCA and EPA regulations.

4.2 SURFACE WATER QUALITY

GOAL – Protect and enhance surface water quality in the City.

POLICY 4.2.1

The City will participate in improving the condition of the Vermillion River and its tributaries, so that these water bodies can be removed from the MPCA impaired waters list.

ACTION 1 – The City will work with the MPCA and other agencies to develop and implement Total Maximum Daily Load (TMDL) studies on all impaired water bodies, by actively participating in the TMDL

process. The City will participate in public meetings and educational outreach. The City will incorporate appropriate load reduction measures identified in TMDL studies.

POLICY 4.2.2

The City will minimize water quality impacts (including thermal impacts) from land disturbing activities, including new development, redevelopment, road construction, and other uses.

ACTION 1 – The City will maintain consistency with the VRWJPO Watershed Plan by amending its ordinances, regulations and permitting processes, to implement and enforce the water quality standards of the watershed. Water quality standards include control of pollutant loads, control of thermal impacts, preservation of habitat, creation of buffers and assignment of maintenance responsibilities. Specific amendments are identified in the implementation section of this plan.

ACTION 2 – The City will require water quality ponds to be designed with outlet skimmers, energy dissipation, sediment storage, stabilized banks and permanent vegetation to maximize pollutant removal and control.

ACTION 3 – The City will promote the use of existing natural retention and detention areas for stormwater management, to maintain or improve existing water quality.

ACTION 4 – The City will support land use planning, policies and controls that maintain sustainable, high-quality surface water resources.

ACTION 5 – The City will require the creation of buffers around water bodies in the permitting of development and land-disturbing activities.

POLICY 4.2.3

The City will manage stormwater to minimize erosion.

ACTION 1 – The City will continue to implement an inspection program for construction sites to ensure compliance with erosion and sediment control regulations and MPCA rules. Require erosion and sediment control best management practices on other sites experiencing erosion problems.

ACTION 2 – The City will require designs that minimize runoff velocities and maximize natural cover to reduce erosion.

POLICY 4.2.4

The City will actively implement the pollution prevention measures outlined in the NPDES permit for the Municipal Separate Storm Sewer System (MS4.)

ACTION 1 – The City will continue to prohibit the discharge of pollutants into the stormwater system. Pollutants include, but are not limited to waste oil, paint, grass clippings, leaves, and ecologically harmful chemicals. The City will continue to implement the storm drain stenciling program.

ACTION 2 – The City will maintain a spill response program for City personnel to prevent discharge of spilled materials into the storm sewer system. The response program will focus on containing, neutralizing and properly disposing of spilled materials. The Fire Department, Public Safety Department, and Municipal Services Department shall have a readily available supply of response materials.

ACTION 3 – The City will adopt best management practices for the use of pesticides and fertilizers on City-owned lands.

ACTION 4 – The City will implement a program, in conjunction with the watershed, to monitor the long-term water quality trends on prioritized waterbodies and update the SWMP when necessary. The City will promote and coordinate with other agencies for the continuation of water quality monitoring programs.

POLICY 4.2.5

The City will ensure stormwater management systems are maintained.

ACTION 1 – The City will actively implement the stormwater management system maintenance practices outlined in the NPDES permit for the MS4, including the maintenance of detention ponds and pond outlet structures.

ACTION 2 – The City will require maintenance agreements and development planning to ensure that stormwater management structures and facilities are maintained in perpetuity as originally designed. The responsibility for maintenance shall be assumed either by the city or by the applicant entering into a compliance agreement.

ACTION 3 – The City will actively implement the street sweeping program outlined in the NPDES permit for the MS4.

4.3 SURFACE WATER QUANTITY

GOAL – Provide flood protection for persons and property, and manage the rate and volume of runoff entering rivers, streams, lakes and wetlands within the City.

POLICY 4.3.1

The City will minimize the impacts of runoff from land disturbing activities, including new development, redevelopment, road construction and other uses, by implementing stormwater rate and volume control standards.

ACTION 1 – The City will maintain consistency with the VRWJPO Watershed Plan by amending its ordinances, regulations and permitting processes, to implement and enforce the water quantity standards of the watershed. Water quantity standards include control of runoff peaks, control of runoff volumes, preservation of floodplain storage areas, and dedication of easements for drainage. Specific amendments are identified in the implementation section of this plan.

ACTION 2 – The City will require that development plans include design for minimum freeboard of 2 feet above the 100-year high water level, or 1 foot above the emergency overflow elevation whichever is more

restrictive, for the lowest floor of buildings adjacent to ponding areas, open channels, overflow paths and floodplains.

ACTION 3 – The City will require that development plans include design for minimum freeboard of 2 feet above the highest recorded groundwater elevation. The highest recorded groundwater elevation shall be based on records from existing on-site wells and/or piezometers installed by the developer and monitored for a minimum of six months. The monitoring period shall include the spring months beginning in March. The minimum freeboard may be increased 1 foot at the City Engineer's discretion if rainfall during the monitoring period and/or 1 year prior is less than 80% of average rainfall.

ACTION 4 – The City will establish and maintain overflow routes where possible to provide relief during storms which exceed design conditions.

ACTION 5 – The City will require the proper design, operation, and maintenance of the surface water system.

ACTION 6 – The City will strictly enforce ordinances regulating floodplain development.

ACTION 7 – The City will require the dedication of land and/or protective easements as required to permanently protect surface storage areas and conveyance systems.

4.4 GROUNDWATER

GOAL – Protect groundwater quality and quantity to preserve it for sustainable and beneficial purposes.

POLICY 4.4.1

The City will promote groundwater recharge where it is feasible and does not pose a threat to groundwater quality.

ACTION 1 – The City will require that ponds and wetlands are designed with consideration for the protection of groundwater.

ACTION 2 – The City will promote and coordinate with other agencies for the continuation of groundwater monitoring programs.

ACTION 3 – The City will actively implement the street sweeping program outlined in the NPDES permit for the MS4.

ACTION 4 – The City will actively implement the spill prevention and response program outlined in the NPDES permit for the MS4.

4.5 WETLANDS

GOAL – Maintain and enhance the functions and values of wetlands within the City.

POLICY 4.5.1

The City will protect wetlands from chemical, physical, biological, or hydrological changes, to prevent significant adverse impacts to designated wetland uses, to maintain biological diversity, to preserve wildlife habitat, to provide recreational opportunities, and to minimize stormwater runoff in the watershed.

ACTION 1 – The City will maintain a wetland inventory, map and management classification system.

ACTION 2 – The City will enforce the requirements of the Wetland Conservation Act, including requirements for no net loss of wetland quantity, quality and biological diversity. The City will require wetland replacements that provide equal or greater functions and values at the replacement ratio dictated by the Wetland Conservation Act. The City will promote avoidance of direct or indirect wetland disturbance for all developments and land disturbing activities. The City will promote the restoration and/or creation of wetlands.

ACTION 3 – The City will maintain consistency with the VRWJPO Watershed Plan by amending its ordinances, regulations and permitting processes, to implement and enforce the wetland standards of the watershed, including wetland buffers. Specific amendments are identified in the implementation section of this plan.

ACTION 4 – The City will require buffers, acting as filter strips, around every wetland based on its management classification.

4.6 FLOODPLAINS

GOAL – Preserve floodplains and manage adjacent uses to prevent flood damages.

POLICY 4.6.1

The City will protect the natural floodwater storage function of the floodplain from encroachment.

ACTION 1 – The City will adopt floodplain regulations consistent with Dakota County ordinances and current FEMA maps.

ACTION 2 – The City will work to maintain no net loss of floodplain storage.

ACTION 3 – The City will require that developments do not increase 100-year flood elevations.

POLICY 4.6.2

The City will require that development and uses adjacent to the floodplain are designed to prevent flood damages.

ACTION 1 – The City will adopt floodplain regulations consistent with Dakota County ordinances and current FEMA maps.

ACTION 2 – The City will require that buildings adjacent to floodplains are adequately elevated above the flood elevation.

ACTION 3 – The City will promote construction of new structures on sites above flood prone areas.

4.7 OPEN SPACE AND RECREATIONAL AREAS

GOAL – Develop or improve recreational open space areas, fish and wildlife habitat, and public accessibility in conjunction with water quality improvement projects.

POLICY 4.7.1

The City will work to preserve, restore and enhance natural areas, shoreland and wetlands, and connect them to outdoor recreational and cultural resources whenever possible.

ACTION 1 – The City will work to avoid or mitigate impacts to regionally and locally important natural areas.

ACTION 2 – The City will adopt shoreland ordinances that comply with County and State ordinances, and VRWJPO standards.

4.8 LAND USE MANAGEMENT

GOAL – Protect and conserve water and natural resources by promoting sustainable growth and integrated land use planning.

POLICY 4.8.1

The City will promote the protection and restoration of natural resources in order to maintain or improve their function and value.

ACTION 1 – The City will coordinate the public acquisition and ownership of the drainage system with the parks plan in order to develop environmentally-oriented corridors along drainage ways.

ACTION 2 – The City will promote open channel drainage systems with multiple uses for natural habitat and recreation.

ACTION 3 – The City will work to prevent fragmentation of natural areas and corridors when feasible.

ACTION 4 – The City will use Dakota County Biological Survey to evaluate development proposals and set preservation goals to protect high-quality habitat for plants and animals.

4.9 EDUCATION

GOAL – Increase public awareness of the function and value of surface water resources and the impacts associated human activities.

POLICY 4.9.1

The City will promote public education and coordinate with the activities of other agencies.

ACTION 1 – The City will actively implement the public education component of the NPDES MS4 permit.

ACTION 2 – The City will coordinate the public education program with the Dakota County Soil and Water Conservation District, the Vermillion River Watershed and the Dakota County Environmental Health Department.

ACTION 3 – The City will actively implement the municipal housekeeping component of the NPDES MS4 permit, including the training program for City staff.

4.10 FUNDING

GOAL – Maintain adequate funding for surface water management

POLICY 4.10.1

The City will adequately support surface water management through a combination of dedicated City revenue, stormwater utility funds, special assessments, and development fees.

ACTION 1 – The City will focus funding for surface water management based on priorities established in the capital improvement program, update annually.

Section 5 – Implementation Priorities/Program

5.1 IMPLEMENTATION RESPONSIBILITIES

5.1.1 REGULATORY RESPONSIBILITIES

Farmington will maintain full authority for watershed management permitting of land alteration activities within the City.

The City will require the proper design, operation, and maintenance of the surface water system.

The City will enforce floodplain regulations consistent with Dakota County ordinances and current FEMA maps.

The City will enforce the requirements of the Wetland Conservation Act, including requirements for no net loss of wetland quantity, quality and biological diversity.

The City will actively implement the pollution prevention measures outlined in the NPDES permit for the Municipal Separate Storm Sewer System (MS4), including an inspection program for construction sites to ensure compliance with erosion and sediment control requirements and MPCA rules.

5.1.2 MAINTENANCE RESPONSIBILITIES

The City will actively implement the stormwater management system maintenance practices outlined in the NPDES permit for the MS4, including the maintenance of detention ponds and pond outlet structures. In cases where property owners are responsible for maintenance, the City will require maintenance agreements and development planning to ensure that stormwater management structures and facilities are maintained in perpetuity as originally designed.

5.2 ORDINANCE MODIFICATIONS

Codes and ordinances (official controls) are necessary tools supporting implementation of this surface water management plan. After adoption of this plan, the City Code will need to be updated to achieve consistency with the watershed plan. Per State statute, this implementation step must be completed within 180 days after adoption of this plan by the watershed. Gaps in the City's standards will be addressed through the following changes in City Codes and standards:

1. City Ordinance 10-5-25: Floodplain Overlay District will be updated to require easements over areas below the 100-year critical flood elevation of any public water, public waters wetland, or wetland, establish setbacks along major waterways, and allow projects that alter floodplain boundaries as long as no detrimental impacts result, or adverse impacts are mitigated.
2. City Ordinance 10-6-17: Wetland Standards will be updated to allow the BWSR replacement program for transportation projects, detail the requirements for allowing stormwater ponds in buffers, and require minimum and average buffer widths for Manage 3 wetlands that meet the VRWJPO's standards.

3. Major waterway buffers widths will be added to **City Ordinance 10-6-18: Shoreland Management Regulations** that meet the buffer widths in the VRWJPO's standards.

4. **City Ordinance 10-6-27: Erosion Control Required** will be updated to require compliance with the NPDES General Construction Permit requirements, as well as require conveyance channels be constructed to withstand velocities from a 10-year storm event without erosion.

6. **City Ordinance 11-4-7: Storm Drainage** will be updated to require a land alteration permit for any land disturbance activity, and will also include the VRWJPO's requirements for temperature control, water quality criteria, rate control, and volume control.

Over time, codes must be updated to remain consistent with goals, policies and practices. The City will submit proposed surface water management related code revisions to the VRWJPO for review and comment. All code sections are available for online viewing at the City's website.

5.3 IMPLEMENTATION PROGRAMS

5.3.1 Permit Program

Farmington will maintain full authority for permitting of land altering activities within the City. Consistency with watershed requirements will be demonstrated through a land disturbance permit program. The City will implement this program after adoption of this plan by the watershed.

5.3.2 Operations and Maintenance Programs

The City's stormwater system maintenance program is outlined in the NPDES permit for the MS4. BMP 3a-1 requires the City to create and update a storm sewer system base map that includes ponds, streams, lakes, wetlands, structural pollution control devices, pipes, outfalls and discharge points. Using this base map as a reference, the City is required to provide maintenance as defined in several BMP's:

- 5c-1: Long-term Operation and Maintenance of BMPs – The City of Farmington regularly inspects structural BMPs. Repairs, replacements, and maintenance are conducted as needed. The City is to track annually the number of outfalls, sediment basins, ponds, and pollution control devices inspected, as well as the number of structures receiving maintenance.
- 6a-2: City Street Sweeping – The City of Farmington sweeps the streets at least twice in the spring to remove excess sand and salt from plowing operations and at least twice in the fall after most of the leaves have fallen. The City utilizes a mechanical, brush-type sweeper and tracks the hours spent sweeping streets.
- 6b-2: Inspection of Structural Pollution Control Devices – The City inspects 100% of the pollution control devices, such as trap manholes, grit chambers, sumps, floatable skimmers and traps, separators, and other small settling or filtering devices. Maintenance is scheduled based on the results of the inspections.
- 6b-3: Inspection of MS4 Outfalls, Sediment Basins, and Ponds – The City inspects 20% of all outfalls, sedimentation basins, and ponds annually on a rotating basis and tracks any maintenance conducted.
- 6b-4: Annual Inspection of All Exposed Stockpile, Storage, and Material Handling Areas – The City inspects all exposed stockpile, storage, and material handling areas and tracks the number of areas inspected.

- 6b-5: Inspection Follow-up – The annual inspection programs in BMPs 6b-2, 6b-3, and 6b-4 automatically yield correction notices that are forwarded to the Municipal Services Department. When the correction work is completed, the work is re-inspected.

5.3.3 CAPITAL PROJECTS

Consistent with previous surface water planning in Farmington, this LSWMP assessment focuses on the development of regional ponds for surface water management. Section 3.3 discusses specific pond locations in each of the drainage sub-basins. Appendix C provides a summary list of the proposed pond improvements and estimated costs for planning purposes. In addition to proposed ponds, the capital improvements list also includes several drainage system improvements.

5.4 FINANCIAL/FUNDING CONSIDERATIONS

Surface water management activities in Farmington are funded through a combination of funding sources. The City's stormwater utility fund provides revenue for system maintenance, reconstruction and NPDES compliance. System expansion and improvement projects are funded through area charges for new development. The City also works with other agencies to fund projects through cost-share and grants.

The City will periodically review and update the schedule of utility fees and area charges for development, to maintain adequate funding to support the stormwater management program. The surface water model and proposed improvements identified in this LSWMP will be used to review the current area charges for development.

Section 6 – Administration

6.1 REVIEW AND ADOPTION PROCESS

Review and adoption of this Surface Water Management Plan will follow the procedure outlined in Minnesota Statutes 103B.235:

'After consideration but before adoption by the governing body, each local government unit shall submit its water management plan to the watershed management organization[s] for review for consistency with the watershed plan. The organization[s] shall have 60 days to complete its review.'

'Concurrently with its submission of its local water management plan to the watershed management organization, each local government unit shall submit its water management plan to the Metropolitan Council for review and comment. The council shall have 45 days to review and comment upon the local plan. The council's 45-day review period shall run concurrently with the 60-day review period by the watershed management organization. The Metropolitan Council shall submit its comments to the watershed management organization and shall send a copy of its comments to the local government unit.'

'After approval of the local plan by the watershed management organization[s], the local government unit shall adopt and implement its plan within 120 days, and shall amend its official controls accordingly within 180 days.'

6.2 ANTICIPATED AMENDMENTS

This Local Surface Water Management Plan will be incorporated into the City's 2008 Comprehensive Plan update and will be applicable until 2018, at which time an updated plan will be required. Periodic amendments may be required to incorporate changes in local practices. In particular, plan amendments will be necessary when the VRWJPO completes the pending hydrologic model, adoption of new rate control standards, and adoption of a stream temperature trading system.

LSWMP amendments will be incorporated by following the amendment procedure for the presented below.

Request for Amendment

Written request for plan amendment is submitted to City staff. The request shall outline the need for the amendment as well as additional materials that the City will need to consider before making its decision.

Staff Review of Amendment

A decision is made as to the validity of the request. Three options exist: 1) reject the amendment, 2) accept the amendment as a minor issue, with minor issues collectively added to the plan at a later date, or 3) accept the amendment as a major issue, with major issues requiring an immediate amendment. In acting on an amendment request, City staff shall recommend to City Council whether or not a public hearing is warranted.

Council Consideration

The amendment and the need for a public hearing shall be considered at a regular or special Council meeting. Staff recommendations should be considered before decisions on appropriate action(s) are made.

Public Hearing and Council

This step allows for public input based on public interest. Council shall determine when the public hearing should occur in the process. Based on the public hearing, the City Council could approve the amendment.

Metropolitan Council and Watershed Organization Approval

All proposed amendments must be reviewed and approved by Metropolitan Council and the VRWJPO prior to final adoption of the amendments.

Council Adoption

Final action on an amendment, following approval by Metropolitan Council and the VRWJPO, is City Council adoption. However, prior to the adoption, an additional public hearing could be held to review the plan changes and notify the appropriate stakeholders.

Section 7 – References

Bonestroo. 2006. Farmington Draft SWMP Addendum Southeast Area. 34 pgs. plus appendices.

Bonestroo. 2006. Farmington Seed/Genstar Alternative Urban Areawide Review Update (AUAR). 118 pgs. plus appendices.

Bonestroo. 1997. Farmington Surface Water Management Plan. 102 pgs. plus appendices.

Metropolitan Council. 2005. 2030 Water Resources Management Policy Plan. 113 pgs.

Minnesota Pollution Control Agency (MPCA). 2006. Minnesota Stormwater Manual. 717 pgs.

Vermillion River Watershed Joint Powers Organization. 2005. Watershed Plan. 222 pgs. plus appendices.

Vermillion River Watershed Joint Powers Organization. 2008. Standards. 34 pgs.

Vermillion River Watershed Joint Powers Organization. 2007. Rules. 55 pgs.

U.S. Department of Agriculture, Soil Conservation Service. Hydrology Guide for Minnesota. 175 pgs. plus appendices.

Appendix A

DRAINAGE SUBDISTRICT AREAS

Appendix A - Subdistrict Drainage Areas

Subdistrict Name	Area (acres)
Apple Valley District 1	
AV-A1.1	25
AV-A1.2	23
AV-A1.3	34
AV-A1.4	48
AV-A1.5.1	4
AV-A1.5.2	61
AV-A1.6.1	4
AV-A1.6.2	13
AV-A1.7	28
AV-A1.8	87
AV-A1.9	123
AV-A1.9.1	9
AV-A1.10	108
AV-A1.10.1	11
AV-A1.10.2	6
AV-A1.10.3	7
AV-A1.10.4	12
AV-A1.10.5	14
AV-A1.10.6	19
AV-A1.10.7	9
AV-A1.10.8	6
AV-A1.10.9	4
AV-A1.11.1	6
AV-A1.11.2	7
AV-A1.11.3	20
AV-A1.11.4	15
AV-A1.11.5	10
AV-A1.11.6	3
AV-A1.11.7	14
AV-A1.11.8	5
AV-A1.11.9	10
AV-A1.12.1	19
AV-A1.12.2	43
AV-A1.12.3	9
AV-A1.12.4	17
AV-A1.12.5	4
AV-A1.13	114
AV-A1.14	18
AV-A1.15	35
AV-A1.16	159
AV-A1.17	32
Total	1197

Subdistrict Name	Area (acres)
Apple Valley District 2	
AV-A2.1.1	18
AV-A2.1.2	21
AV-A2.1.3	17
AV-A2.1.4	94
AV-A2.1.5	10
AV-A2.2	123
AV-A2.3	154
AV-A2.4	102
AV-A2.5	89
AV-A2.6	40
AV-A2.7	124
AV-A2.7.1	8
AV-A2.8	67
AV-A2.9	109
F-A8.1	20
Total	997
Biscayne District	
B-A1.1	97
B-A1.2	127
B-A1.2	118
B-A1.3	76
B-A1.4	99
B-A1.5	94
B-A1.6	50
B-A1.7	80
B-A1.8	37
B-A1.9	59
B-A1.10	38
B-A1.11	67
B-A1.12	42
B-A1.13	53
B-A1.14	108
B-A1.15	54
B-A1.16	92
B-A1.17	65
B-A1.18	73
Total	1429

Appendix A - Subdistrict Drainage Areas

Subdistrict Name	Area (acres)
Farmington District 1	
F-A1.1	74
F-A1.3	39
F-A1.4	61
F-A1.5	47
F-A1.6	51
F-A1.7	54
F-A1.8.1	4
F-A1.8.2	31
F-A1.8.3	13
F-A1.9	31
F-A1.9.1	19
F-A1.9.2	10
F-A1.10	27
F-A1.11	30
F-A1.12	23
F-A1.13	71
F-A1.13.1	26
F-A1.14	45
F-A1.15	100
F-A1.2	28
Total	785
Farmington District 2	
F-A2.1	60
F-A2.2	31
F-A2.3	20
F-A2.4	16
F-A2.5	40
F-A2.6	14
F-A2.7	77
F-A2.8	65
Total	323
Farmington District 3	
F-A3.1	38
F-A3.10	51
F-A3.2	25
F-A3.3	50
F-A3.4	54
F-A3.5	28
F-A3.6	83
F-A3.6.1	12
F-A3.6.2	25
F-A3.7	74
F-A3.8	23
F-A3.9	8
Total	473
Farmington District 4	
F-A4.1.1	3
F-A4.1.2	16
F-A4.1.3	6
F-A4.1.4	10
F-A4.1.5	5
F-A4.2	75
F-A4.3	8
F-A4.4	33
F-A4.5	45
F-A4.6	34
F-A4.7	49
F-A4.8	54
Total	339
Farmington District 5	
F-A5.1	35
F-A5.10	10
F-A5.10.1	21
F-A5.10.2	14
F-A5.11	9
F-A5.12	48
F-A5.12.1	15
F-A5.12.2	6
F-A5.2.1	47
F-A5.2.2	32
F-A5.3	21
F-A5.4	41
F-A5.5	18
F-A5.6	24
F-A5.7	45
F-A5.8	14
F-A5.9	11
F-A5.9.1	2
F-A5.9.2	2
Total	418
Farmington District 6	
F-A6.1	93
F-A6.2	91
F-A6.4	370
F-A6.4.1	52
F-A6.4.2	14
Total	620

Appendix A - Subdistrict Drainage Areas

Subdistrict Name	Area (acres)
Farmington District 7	
F-A7.1	32
F-A7.10	63
F-A7.12	27
F-A7.13	79
F-A7.14	20
F-A7.14.1	10
F-A7.15	17
F-A7.2	107
F-A7.2.1	37
F-A7.2.2	7
F-A7.2.3	21
F-A7.3	9
F-A7.3.1	16
F-A7.3.2	62
F-A7.3.3	18
F-A7.4	32
F-A7.4.1	22
F-A7.5	52
F-A7.5.1	13
F-A7.5.2	28
F-A7.5.3	11
F-A7.5.4	3
F-A7.6	37
F-A7.6.1	7
F-A7.7	41
F-A7.8	20
F-A7.9	67
Total	858

Subdistrict Name	Area (acres)
Farmington District 8	
F-A8.10	50
F-A8.10.1	14
F-A8.11	40
F-A8.12	86
F-A8.12.1	5
F-A8.2.1	54
F-A8.2.2	21
F-A8.2.3	6
F-A8.3.1	21
F-A8.3.2	22
F-A8.3.3	8
F-A8.3.4	11
F-A8.3.5	16
F-A8.3.6	7
F-A8.4	26
F-A8.5	17
F-A8.6.1	2
F-A8.6.2	19
F-A8.7	19
F-A8.7.1	11
F-A8.7.2	6
F-A8.8.1	13
F-A8.8.2	2
F-A8.9	136
F-A8.9.1	36
F-A8.9.10	16
F-A8.9.11	49
F-A8.9.2	14
F-A8.9.3	12
F-A8.9.4	43
F-A8.9.5	10
F-A8.9.6	8
F-A8.9.7	8
F-A8.9.8	3
F-A8.9.9	7
Total	815

Lakeville District 1	
L-A1.1	31
L-A1.2	8
L-A1.3	74
L-A1.4	60
L-A1.5	42
L-A1.6	72
L-A1.7	75
L-A1.8	99
Total	460

Appendix A - Subdistrict Drainage Areas

Subdistrict Name	Area (acres)
Lakeville District 2	
L-A2.1	79
L-A2.2	123
L-A2.3	164
L-A2.4	153
Total	519

Subdistrict Name	Area (acres)
South Branch District	
SB-A1	106
SB-A2	292
SB-A3	327
Total	725

Prairie Waterway District	
PW-A1.1	57
PW-A1.10	15
PW-A1.11	22
PW-A1.11.1	16
PW-A1.11.2	27
PW-A1.11.3	35
PW-A1.12	66
PW-A1.12.1	5
PW-A1.12.2	33
PW-A1.12.3	14
PW-A1.12.4	21
PW-A1.13	104
PW-A1.14	40
PW-A1.14.1	9
PW-A1.14.2	8
PW-A1.14.3	11
PW-A1.14.4	8
PW-A1.14.5	4
PW-A1.14.6	12
PW-A1.15	42
PW-A1.15.1	15
PW-A1.16	4
PW-A1.17.1	1
PW-A1.17.2	9
PW-A1.17.3	25
PW-A1.18	39
PW-A1.2	98
PW-A1.3	61
PW-A1.4	39
PW-A1.5	21
PW-A1.6.1	24
PW-A1.6.2	29
PW-A1.6.3	11
PW-A1.7	103
PW-A1.8.1	34
PW-A1.8.2	8
PW-A1.8.3	29
PW-A1.9	23
Total	1119

Vermillion River District 1	
VR-A1.1	101
VR-A1.10	20
VR-A1.11	43
VR-A1.11.1	3
VR-A1.11.2	4
VR-A1.11.3	9
VR-A1.11.4	5
VR-A1.12	68
VR-A1.13	25
VR-A1.14	121
VR-A1.15	8
VR-A1.16.3	1
VR-A1.16.4	13
VR-A1.2	93
VR-A1.2.1	47
VR-A1.2.2	4
VR-A1.2.3	16
VR-A1.3	22
VR-A1.3.1	12
VR-A1.3.2	0
VR-A1.3.3	5
VR-A1.4	48
VR-A1.4.1	6
VR-A1.5	43
VR-A1.6	19
VR-A1.7	83
VR-A1.8	51
VR-A1.9	98
Total	970

Vermillion River District 2	
VR-A2.1	48
VR-A2.2	66
Total	114

Appendix B

POND MODELING DATA

Appendix B - Pond Data

Pond ID	Tributary Area			Water Level		Pond Size		100-yr Flood	Peak Flow	Outlet	Existing (E) Proposed (P)
	Direct	Ponded	Total	Outlet Elev. (OE)	100-yr HWL	At NWL	At 100-yr HWL	Storage Volume	100-yr		
	(acres)	(acres)	(acres)	(feet)	(feet)	(acres)	(acres)	(ac-ft)	(cfs)		
Apple Valley 1 District											
AV-P1.1	25		25	926.2	930.2	0.6	1.4	3.9	3.5	12"	E
AV-P1.2	23	25	48	914.0	919.3	0.7	1.0	4.5	6.2	24"	P
AV-P1.3	34		34	911.4	915.6	1.4	2.3	7.2	5.3	18"	E
AV-P1.5.1	4		4	913.6	914.1	1.6	1.8	0.9	0.6	12"	E
AV-P1.6.1	4		4	927.0	928.6	0.4	0.5	0.7	2.7	12"	E
AV-P1.6.2	13	4	17	926.0	928.3	0.4	0.5	1.1	5.0	12"	E
AV-P1.7	28		28	921.0	924.3	1.1	1.5	4.4	6.4	36"	E
AV-P1.8	87	28	114	908.9	912.4	1.5	2.2	6.5	126.6	2-36" Arch, 30" Arch	E
AV-P1.9	233	226	459	905.9	911.5	8.0	12.7	55.0	127.0	42"	E
AV-P1.9.1	9		9	910.2	911.5	0.8	1.3	1.4	3.1	15"	E
AV-P1.10.1	11		11	912.3	913.7	1.3	1.5	2.0	4.2	15"	E
AV-P1.10.2	6	11	17	910.5	911.9	0.9	1.1	1.3	4.9	15"	E
AV-P1.10.3	7		7	911.8	912.8	0.8	1.0	0.9	2.8	24"	E
AV-P1.10.4	12	7	19	910.2	911.5	1.5	1.6	2.1	4.9	18"	E
AV-P1.10.5	14		14	911.0	912.2	1.6	1.9	2.3	3.7	18"	E
AV-P1.10.6	19	50	69	910.0	911.2	10.2	10.6	12.7	4.5	15"	E
AV-P1.10.7	9	75	84	909.0	909.8	5.4	6.3	4.7	4.6	24" arch	E
AV-P1.10.8	6		6	909.1	910.5	0.6	0.7	1.0	2.9	12"	E
AV-P1.10.9	4	84	89	908.2	909.1	1.9	2.0	1.7	4.5	24" arch	E
AV-P1.11.1	6		6	907.5	909.3	0.3	0.4	0.6	10.5	21"	E
AV-P1.11.2	7	465	472	905.5	908.6	0.5	0.9	2.1	121.4	5'x10' box culvert	E
AV-P1.11.3	20		20	906.5	909.6	0.9	1.2	3.2	9.3	15"	E
AV-P1.11.4	15		15	906.2	908.4	1.4	1.6	3.3	3.3	10"	E
AV-P1.11.5	10	507	518	905.2	907.8	1.6	2.4	5.2	125.9	5'x10' box culvert	E
AV-P1.11.6	3		3	906.5	907.9	0.4	0.5	0.6	1.6	12"	E
AV-P1.11.7	14	3	17	905.5	907.9	1.0	1.2	2.6	2.4	12"	E
AV-P1.11.8	5	17	22	905.0	905.6	1.6	1.8	0.9	4.9	3'x6' box culvert	E
AV-P1.11.9	10	518	527	904.8	905.9	1.0	1.2	1.1	127.7	10' wide ditch	E
AV-P1.12.1	19		19	907.4	909.8	0.5	0.6	1.3	31.9	36"	E
AV-P1.12.2	43	19	63	905.0	907.5	4.2	4.6	11.0	9.4	24"	E
AV-P1.12.3	9		9	904.7	906.7	0.6	0.8	1.5	6.9	24"	E
AV-P1.12.4	17	72	89	904.0	906.7	1.5	1.9	4.6	12.7	30"	E
AV-P1.12.5	4	89	93	904.0	906.6	1.4	0.5	2.7	9.6	24"	E
AV-P1.14	18		18	934.0	938.1	0.0	0.7	2.2	10.5	15"	P
AV-P1.15	35		35	960.0	964.2	0.0	1.7	5.8	6.9	12"	P
AV-P1.16	159		159	942.0	946.2	0.0	7.8	30.0	20.4	21"	P

Note: Tributary Areas do not include areas outside of Farmington.

Appendix B - Pond Data

Pond ID	Tributary Area			Water Level		Pond Size		100-yr Flood	Peak Flow	Outlet	Existing (E) Proposed (P)
	Direct	Ponded	Total	Outlet Elev. (OE)	100-yr HWL	At NWL	At 100-yr HWL	Storage Volume	100-yr		
	(acres)	(acres)	(acres)	(feet)	(feet)	(acres)	(acres)	(ac-ft)	(cfs)		
Apple Valley 2 District											
AV-P2.1.1	18		18	907.0	910.1	0.4	0.7	1.7	15.8	24"	E
AV-P2.1.2	21		21	908.0	909.3	1.9	2.1	2.6	6.9	24"	E
AV-P2.1.3	17		17	906.1	907.6	6.1	6.6	9.4	21.2	10' wide ditch	E
AV-P2.1.4	94	41	135	906.1	907.7	17.9	19.0	30.5	7.5	24"	E
AV-P2.1.5	10	170	180	906.1	907.6	2.9	5.9	7.0	4.3	15"	E
AV-P2.2	123	180	303	903.0	904.7	0.0	10.4	17.2	10.4	30"	P
AV-P2.3	154		154	906.0	909.9	0.0	6.5	23.9	35.0	30"	P
AV-P2.4	102	154	256	902.0	906.4	0.0	5.7	23.5	43.9	36"	P
AV-P2.5	89	256	345	901.5	905.9	0.0	4.5	18.6	54.3	36"	P
AV-P2.7.1	8		8	898.5	899.4	5.7	6.3	5.4	10.3	18"	P
AV-P2.8	67		67	896.0	900.3	0.0	2.1	8.0	28.7	30"	P
F-P8.1	20		20	938.5	942.3	0.3	0.9	2.1	14.8	18"	E
Biscayne Drainage District											
B-P1.1	97		97	890.4	892.0	13.5	14.0	21.5	8.9	30"	P
B-P1.2	245		245	888.0	892.5	0.0	14.9	25.3	59.0	27"	E
B-P1.4	99		99	890.0	892.0	14.6	15.2	30.1	3.6	12"	P
B-P1.5	94	99	193	885.8	887.6	4.7	33.4	28.8	7.1	18"	P
B-P1.6	50		50	886.0	887.9	7.0	7.5	13.6	3.7	12"	P
B-P1.7	80	193	274	885.0	888.5	10.9	11.9	39.9	4.2	12"	P
B-P1.8	37		37	891.0	891.9	6.7	14.3	9.7	2.2	18"	P
B-P1.9	59	37	96	887.0	889.4	7.7	8.3	18.8	3.5	12"	P
B-P1.10	38	96	134	884.0	886.3	5.2	5.7	12.2	4.3	12"	P
B-P1.11	67		67	886.2	888.2	9.0	9.5	19.0	4.0	12"	P
B-P1.12	42	67	110	885.0	887.2	0.1	9.9	12.9	4.2	12"	P
B-P1.13	53	110	162	884.0	885.5	0.6	20.0	13.6	8.0	24"	P
B-P1.14	108	296	403	882.0	886.0	14.5	15.8	61.0	6.2	12"	P
B-P1.15	54		54	887.5	888.9	5.1	13.6	16.2	5.0	18"	P
B-P1.16	92	54	145	884.0	886.3	13.5	14.2	32.2	4.4	12"	P
B-P1.17	65	145	211	879.0	883.3	5.6	6.5	26.2	20.5	24" pipe/8" orifice	P

Note: Tributary Areas do not include areas outside of Farmington.

Appendix B - Pond Data

Pond ID	Tributary Area			Water Level		Pond Size		100-yr Flood	Peak Flow	Outlet	Existing (E) Proposed (P)
	Direct	Ponded	Total	Outlet Elev. (OE)	100-yr HWL	At NWL	At 100-yr HWL	Storage Volume	100-yr		
	(acres)	(acres)	(acres)	(feet)	(feet)	(acres)	(acres)	(ac-ft)	(cfs)		
Farmington District 1											
F-P1.4	203		203	950.5	957.0	0.0	10.5	16.8	402.3	5'x10' box culvert	P
F-P1.8.2	35		35	954.3	956.2	0.8	1.1	1.8	69.2	10' wide ditch	E
F-P1.8.3	13	35	48	952.0	955.5	0.4	0.7	2.0	61.3	36" elliptical	E
F-P1.9.1	19		19	963.2	967.2	0.2	0.4	1.0	38.1	30"	E
F-P1.9.2	10	19	29	945.2	948.9	0.5	0.7	2.2	31.0	27"	E
F-P1.13	335	306	640	932.0	942.5	0.0	13.0	43.6	406.6	5'x6' box culvert	P
F-P1.13.1	26		26	950.5	953.5	0.9	1.3	3.3	12.9	18"	E
F-P1.15	145	640	785	916.5	924.6	0.0	5.1	10.4	842.8	8'x8' box culvert, 4'x8' box culvert	E
Farmington District 2											
F-P2.1	60		60	944.5	950.8	2.0	2.8	15.1	274.8	5'x6' box culvert	P
F-P2.4	16		16	964.0	968.1	0.5	0.7	2.4	4.7	12"	P
F-P2.5	40	30	70	959.0	964.9	1.0	1.6	7.7	13.6	15"	P
F-P2.6	14		14	965.0	968.7	0.5	0.8	2.4	3.1	12" pipe/8" orifice	P
F-P2.8	193	129	323	926.5	931.8	0.0	6.8	17.9	419.1	5'x8' box culvert	E
Farmington District 3											
F-P3.1	38		38	973.0	976.8	1.5	1.9	6.4	8.9	15"	P
F-P3.4	130	38	168	931.0	935.4	4.5	5.3	21.7	42.0	30"	P
F-P3.6.1	12		12	919.5	922.4	0.5	0.9	2.1	9.2	15"	E
F-P3.6.2	25		25	936.8	939.8	1.0	1.4	3.7	6.0	12"	E
Farmington District 4											
F-P4.1.2	16		16	990.3	991.0	0.1	0.2	0.1	54.5	66" beehive	E
F-P4.1.3	6		6	986.5	987.0	0.2	0.3	0.1	28.9	54" beehive	E
F-P4.1.4	10		10	990.4	991.0	0.0	0.2	0.2	32.4	48" beehive	E
F-P4.1.5	5		5	984.0	984.4	0.1	0.1	0.1	13.6	72" beehive	E
F-P4.2	78	37	115	951.0	955.3	4.5	6.0	22.5	15.9	15"	E
F-P4.7	49		49	924.0	927.7	1.8	2.3	7.7	6.8	12"	P

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Appendix B - Pond Data

Pond ID	Tributary Area			Water Level		Pond Size		100-yr Flood	Peak Flow	Outlet	Existing (E) Proposed (P)
	Direct	Ponded	Total	Outlet Elev. (OE)	100-yr HWL	At NWL	At 100-yr HWL	Storage Volume	100-yr		
	(acres)	(acres)	(acres)	(feet)	(feet)	(acres)	(acres)	(ac-ft)	(cfs)		
Farmington District 5											
F-P5.1	35		35	930.0	934.3	0.2	1.7	4.3	16.0	18"	E
F-P5.2.1	47		47	945.8	948.5	0.9	1.6	3.6	57.3	30"	E
F-P5.2.2	53	82	135	929.3	934.5	5.0	7.1	31.0	5.9	12"	E
F-P5.4	41		41	930.0	933.3	0.5	1.2	2.9	58.2	30"	E
F-P5.6	24	135	159	927.3	932.3	0.5	1.9	5.4	6.8	18"	E
F-P5.7	45		45	951.2	955.0	0.0	3.7	7.3	3.9	12"	E
F-P5.9	13		13	951.5	953.6	1.0	1.4	2.4	4.7	12"	E
F-P5.10	66	274	339	922.1	931.4	2.5	6.1	40.4	10.5	12"	E
F-P5.10.2	14	13	27	928.0	930.3	0.6	0.8	1.7	24.0	24"	E
F-P5.12	57	361	418	908.5	910.4	6.7	17.0	21.6	11.1	30"	E
F-P5.12.1	15		15	910.5	915.2	0.3	0.6	1.6	29.0	24"	E
F-P5.12.2	6		6	911.0	912.6	0.4	0.5	0.8	3.4	12"	E
Farmington District 6											
F-P6.1	93		93	914.1	917.9	5.7	6.3	23.1	38.5	42" pipe/33" orifice	P
F-P6.2	91		91	925.0	928.5	3.0	3.9	21.1	38.2	36"	P
F-P6.4	370	250	620	903.5	910.5	0.0	201.8	489.1	606.1	2-5'x12' box culvert	E
F-P6.4.1	52		52	908.0	911.8	1.2	1.6	5.1	96.7	15"	E
F-P6.4.2	14		14	908.0	909.8	1.4	1.9	3.0	2.0	12"	E

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Appendix B - Pond Data

Pond ID	Tributary Area			Water Level		Pond Size		100-yr Flood	Peak Flow	Outlet	Existing (E) Proposed (P)
	Direct	Ponded	Total	Outlet Elev. (OE)	100-yr HWL	At NWL	At 100-yr HWL	Storage Volume	100-yr		
	(acres)	(acres)	(acres)	(feet)	(feet)	(acres)	(acres)	(ac-ft)	(cfs)		
Farmington District 7											
F-P7.1	32		32	949.0	952.2	1.5	2.2	5.9	8.3	15"	E
F-P7.2	107	97	205	908.0	909.5	0.0	44.0	63.9	3.1	12"	E
F-P7.2.1	37		37	918.0	923.9	0.0	1.5	6.1	11.8	15"	E
F-P7.2.2	7		7	914.0	915.9	0.0	0.7	1.1	3.7	12"	E
F-P7.2.3	21		21	916.0	919.1	0.0	1.0	2.4	8.0	15"	E
F-P7.3	9	300	309	904.0	907.1	0.0	5.3	9.2	12.9	18"	E
F-P7.3.1	16		16	906.5	908.8	1.0	1.2	2.6	5.1	12"	E
F-P7.3.2	62		62	905.0	908.2	2.7	4.0	10.3	22.9	12"	E
F-P7.3.3	18		18	906.5	908.6	1.1	1.5	2.7	4.7	12"	E
F-P7.4.1	22		22	905.5	909.8	0.6	1.0	3.7	11.4	15"	E
F-P7.5	52	55	106	903.0	906.6	1.6	2.4	7.3	109.2	18"	E
F-P7.5.1	13		13	913.0	913.9	1.6	1.8	1.6	59.0	10' wide concrete spillway	E
F-P7.5.2	28	13	41	906.7	910.6	2.4	3.2	11.5	12.3	21"	E
F-P7.5.3	11		11	907.0	910.9	0.7	0.9	3.1	5.6	15"	E
F-P7.5.4	3		3	907.0	908.5	0.3	0.5	0.6	6.0	18"	E
F-P7.6.1	7		7	907.0	908.9	0.4	0.5	1.0	7.9	15"	E
F-P7.7	41		41	905.0	905.9	0.0	10.2	8.2	1.9	12"	P
F-P7.9	67		67	906.6	908.4	10.1	10.6	18.7	19.7	36"	E
F-P7.12	27		27	898.0	900.1	0.0	4.8	5.3	0.4	30"	E
F-P7.13	142	94	236	900.0	901.8	3.8	22.1	25.1	92.6	10" wide ditch	E
F-P7.14	20	10	30	902.0	903.5	0.0	4.3	4.9	3.7	12"	P
F-P7.14.1	10		10	906.5	908.3	0.6	0.7	1.2	6.5	15"	E
F-P7.15	106	751	858	897.0	900.8	0.0	3.1	4.1	209.8	5-72"	E

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Appendix B - Pond Data

Pond ID	Tributary Area			Water Level		Pond Size		100-yr Flood	Peak Flow	Outlet	Existing (E) Proposed (P)
	Direct	Ponded	Total	Outlet Elev. (OE)	100-yr HWL	At NWL	At 100-yr HWL	Storage Volume	100-yr		
	(acres)	(acres)	(acres)	(feet)	(feet)	(acres)	(acres)	(ac-ft)	(cfs)		
Farmington District 8											
F-P8.2.1	54	6	59	905.0	906.0	0.0	24.7	16.8	2.0	12"	E
F-P8.2.2	21	59	80	904.0	904.8	2.8	5.6	5.0	.	12"	E
F-P8.2.3	6		6	905.1	906.2	0.7	0.9	1.0	3.1	15"	E
F-P8.3.1	21		21	902.5	903.3	0.0	7.6	6.2	1.6	12"	E
F-P8.3.2	22	29	51	901.0	902.4	0.0	6.0	7.8	1.9	12"	E
F-P8.3.3	8		8	901.5	902.4	0.0	1.9	1.6	1.2	12"	E
F-P8.3.4	11	131	142	900.5	902.2	0.0	2.8	4.5	3.0	12"	E
F-P8.3.5	16	142	157	900.0	901.2	0.0	4.0	4.8	3.3	12"	E
F-P8.6.1	2		2	905.0	906.1	0.1	0.2	0.2	4.5	12"	E
F-P8.7.1	11		11	900.8	902.2	0.5	0.6	0.8	38.9	10' wide concrete spillway	E
F-P8.7.2	6	11	17	900.8	902.2	1.4	2.2	2.6	6.7	24"	E
F-P8.8.1	13		13	912.0	913.5	0.2	0.3	0.3	29.9	33"	E
F-P8.9	274	347	621	894.5	897.2	0.0	27.6	70.9	25.3	36"	P
F-P8.9.1	36		36	900.5	901.9	6.3	7.0	9.4	3.2	15"	E
F-P8.9.10	16	141	157	899.4	900.9	1.7	2.1	2.9	2.7	18"	E
F-P8.9.2	14	36	50	900.1	902.6	0.3	0.4	0.8	10.4	18"	E
F-P8.9.3	12		12	900.5	903.1	0.5	0.9	2.0	11.4	24"	E
F-P8.9.4	43	61	104	900.0	901.2	20.8	21.7	25.9	1.8	15"	E
F-P8.9.5	10		10	900.6	902.2	0.5	0.6	0.9	6.6	18"	E
F-P8.9.6	8		8	900.6	902.3	0.3	0.3	0.5	6.8	18"	E
F-P8.9.7	8	19	26	900.5	901.7	4.0	4.2	4.9	5.5	24"	E
F-P8.9.8	3	26	30	899.6	900.7	3.2	4.4	4.1	2.3	24" arch	E
F-P8.9.9	7	134	141	899.5	900.6	2.9	6.1	5.5	2.7	24" arch	E
F-P8.10.1	14		14	896.0	898.0	0.3	0.5	0.8	37.3	15"	E
F-P8.12.1	5		5	898.5	899.8	0.7	0.9	1.0	2.2	12"	E
Lakeville District 1											
L-P1.1	30		30	948.0	949.7	1.9	2.2	3.4	15.6	12"	E
L-P1.2	7	30	38	947.3	951.5	0.0	1.6	5.7	20.3	12" pipe/8" orifice	E
L-P1.4	135	38	172	926.6	932.1	0.0	5.5	8.6	271.3	4'x8' box culvert	E
L-P1.6	113	172	286	918.1	924.6	0.0	8.1	13.5	1255.4	5'x10' box culvert	E
L-P1.7	75		75	919.1	924.9	0.0	3.1	5.1	492.0	5'x10' box culvert, 2-48" pipes	P
Lakeville District 2											
L-P2.1	79		79	923.5	928.1	0.0	4.1	15.9	39.2	30"	E
L-P2.3	287		287	910.0	918.4	0.7	40.7	116.9	723.4	7'x12' box culvert, 2- 6'x10' box culverts	P

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Appendix B - Pond Data

Pond ID	Tributary Area			Water Level		Pond Size		100-yr Flood	Peak Flow	Outlet	Existing (E) Proposed (P)
	Direct	Ponded	Total	Outlet Elev. (OE)	100-yr HWL	At NWL	At 100-yr HWL	Storage Volume	100-yr		
	(acres)	(acres)	(acres)	(feet)	(feet)	(acres)	(acres)	(ac-ft)	(cfs)		
Prairie Waterway District											
PW-P1.1	57		57	908.0	911.9	2.5	3.4	15.6	10.8	15"	E
PW-P1.2	98		98	905.5	907.6	2.4	9.6	13.2	2.5	10"	P
PW-P1.5	60		60	894.0	902.2	1.3	2.2	14.2	4.5	24"	E
PW-P1.6.1	24		24	899.1	901.6	0.8	1.0	2.2	15.2	24"	E
PW-P1.6.2	29		29	899.1	901.7	1.1	1.4	3.2	15.3	24"	E
PW-P1.6.3	11	53	64	898.9	901.3	2.6	7.2	12.6	1.4	12"	E
PW-P1.7	103		103	891.4	896.6	5.0	6.0	28.5	3.4	18"	P
PW-P1.8.1	34		34	892.3	897.2	0.4	1.1	3.5	73.9	48"	E
PW-P1.8.2	8	124	132	892.5	897.6	5.4	6.7	31.1	3.8	24"	E
PW-P1.8.3	90	320	410	892.5	897.6	5.4	5.9	10.3	8.2	24"	E
PW-P1.9	23		23	894.4	901.6	0.0	0.4	1.1	37.6	27"	P
PW-P1.11	22	628	650	889.7	893.0	13.5	23.1	43.0	12.6	21"	E
PW-P1.11.1	16		16	893.7	897.9	0.0	1.7	1.8	21.3	24"	E
PW-P1.11.2	27	16	43	891.7	897.5	0.0	1.0	2.1	50.5	30"	E
PW-P1.11.3	49	476	525	890.0	893.4	6.1	7.1	18.7	39.0	36"	E
PW-P1.12	66	702	768	888.4	892.7	2.6	12.8	17.7	13.4	21"	E
PW-P1.12.1	5		5	895.5	897.0	0.3	1.1	1.0	0.8	15"	E
PW-P1.12.2	33	5	38	893.4	897.5	0.0	1.4	2.2	31.3	30"	E
PW-P1.12.3	14	38	52	891.7	896.0	0.0	0.4	0.7	63.3	42"	E
PW-P1.12.4	21		21	892.2	894.6	2.0	2.4	5.2	0.6	12"	E
PW-P1.14	144	842	986	886.5	891.8	1.5	2.1	9.7	106.3	54"	E
PW-P1.14.1	9		9	888.4	892.6	0.4	0.6	2.1	3.4	21"	E
PW-P1.14.2	8		8	888.2	893.1	0.2	0.6	1.5	5.0	12"	E
PW-P1.14.3	11	21	32	888.2	892.4	0.4	0.7	2.4	3.4	24"	E
PW-P1.14.4	8	32	40	887.3	891.6	0.5	0.9	3.1	4.6	15"	E
PW-P1.14.5	4	821	825	887.0	891.6	1.0	1.9	6.6	16.6	30"	E
PW-P1.14.6	12	768	781	887.7	892.1	0.0	0.6	1.8	21.0	24"	E
PW-P1.15	42	1001	1043	886.0	890.4	6.3	11.2	42.6	33.2	30"	E
PW-P1.15.1	15		15	890.0	893.8	0.3	0.5	1.6	14.9	27"	E
PW-P1.16	4	1077	1081	884.7	888.6	0.0	1.0	1.7	32.2	48"	E
PW-P1.17.1	1		1	887.9	890.1	0.1	0.2	0.4	5.9	27"	E
PW-P1.17.2	9	1	10	887.7	890.0	0.5	0.7	1.4	4.5	12"	E
PW-P1.17.3	25	10	35	885.2	888.6	2.7	4.2	11.4	6.2	24"	E
PW-P1.18	39	1081	1119	883.3	888.2	2.7	6.7	23.7	33.4	54"	E

Note: Tributary Areas do not include areas outside of Farmington.

Appendix B - Pond Data

Pond ID	Tributary Area			Water Level		Pond Size		100-yr Flood	Peak Flow	Outlet	Existing (E) Proposed (P)
	Direct	Ponded	Total	Outlet Elev. (OE)	100-yr HWL	At NWL	At 100-yr HWL	Storage Volume	100-yr		
	(acres)	(acres)	(acres)	(feet)	(feet)	(acres)	(acres)	(ac-ft)	(cfs)		
Vermillion River District 1											
VR-P1.2.1	47		47	905.5	908.6	1.6	2.2	5.8	74.3	4-24" arch	E
VR-P1.2.2	4	47	51	905.5	907.8	3.1	3.5	7.7	22.4	24"	E
VR-P1.2.3	16		16	901.0	902.5	0.0	2.5	2.2	8.3	24"	E
VR-P1.3.1	12		12	911.1	912.6	2.1	2.3	3.3	0.7	18"	E
VR-P1.3.2	0	12	13	910.5	911.2	0.2	0.3	0.2	0.8	15"	E
VR-P1.3.3	5	13	17	910.4	911.2	0.6	0.8	0.5	1.3	15"	E
VR-P1.4	48	24	72	899.9	903.0	1.1	1.3	3.7	11.0	12", 24" arch	E
VR-P1.4.1	6		6	901.2	903.0	0.5	0.6	1.1	10.9	27"	E
VR-P1.11.1	3		3	899.0	901.2	0.3	0.3	0.7	1.2	12"	E
VR-P1.11.2	4		4	900.5	902.4	0.4	0.5	0.8	1.9	12"	E
VR-P1.11.3	9	7	16	898.0	898.6	2.3	2.8	1.7	1.3	12"	E
VR-P1.16.1	20		20	890.0	892.3	0.9	1.2	2.4	40.3	36"	E
VR-P1.16.2	22	20	42	889.8	892.2	0.5	0.7	1.4	17.1	30"	E
VR-P1.16.3	1	42	43	899.6	891.8	0.2	0.3	0.6	12.2	24"	E
Vermillion River District 2											
VR-P2.1	48		48	971.0	976.6	0.0	2.6	7.3	25.2	24"	E
VR-P2.2	66		66	926.5	931.7	0.0	3.1	12.6	22.9	24"	E

Note: Tributary Areas do not include areas outside of Farmington.

Appendix C

CAPITAL IMPROVEMENT PROJECTS LIST

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size	Length	Pipe Cost [1]	Outlet [2]						
	(in.)	(ft.)	($)	($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Apple Valley 1 District										
AV-P1.1	12"	existing			existing				0	0
AV-P1.2	24"	886	63,687		existing				63,687	0
AV-P1.3	18"	existing			existing				0	0
AV-P1.5.1	12"	existing			existing				0	0
AV-P1.6.1	12"	existing			existing				0	0
AV-P1.6.2	12"	existing			existing				0	0
AV-P1.7	36"	existing			existing				0	0
AV-P1.8	2-36" Arch, 30" Arch	existing			existing				0	0
AV-P1.9	42"	existing			existing				0	0
AV-P1.9.1	15"	existing			existing				0	0
AV-A1.10	channel	existing			existing		3000	300,000	300,000	0
AV-P1.10.1	15"	existing			existing				0	0
AV-P1.10.2	15"	existing			existing				0	0
AV-P1.10.3	24"	existing			existing				0	0
AV-P1.10.4	18"	existing			existing				0	0
AV-P1.10.5	18"	existing			existing				0	0
AV-P1.10.6	15"	existing			existing				0	0
AV-P1.10.7	24" arch	existing			existing				0	0
AV-P1.10.8	12"	existing			existing				0	0
AV-P1.10.9	24" arch	existing			existing				0	0
AV-P1.11.1	21"	existing			existing				0	0
AV-P1.11.2	5'x10' box culvert	existing			existing				0	0
AV-P1.11.3	15"	existing			existing				0	0
AV-P1.11.4	10"	existing			existing				0	0
AV-P1.11.5	5'x10' box culvert	existing			existing				0	0
AV-P1.11.6	12"	existing			existing				0	0
AV-P1.11.7	12"	existing			existing				0	0
AV-P1.11.8	3'x6' box culvert	existing			existing				0	0
AV-P1.11.9	10' wide ditch	existing			existing				0	0
AV-P1.12.1	36"	existing			existing				0	0
AV-P1.12.2	24"	existing			existing				0	0
AV-P1.12.3	24"	existing			existing				0	0
AV-P1.12.4	30"	existing			existing				0	0
AV-P1.12.5	24"	existing			existing				0	0
AV-A1.13	channel	existing			existing		4500	450,000	450,000	0
AV-P1.14	15"	50	2,626	7,500	2	16,133			26,260	56,000
AV-P1.15	12"	50	2,488	7,500	2	16,133			26,122	136,000
AV-P1.16	21"	50	3,387	7,500	40	322,667			333,553	624,000

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size	Length	Pipe Cost [1]	Outlet [2]						
	(in.)	(ft.)	($)	($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Apple Valley 2 District										
AV-P2.1.1	24"	existing			existing				0	0
AV-P2.1.2	24"	existing			existing				0	0
AV-P2.1.3	10' wide ditch	existing			existing				0	0
AV-P2.1.4	24"	existing			existing				0	0
AV-P2.1.5	15"	existing			existing				0	0
AV-P2.2	30"	100	10,782	7,500	18	145,200			163,482	832,000
AV-P2.3	30"	50	5,391	7,500	36	290,400			303,291	520,000
AV-P2.4	36"	200	27,094	7,500	23	185,533			220,127	456,000
AV-P2.5	36"	50	6,773	7,500	8	64,533			78,807	360,000
AV-A2.6	channel	existing			existing		1700	170,000	170,000	0
AV-A2.7	channel	existing			existing		5400	540,000	540,000	0
AV-P2.7.1	18"	50	3,179		existing				3,179	0
AV-P2.8	30"	800	86,258	7,500	existing				93,758	0
AV-A2.9	channel	existing			existing		3800	380,000	380,000	0
F-P8.1	18"	existing			existing				0	0
Biscayne Drainage District										
B-P1.1	30"	1330	979,927	7,500	47	375,100			1,362,527	139,710
B-P1.2	27"	existing			existing				0	0
B-A1.3	channel	existing			existing		1700	170,000	170,000	0
B-P1.4	12"	150	9,538	7,500	13	104,867			121,905	1,216,400
B-P1.5	18"	100	6,359	7,500	existing				13,859	334,200
B-P1.6	12"	60	2,986	7,500	3	24,200			34,686	597,360
B-P1.7	12"	800	39,811	7,500	3	24,200			71,511	951,840
B-P1.8	18"	60	3,815	7,500	existing				11,315	143,310
B-P1.9	12"	200	9,953	7,500	7	56,467			73,920	661,680
B-P1.10	12"	760	37,821	7,500	12	96,800			142,121	452,080
B-P1.11	12"	200	9,953	7,500	14	112,933			130,386	761,040
B-P1.12	12"	1400	69,670	7,500	existing				77,170	99,490
B-P1.13	24"	60	4,313	7,500	3	24,200			36,013	200,190
B-P1.14	12"	60	2,986	7,500	35	282,333	1500	150,000	442,819	1,264,560
B-P1.15	18"	60	3,815	7,500	existing				11,315	135,810
B-P1.16	12"	60	2,986	7,500	39	314,600			325,086	1,135,840
B-P1.17	24" pipe/8" orifice	60	4,313	7,500	27	217,800			379,613	517,360

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size (in.)	Length (ft.)	Pipe Cost [1] ($)	Outlet [2] ($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Farmington District 1										
F-A1.1	channel	existing			existing		1000	100,000	100,000	0
F-P1.4	5'x10' box culvert	existing			existing		2000	200,000	200,000	0
F-A1.5	channel	existing			existing		1000	100,000	100,000	0
F-A1.6	channel	existing			existing		2500	250,000	250,000	0
F-A1.7	channel	existing			existing		1000	100,000	100,000	0
F-P1.8.2	10' wide ditch	existing			existing				0	0
F-P1.8.3	36" elliptical	existing			existing				0	0
F-A1.9	channel	existing			existing		1200	120,000	120,000	0
F-P1.9.1	30"	existing			existing				0	0
F-P1.9.2	27"	existing			existing				0	0
F-A1.12	channel	existing			existing		700	70,000	70,000	0
F-P1.13	5'x6' box culvert	100	26,956		existing		1400	140,000	166,956	0
F-P1.13.1	18"	existing			existing				0	0
F-A1.14	channel	existing			existing		1300	130,000	130,000	0
F-P1.15	8'x8' box culvert, 4'x8' box culvert	existing			existing		3000	300,000	300,000	0
Farmington District 2										
F-P2.1	5'x6' box culvert	100	26,956		21	169,400			196,356	192,000
F-A2.2	channel	existing			existing		1400	140,000	140,000	0
F-P2.4	12"	400	19,906		4	32,267			52,172	56,000
F-P2.5	12"	100	4,976	7,500	13	103,253			115,730	136,000
F-P2.6	12" pipe/8" orifice	100	4,976		3	26,620			31,596	64,000
F-A2.7	channel	existing			existing		2400	240,000	240,000	0
F-P2.8	5'x8' box culvert	existing		7,500	6	44,367			51,867	496,000
Farmington District 3										
F-P3.1	15"	75	3,940	7,500	12	92,767			104,206	152,000
F-A3.2	channel	existing			existing		1200	120,000	120,000	0
F-A3.3	channel	existing			existing		1900	190,000	190,000	0
F-P3.4	30"	10	1,078	7,500	40	323,473	900	90,000	422,052	53,000
F-A3.5	channel	existing			existing		1300	130,000	130,000	0
F-P3.6.1	15"	existing			existing				0	0
F-P3.6.2	12"	existing			existing				0	0
F-A3.7	channel	existing			existing		2300	230,000	230,000	0
Farmington District 4										
F-P4.1.2	66" beehive	existing			existing				0	0
F-P4.1.3	54" beehive	existing			existing				0	0
F-P4.1.4	48" beehive	existing			existing				0	0
F-P4.1.5	72" beehive	existing			existing				0	0
F-P4.2	15"	existing			existing				0	0
F-P4.7	12"	50	2,488	7,500	11	90,347			100,335	184,000

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size (in.)	Length (ft.)	Pipe Cost [1] ($)	Outlet [2] ($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Farmington District 5										
F-P5.1	18"	existing			existing				0	0
F-P5.2.1	30"	existing			existing				0	0
F-P5.2.2	12"	existing			existing				0	0
F-P5.4	30"	existing			existing				0	0
F-P5.6	18"	existing			existing				0	0
F-P5.7	12"	existing			existing				0	0
F-P5.9	12"	existing			existing				0	0
F-P5.10	12"	existing			existing				0	0
F-P5.10.2	24"	existing			existing				0	0
F-P5.12	30"	existing			existing				0	0
F-P5.12.1	24"	existing			existing				0	0
F-P5.12.2	12"	existing			existing				0	0
Farmington District 6										
F-P6.1	42" pipe/33" orifice	10	1,258	7,500	51	411,400			420,158	63,000
F-P6.2	36"	3500	474,142	7,500	33	266,200			747,842	312,000
F-P6.4	2-5'x12' box culvert	existing			existing		4500	450,000	450,000	0
F-P6.4.1	15"	existing			existing				0	0
F-P6.4.2	12"	existing			existing				0	0

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size	Length	Pipe Cost [1]	Outlet [2]						
	(in.)	(ft.)	($)	($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Farmington District 7										
F-P7.1	15"	existing			existing				0	0
F-P7.2	12"	existing			existing				0	0
F-P7.2.1	15"	existing			existing				0	0
F-P7.2.2	12"	existing			existing				0	0
F-P7.2.3	15"	existing			existing				0	0
F-P7.3	18"	existing			existing				0	0
F-P7.3.1	12"	existing			existing				0	0
F-P7.3.2	12"	existing			existing				0	0
F-P7.3.3	12"	existing			existing				0	0
F-A7.4	channel	existing			existing		1200	120,000	120,000	0
F-P7.4.1	15"	existing			existing				0	0
F-P7.5	18"	existing			existing				0	0
F-P7.5.1	10' wide concrete spillway	existing			existing				0	0
F-P7.5.2	21"	existing			existing				0	0
F-P7.5.3	15"	existing			existing				0	0
F-P7.5.4	18"	existing			existing				0	0
F-A7.6	channel	existing			existing		2800	280,000	280,000	0
F-P7.6.1	15"	existing			existing				0	0
F-P7.7	12"	100	4,976	7,500	existing				12,476	0
F-A7.8	channel	existing			existing		1300	130,000	130,000	0
F-P7.9	36"	existing			existing				0	0
F-P7.12	30"	existing			existing				0	0
F-P7.13	10" wide ditch	existing			existing				0	0
F-P7.14	12"	200	9,953	7,500	existing				17,453	0
F-P7.14.1	15"	existing			existing				0	0
F-P7.15	5-72"	existing			existing		1000	100,000	100,000	0

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size	Length	Pipe Cost [1]	Outlet [2]						
	(in.)	(ft.)	($)	($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Farmington District 8										
F-P8.2.1	12"	existing			existing				0	0
F-P8.2.2	12"	existing			existing				0	0
F-P8.2.3	15"	existing			existing				0	0
F-P8.3.1	12"	existing			existing				0	0
F-P8.3.2	12"	existing			existing				0	0
F-P8.3.3	12"	existing			existing				0	0
F-P8.3.4	12"	existing			existing				0	0
F-P8.3.5	12"	existing			existing				0	0
F-P8.6.1	12"	existing			existing				0	0
F-P8.7.1	10' wide concrete spillway	existing			existing				0	0
F-P8.7.2	24"	existing			existing				0	0
F-P8.8.1	33"	existing			existing				0	0
F-P8.9	36"	50	6,773		194	1,564,933	1900	190,000	1,761,707	2,208,000
F-P8.9.1	15"	existing			existing				0	0
F-P8.9.10	18"	existing			existing				0	0
F-P8.9.2	18"	existing			existing				0	0
F-P8.9.3	24"	existing			existing				0	0
F-P8.9.4	15"	existing			existing				0	0
F-P8.9.5	18"	existing			existing				0	0
F-P8.9.6	18"	existing			existing				0	0
F-P8.9.7	24"	existing			existing				0	0
F-P8.9.8	24" arch	existing			existing				0	0
F-P8.9.9	24" arch	existing			existing				0	0
F-A8.10	channel	existing			existing		1600	160,000	160,000	0
F-P8.10.1	15"	existing			existing				0	0
F-A8.11	channel	existing			existing		1500	150,000	150,000	0
F-A8.12	channel	existing			existing		1300	130,000	130,000	0
F-P8.12.1	12"	existing			existing				0	0

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size (in.)	Length (ft.)	Pipe Cost [1] ($)	Outlet [2] ($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Lakeville District 1										
L-P1.1	12"	existing			existing				0	0
L-P1.2	12" pipe/8" orifice	existing			existing				0	0
L-A1.3	channel	existing			existing		1500	150,000	150,000	0
L-P1.4	4'x8' box culvert	existing			existing		2400	240,000	240,000	0
L-A1.5	channel	existing			existing		2500	250,000	250,000	0
L-P1.6	5'x10' box culvert	existing			existing		2400	240,000	240,000	0
L-P1.7	5'x10' box culvert	100	35,941		existing		2800	280,000	315,941	0
L-A1.8	channel	existing			existing		3000	300,000	300,000	0
Lakeville District 2										
L-P2.1	30"	existing		7,500	19	149,233			156,733	410,000
L-A2.2	channel	existing			existing		3200	320,000	320,000	0
L-P2.3	7'x12' box culvert, 2- 6'x10' box culverts	160	129,387		existing		2500	250,000	379,387	0
L-A2.4	channel	existing			existing		3600	360,000	360,000	0

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size	Length	Pipe Cost [1]	Outlet [2]						
	(in.)	(ft.)	($)	($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Prairie Waterway District										
PW-P1.1	15"	existing		7,500	28	225,867			233,367	340,000
PW-P1.2	10"	1000	52,529	7,500	1	9,680			69,709	768,000
PW-P1.5	24"	existing			existing				0	0
PW-P1.6.1	24"	existing			existing				0	0
PW-P1.6.2	24"	existing			existing				0	0
PW-P1.6.3	12"	existing			existing				0	0
PW-P1.7	18"	200	12,718	7,500	26				20,218	480,000
PW-P1.8.1	48"	existing			existing				0	0
PW-P1.8.2	24"	existing			existing				0	0
PW-P1.8.3	24"	existing			existing				0	0
PW-P1.9	27"	10	816	7,500	1	8,067			16,382	4,000
PW-P1.11	21"	existing			existing				0	0
PW-P1.11.1	24"	existing			existing				0	0
PW-P1.11.2	30"	existing			existing				0	0
PW-P1.11.3	36"	existing			existing				0	0
PW-P1.12	21"	existing			existing				0	0
PW-P1.12.1	15"	existing			existing				0	0
PW-P1.12.2	30"	existing			existing				0	0
PW-P1.12.3	42"	existing			existing				0	0
PW-P1.12.4	12"	existing			existing				0	0
PW-P1.14	54"	existing			existing				0	0
PW-P1.14.1	21"	existing			existing				0	0
PW-P1.14.2	12"	existing			existing				0	0
PW-P1.14.3	24"	existing			existing				0	0
PW-P1.14.4	15"	existing			existing				0	0
PW-P1.14.5	30"	existing			existing				0	0
PW-P1.14.6	24"	existing			existing				0	0
PW-P1.15	30"	existing			existing				0	0
PW-P1.15.1	27"	existing			existing				0	0
PW-P1.16	48"	existing			existing				0	0
PW-P1.17.1	27"	existing			existing				0	0
PW-P1.17.2	12"	existing			existing				0	0
PW-P1.17.3	24"	existing			existing				0	0
PW-P1.18	54"	existing			existing				0	0

Appendix C - SWMP Addendum Cost Estimates

Pond	Pond Outlet				Pond Excavation		Channel Rehabilitation		Subtotal	Land Cost
	Pipe Size (in.)	Length (ft.)	Pipe Cost [1] ($)	Outlet [2] ($) [4]	(ac-ft)	($) [3]	(ft.)	($) [4]	($) [5]	($) [6]
Vermillion River District 1										
VR-A1.1	channel	existing			existing		2000	200,000	200,000	0
VR-A1.2	channel	existing			existing		5000	500,000	500,000	0
VR-P1.2.1	4-24" arch	existing			existing				0	0
VR-P1.2.2	24"	existing			existing				0	0
VR-P1.2.3	24"	existing			existing				0	0
VR-P1.3.1	18"	existing			existing				0	0
VR-P1.3.2	15"	existing			existing				0	0
VR-P1.3.3	15"	existing			existing				0	0
VR-P1.4	12", 24" arch	existing			existing				0	0
VR-P1.4.1	27"	existing			existing				0	0
VR-A1.5	channel	existing			existing		2000	200,000	200,000	0
VR-A1.7	channel	existing			existing		1300	130,000	130,000	0
VR-A1.11	channel	existing			existing		1200	120,000	120,000	0
VR-P1.11.1	12"	existing			existing				0	0
VR-P1.11.2	12"	existing			existing				0	0
VR-P1.11.3	12"	existing			existing				0	0
VR-A1.13	channel	existing			existing		900	90,000	90,000	0
VR-P1.16.1	36"	existing			existing				0	0
VR-P1.16.2	30"	existing			existing				0	0
VR-P1.16.3	24"	existing			existing				0	0
Vermillion River District 2										
VR-P2.1	24"	existing			1	8,067			8,067	26,000
VR-P2.2	24"	existing			existing				0	0

Subtotal	**$18,997,220**	**$17,538,870**
25% Design & Construction Contingencies	$4,749,305	
30% - Engineering, Interest, Administration	$7,123,958	
Total [5]	**$30,870,483**	
Total Including Land Costs	**$48,409,353**	

[1] Pipe cost includes manholes

[2] Outlet Structures include skimming and pipe connection = $7,500

[3] Excavation costs = $5 CY

[4] Channel restoration costs = $100 LF

[5] Does not include easement acquisition or lateral benefits

[6] Land cost assumptions

$10,000	wetlands and floodprone area
$80,000	residential zoned area
$100,000	commercial zoned area

Appendix D

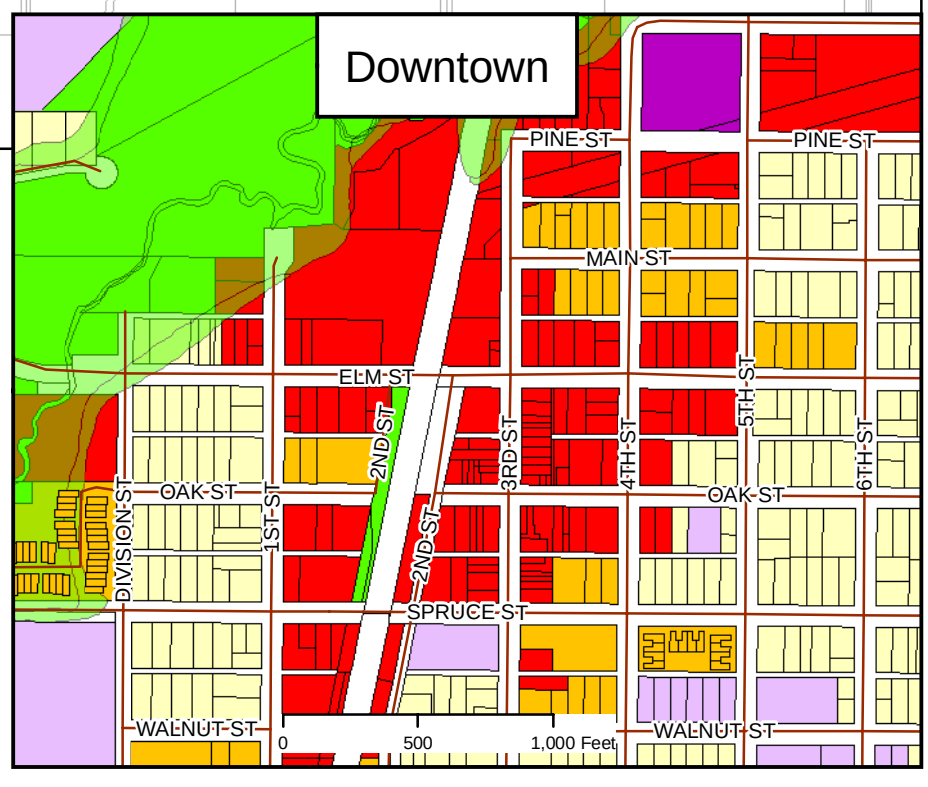
LAND USE AND ZONING MAPS

Existing Land Use 2007

0 2,000 4,000 Feet

Legend

- Vacant/Agriculture
- Commercial
- Industrial
- Mixed-Use (Public/Residential)
- Mixed-Use (Commercial/Residential)
- Single-Family Residential
- Multi-Family Residential
- Public/Semi-Public
- Park/Open Space
- Non-Designated
- Restricted Development
- ROW (Right-of-Way)
- Lakeville/Townships
- Ag Preserves



Map current as of November 19, 2007.

Prepared for the Farmington Community Development Department by the Dakota County Office of GIS.

Project #11664

2030 Comprehensive Plan

(2008 Update)

Legend

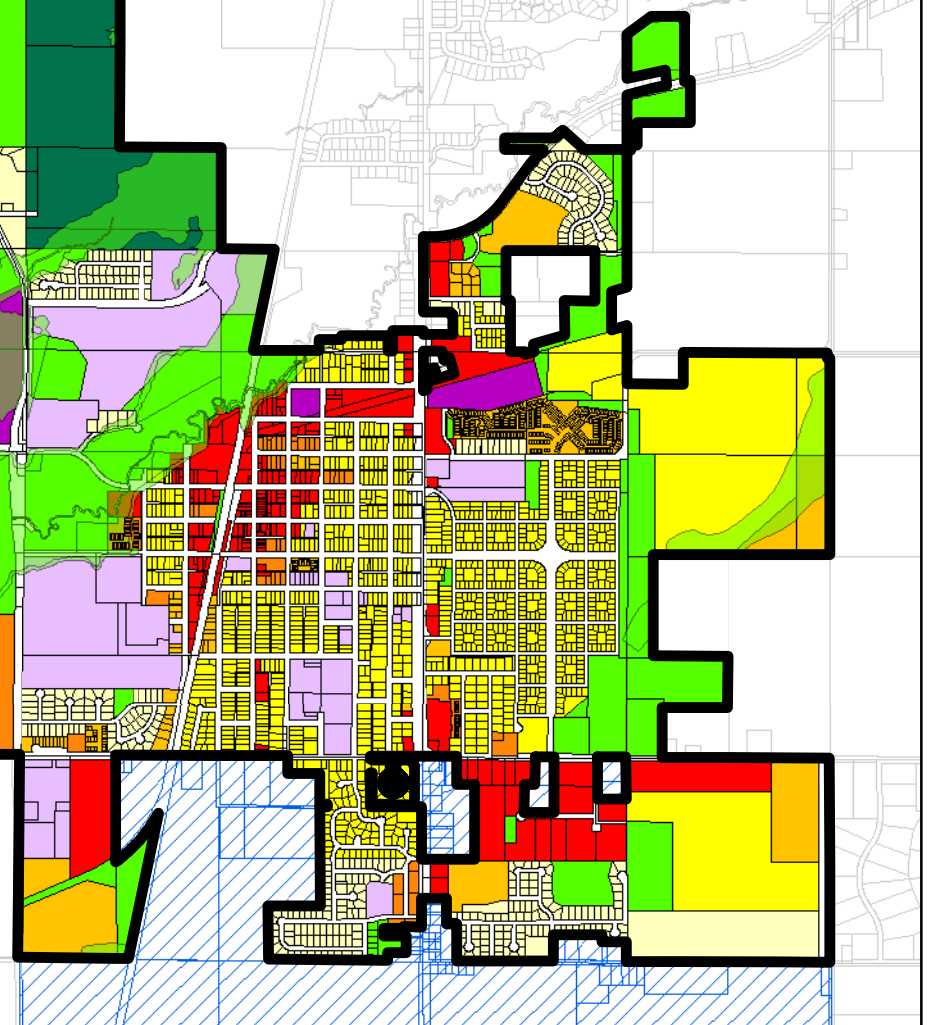
- Agricultural
- Commercial
- Industrial
- Mixed-Use (Commercial/Residential)
- Low Density
- Low Medium
- Medium Density
- High Density
- Public/Semi-Public
- Park/Open Space
- Restricted Development
- ROW (Right-of-Way)
- Ag Preserves
- Castle Rock OAA

0 2,000 4,000 Feet

N

Map current as of November 16, 2007.

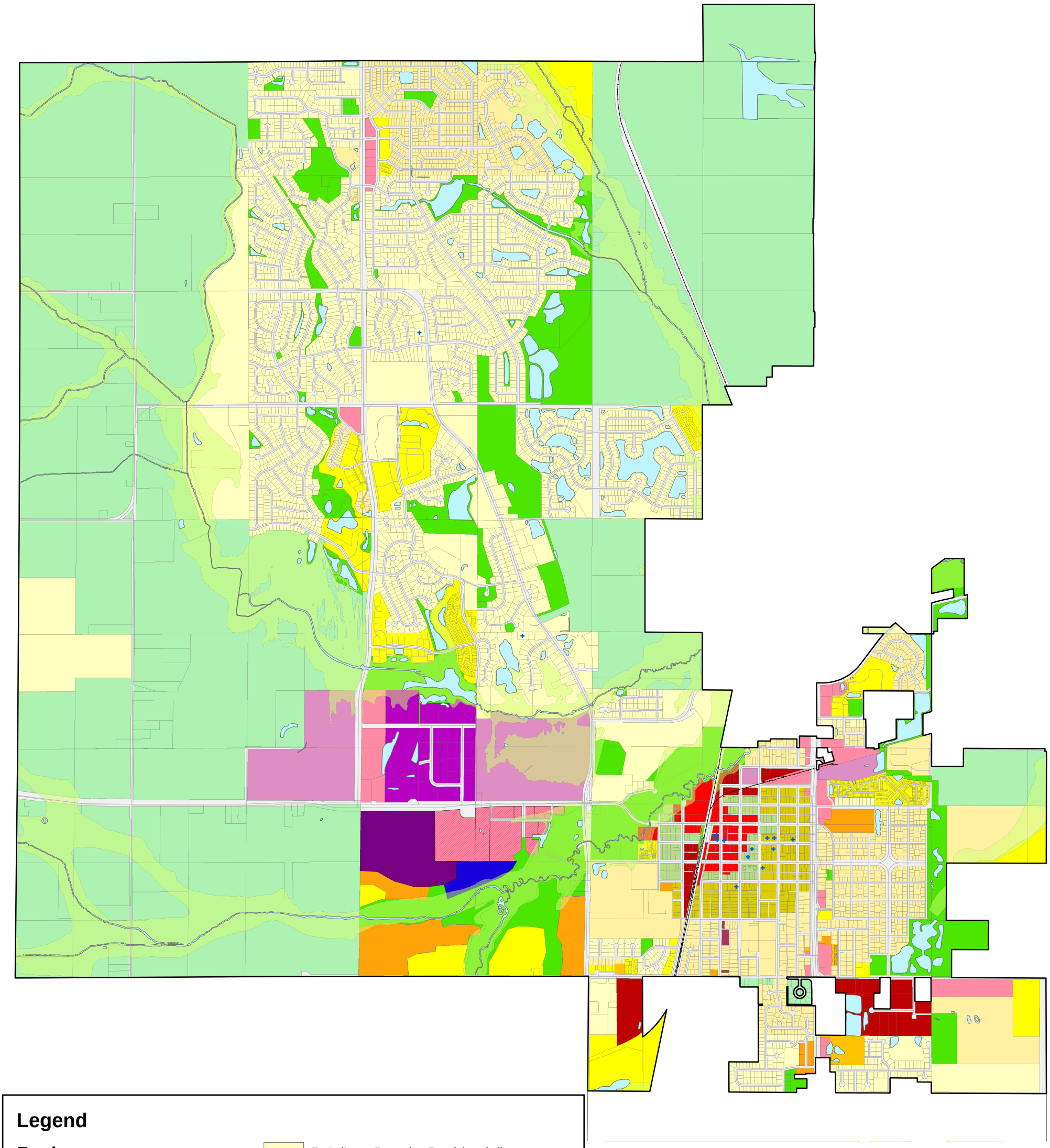
Downtown



Prepared for the Farmington Community Development Department by the Dakota County Office of GIS.

Project #11663

City of Farmington Zoning Districts



Legend

Zoning

- A-1 (Agriculture)
- B-1 (Highway Business)
- B-2 (Downtown Business)
- B-3 (Heavy Business)
- B-4 (Neighborhood Business)
- Business/Commercial Flex
- I-1 (Industrial)
- IP (Industrial Park)
- Mixed-Use
- P/OS (Park/Open Space)
- R-1 (Low Density Residential)
- R-2 (Low/Medium Density Residential)
- R-3 (Medium Density Residential)
- R-4 (Medium/High Density Residential)
- R-5 (High Density Residential)
- R-D (Downtown Residential)
- R-T (Downtown Transitional Mixed Use)
- ROW (Right-of-Way)
- SSC (Spruce Street Commercial)
- Water
- Vermillion River Floodplain
- Historic Properties

0 0.25 0.5 1 Miles

N
W E
S

Map dated July 13, 2007.
Prepared for the City of Farmington's Community Development Department by the Dakota County Office of GIS.

Appendix E

VRWJPO JOINT POWERS AGREEMENT

APPENDIX E

JOINT POWERS AGREEMENT
BETWEEN DAKOTA COUNTY AND SCOTT COUNTY
FOR VERMILLION RIVER WATERSHED

WHEREAS, Minnesota Statutes § 471.59 authorizes local governmental units to jointly or cooperatively exercise any power common to the contracting parties; and

WHEREAS, pursuant to Minn. Stat. § 103B.231 a watershed management plan is required for watersheds comprising all minor watershed units wholly or partly within the metropolitan area, in accordance with the requirements of § 103B.205 to § 103B.255; and

WHEREAS, the Vermillion River Watershed is a watershed comprising minor watershed units wholly within the metropolitan area, specifically, within Dakota County and Scott County; and

WHEREAS, pursuant to Minn. Stat. § 103B.231 if a watershed management organization within the metropolitan area is terminated, the counties containing the watershed unit shall prepare, adopt, and implement the watershed plan and shall have the planning, review, permitting, and financing authority of a watershed management organization specified in Minn. Stat. §§ 103B.211 to 103B.255; and

WHEREAS, the Vermillion River Watershed Management Organization, consisting of 21 cities and towns located within the Vermillion River Watershed ceased to exist as of August 1, 2000; and

WHEREAS, Dakota County and Scott County desire to cooperatively carry out their responsibilities and duties pursuant to Minn. Stat. §§ 103B. 211 to 103B.255; and

WHEREAS, Dakota County and Scott County desire to do so pursuant to the authority granted to them pursuant to Minn. Stat. § 471.59.

NOW, THEREFORE, in consideration of the mutual promises and benefits that Dakota County and Scott County shall derive herefrom, Dakota County and Scott County hereby enter into this joint powers agreement for the purposes herein.

I. Purposes.

This Agreement has been executed by Dakota and Scott Counties for the purposes set forth at Minn. Stat. § 103B.201 within the political boundary of the Vermillion River watershed located in Dakota County and Scott County, as shown on the attached Map A, hereby incorporated by reference. Specifically, the purpose of this Agreement is to establish a joint powers board that will (1) exercise leadership in the development of policies, programs and projects that will promote the accomplishment of the purposes found at Minn. Stat. § 103B.201, including the preparation, adoption and implementation of the plan required by Minn. Stat. § 103B.211 for the Vermillion

River watershed and (2) guide and assist Dakota County and Scott County in acting jointly and individually to take actions that will promote the goals listed in Minn. Stat. § 103B.201 and fulfill their responsibilities under Chapter 103B.

II. Joint Powers Board.

A. Creation and Composition of Joint Powers Board.

A joint powers board, known as the Vermillion River Watershed Joint Powers Board (VRWJPB), is established for the purposes contained herein with the powers and duties set forth in this Agreement. The VRWJPB shall consist of one county commissioner from Scott County and two county commissioners from Dakota County. The board of commissioners of each county shall appoint, by resolution, its representative(s) to the VRWJPB, together with one alternate commissioner. Resolutions appointing representatives of each county shall be filed with the clerk to the board of commissioners of Dakota County.

B. Terms.

Each county representative and alternate shall be appointed for a two-year term, except that the terms of the initial members shall extend from the date of their appointment through December 31, 2004. In the event that any county representative or alternate shall not have been appointed by the board of commissioners prior to expiration of the representative's term, the incumbent representative shall serve until a successor has been appointed.

C. Vacancies.

If the appointment of any representative commissioner or alternate is vacated before the end of the term, the vacancy shall be filled by appointment by the appropriate county board of commissioners. A vacancy shall be deemed to have occurred when any of the conditions specified in Minn. Stat. § 351.02 exist or if a representative fails to qualify or act as a commissioner.

D. Chair and Vice-chair.

The VRWJPB shall elect a chair and a vice-chair from its membership for one-year terms. The chair shall preside at all meetings of the VRWJPB and shall perform other duties and functions as may be determined by the VRWJPB. The vice-chair shall preside over and act for the VRWJPB during the absence of the chair.

E. Secretary/Treasurer.

The VRWJPB shall elect a secretary/treasurer from its membership for a one-year term. The secretary/treasurer shall submit all minutes of VRWJPB

meetings for approval by the VRWJPB and shall assist the chair in overseeing the VRWJPB's budget and finances.

F. Meetings.

The VRWJPB shall have regular meetings at least annually and at such times and places as the VRWJPB shall determine. Special meetings may be held on reasonable notice by the chair or by a majority of the VRWJPB upon terms and conditions as the VRWJPB may determine. The presence of a majority of the VRWJPB at a meeting shall constitute a quorum. The VRWJPB shall be subject to the requirements of the Open Meeting Law, Minn. Stat. Ch. 13D.

G. Voting.

Each county representative shall be entitled to one vote. If a county representative is absent that county's alternate is entitled to one vote. If more than one Dakota County representative is absent, Dakota County's alternate shall be entitled to only one vote. The VRWJPB shall function by a majority vote of the county representatives present.

H. Staff.

Dakota County and Scott County shall provide staff support to the VRWJPB. Dakota County and Scott County shall provide legal services as needed, and in accordance with law.

I. Duties of the VRWJPB.

The VRWJPB shall have the responsibility to prepare, adopt and implement a plan for the Vermillion River watershed that meets the requirements of Minn. Stat. § 103B.231; the responsibility to review and approve local water management plans as provided in Minn. Stat. § 103B.235; the responsibility to regulate the use and development of land in the Vermillion River watershed if the conditions found at Minn. Stat. §. 103B.211, subd. 1(3)(i)(ii)(iii) are present.

III. Powers of the VRWJPB.

A. General Powers.

The VRWJPB is hereby authorized to exercise such authority as is necessary and proper to fulfill its purposes and perform the duties identified in paragraph II(I) above. Such authority shall include, but not be limited to, those specific powers enumerated in paragraph III (Sections B through I) herein. The VRWJPB may refer decisions for approval by the boards of commissioners of

Dakota County and Scott County. The VRWJPB shall not have the authority described at Minn. Stat. § 103B.211, subd. 1(a)(6).

B. Contracts.

The VRWJPB may enter into any contract necessary or proper for the exercise of its powers or the fulfillment of its duties and enforce such contracts to the extent available in equity or at law, including contracts with Dakota County and/or Scott County. Additionally, the VRWJPB may enter into agreements pursuant to Minn. Stat. § 471.59. The VRWJPB may approve any contract up to the amount included in the approved annual budget and may authorize its chair to execute these contracts. No payment on any invoice for services performed by a consultant or any other person or organization providing services in connection with this Agreement shall be authorized unless approved by the chair and vice-chair or by the chair and secretary/treasurer. The chair shall report to the VRWJPB and the VRWJPB shall ratify any such payments authorized under this provision at its next regular meeting.

C. Funds.

The VRWJPB may disburse funds in a manner which is consistent with the Agreement and with the method provided by law for the disbursement of funds by the parties to this Agreement.

D. Bylaws.

The VRWJPB shall have the power to adopt and amend such bylaws that it may deem necessary or desirable for the conduct of its business. Such bylaws shall be consistent with this Agreement and any applicable laws or regulations.

E. Grants and Loans.

The VRWJPB may apply for and accept gifts, grants or loans of money, other property or assistance from the United States government, the State of Minnesota, or any person, association or agency for any of its purposes; enter into any agreement in connection therewith; and hold, use and dispose of such money, other property and assistance in accordance with the terms of the gift, grant or loan relating thereto.

F. Property.

The VRWJPB may hold such property as may be required to accomplish the purposes of this Agreement and upon termination of this Agreement make distribution of such property as is provided for in this Agreement.

G. Insurance.

The VRWJPB may obtain any liability insurance or other insurance it deems necessary to insure itself and Dakota County and Scott County for action arising out of this Agreement.

H. Exercise of Powers.

All powers granted herein shall be exercised by the VRWJPB in a fiscally responsible manner and in accordance with the requirements of law. The purchasing and contracting requirements of the county which is the lead for the project shall apply to the VRWJPB.

I. Public Participation.

The VRWJPB shall provide for such public participation in the conduct of its activities as will promote understanding of its activities among the public and local governmental units affected by the activities and the informal resolution of disputes or complaints.

IV. Reservation of Authority.

All responsibilities not specifically set out to be jointly exercised by the VRWJPB under this Agreement are hereby reserved to the Counties.

V. Budgeting and Funding.

A. Budget.

By September 1 of each year, the VRWJPB shall adopt a budget for the following calendar year. Any proposed contribution from Dakota County or Scott County which the VRWJPB deems appropriate to be satisfied from the annual property tax levy must be recommended to Dakota County and Scott County prior to the date by which the counties shall establish their maximum levy pursuant to Minn. Stat. § 275.065, subd. 1. Other proposed contributions or assessments from Dakota County or Scott County may be made at any time.

B. County Funding.

If there is proposed funding from Dakota County or Scott County which is to be satisfied from the annual property tax levy, such proposed funding shall not become the obligation of either county unless and until the respective county has agreed to the funding as part of the county's annual budget and levy process pursuant to Minn. Stat. § 275.065. If there is proposed funding from Dakota County or Scott County which is not to be satisfied from the annual

property tax levy, such funding shall not become the obligation of either county until the respective county has agreed by resolution to the funding.

Any proposed funding from Dakota County or Scott County which has been included within the county's levy or which has been approved by resolution of the Dakota County or Scott County board of commissioners shall constitute an assessment against the county and shall be paid over to the VRWJPB pursuant to its terms, this Agreement, and as required by law.

C. Expenditure Policy.

Dakota County and Scott County agree that the budget for each year shall include expenditures which will benefit the portion of the Vermillion River Watershed located in Scott County.

D. Fiscal Agent.

Dakota County agrees to serve as the fiscal agent for the VRWJPB. Dakota County agrees to provide any and all budgeting and accounting services necessary or convenient for the VRWJPB. Such services include, but are not limited to, management of all funds, including county contributions and grant monies; payment for contracted services; relevant record keeping and bookkeeping. The treasurer/auditor of Dakota County shall act as controller for the VRWJPB and shall draw warrants to pay demands against the VRWJPB when the demands have been approved by the VRWJPB. Scott County retains the authority to request reports pertaining to any and all budgeting and accounting services. All interest earned from VRWJPB funds shall be credited back to that fund.

E. Accountability.

All funds shall be accounted for according to generally accepted accounting principles.

VI. Watershed Planning Commission.

As soon as practicable after appointment of the VRWJPB, the VRWJPB by resolution shall establish and make appointments to the Watershed Planning Commission (WPC). The VRWJPB shall utilize an open appointments process for making these appointments.

A. Responsibilities of WPC.

The WPC shall have the responsibility to advise the VRWJPB with respect to implementation of the VRWJPB's duties pursuant to this Agreement, including the responsibility to review, comment and recommend upon the proposed

watershed management plan; review, comment and recommend upon the proposed annual work plan and budget; and recommend action regarding disputes pursuant to section IX hereof.

B. Membership.

The WPC shall consist of nine members who are residents of the Vermillion River Watershed. One shall be from Scott County and eight shall be from Dakota County. WPC members shall be appointed to three-year staggered terms. WPC members must be and remain residents of the watershed and the County from which they were appointed. WPC members are limited to serving two consecutive terms.

C. Conflict of Interest.

If any WPC member has a financial interest or personal interest with respect to the parties involved, or stands to realize a financial or personal gain or loss with respect to an action on any matter coming before the WPC, that member shall disclose this fact and be disqualified from taking part in any discussion or action on the matter as a member of the WPC. The chair of the WPC shall make rulings on such disqualifications. Any WPC member who believes that the WPC chair should be disqualified from any matter hereunder may refer the matter to the vice-chair who shall make a ruling on such disqualification.

D. Compensation.

Members of the WPC shall be eligible to receive a per diem payment of $35 per meeting in lieu of expenses.

E. Officers.

The WPC shall elect a chair and vice-chair from among its members. The chair and vice-chair shall serve for one-year terms.

F. Meetings.

The WPC shall meet regularly pursuant to a schedule established by the WPC. Special meetings may be called by the chair. The WPC shall be subject to the Open Meeting Law, Minn. Stat. Ch. 13D.

G. Bylaws.

The WPC shall adopt bylaws governing its activities. Such bylaws shall be subject to approval by the VRWJPB and shall be consistent with law and terms of this Agreement.

H. Staff Support.

Dakota County and Scott County shall provide staff support to the WPC. The cost of such support will be funded through the budget of the VRWJPB. The VRWJPB also may make technical support available to the WPC.

VII. Indemnification.

If the VRWJPB incurs any expenses as a result of a claim for damages, the expenses and any damages paid shall be assessed against the counties in proportionate shares. Proportionality will be measured with reference to fault, percentage of county financial contribution, location of the project or other similar factors giving rise to the damages or expenses. Dakota County and Scott County hereby agree to indemnify, save, hold harmless and defend the VRWJPB, its officers, employees, and agents for negligent or intentional acts or omissions of itself, its officers, employees, and agents that result in expenses or damages assessed against the VRWJPB.

VIII. Records, Accounts, and Reports.

The books and records of the VRWJPB shall be subject to the provisions of Minn. Stat. Ch. 13. The VRWJPB annually shall give a complete written report of all financial activities for the previous fiscal year to the counties.

IX. Dispute Resolution.

Disputes between Dakota County and Scott County may be addressed by any means agreed upon by them, and may include the procedures set forth at Minn. Stat. § 103B.345.

X. Termination.

This Agreement shall terminate upon the withdrawal of either member county. Either county may withdraw upon one year's written notice to the other county. Withdrawal shall not act to discharge any liability incurred or chargeable to the withdrawing county before the effective date of the withdrawal. Such liability shall continue until discharged by law or agreement.

XI. Distribution of Surplus Funds and Property.

Upon termination of this Agreement, funds and property held by the VRWJPB shall then be distributed to Dakota County and Scott County in proportion to their contributions.

XII. Amendments.

This Agreement may be amended only in writing and upon consent of each of the county boards of commissioners of Dakota County and Scott County.

IN WITNESS WHEREOF, the parties have executed this Agreement on the dates indicated below.

Approved as to form:

_____
Assistant Dakota County Attorney/Date

COUNTY OF DAKOTA

By_____

Title Chair
Date of Signature_____

ATTEST:

_____
Title Clerk to the Board

Approved as to form:

_____
Assistant Scott County Attorney/Date

COUNTY OF SCOTT

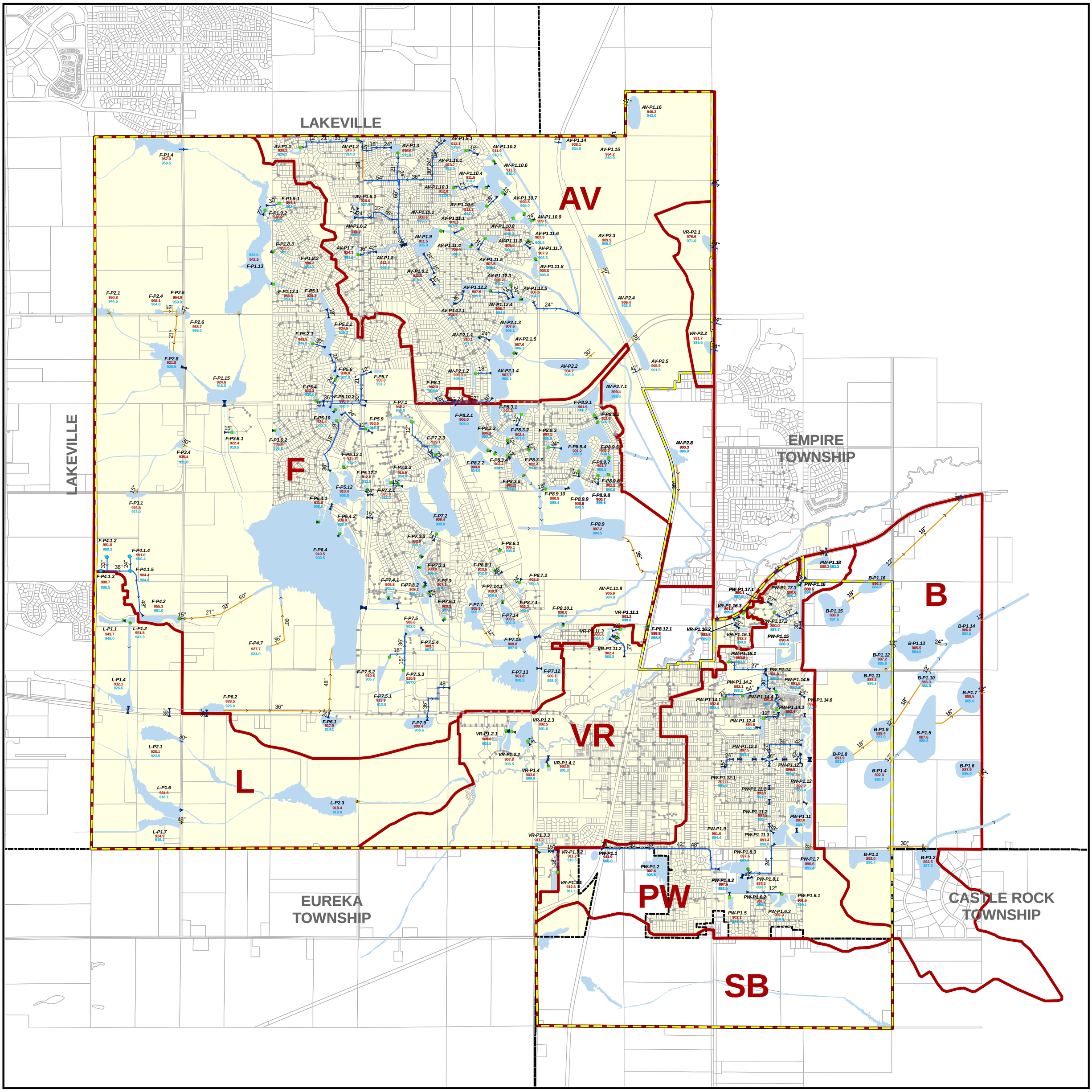
By_____

Title Chair
Date of Signature_____

ATTEST:

_____
Title _____

K/K02-181 Vermillion River Watershed Board JPA



Pond Inlets and Outlets

- Catch Basin Manhole
- Flared End
- Skimmer
- Existing Pond Outlet Pipe
- Proposed Pond Outlet Pipe
- Open Channel

Existing Storm Sewer System

- Catch Basin Manhole
- Flared End
- Manhole
- Skimmer
- Catch Basin
- Existing Storm Pipe

- Major District
- 2030 Boundary
- City Boundary
- Other Jurisdictional Boundary
- Waterbodies

L-P1.7 Pond ID
898.5 HWL- High Water Level
896.0 OE - Outlet Elevation

City of Farmington

Local Surface Water Management Plan

SURFACE WATER SYSTEM

Map 1

N W E S

Feet
2000 1000 0 2000

July 2008
Updated: November 2010

Bonestroo

CITY OF FARMINGTON
A PROUD PAST • A PROMISING FUTURE

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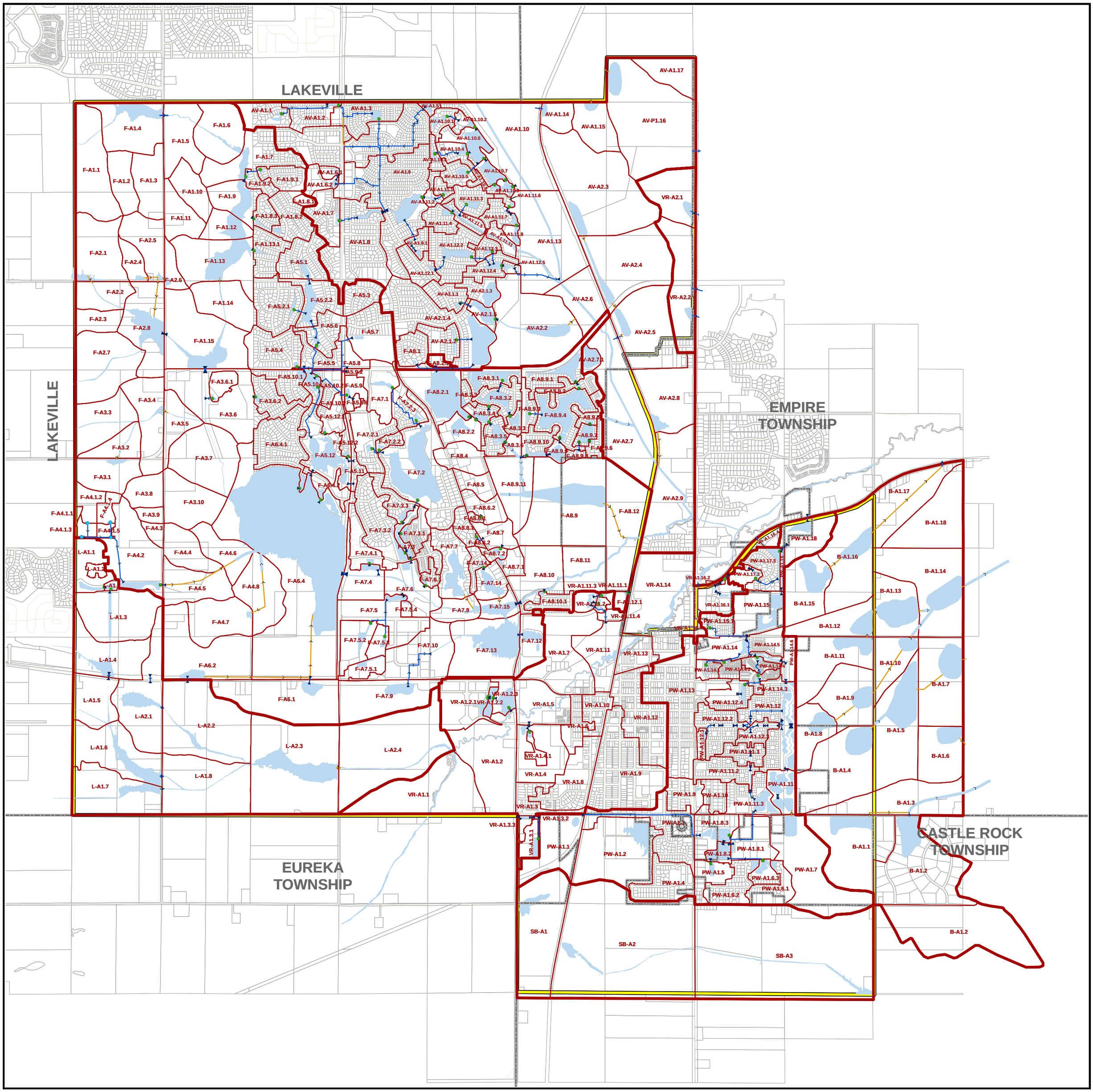

Catch Basin Manhole
Flared End
Skimmer
Existing Pond Outlet Pipe
Open Channel
Proposed Pond Outlet Pipe
Subdistricts
Major Districts
Waterbodies
Study Area Boundary
Jurisdictional Boundary

City of Farmington

Local Surface Water Management Plan

SURFACE WATER AREAS

July 2008

Map 2

N W E S

Feet
2000 1000 0 2000

Bonestroo

CITY OF FARMINGTON
A PROUD PAST • A PROMISING FUTURE

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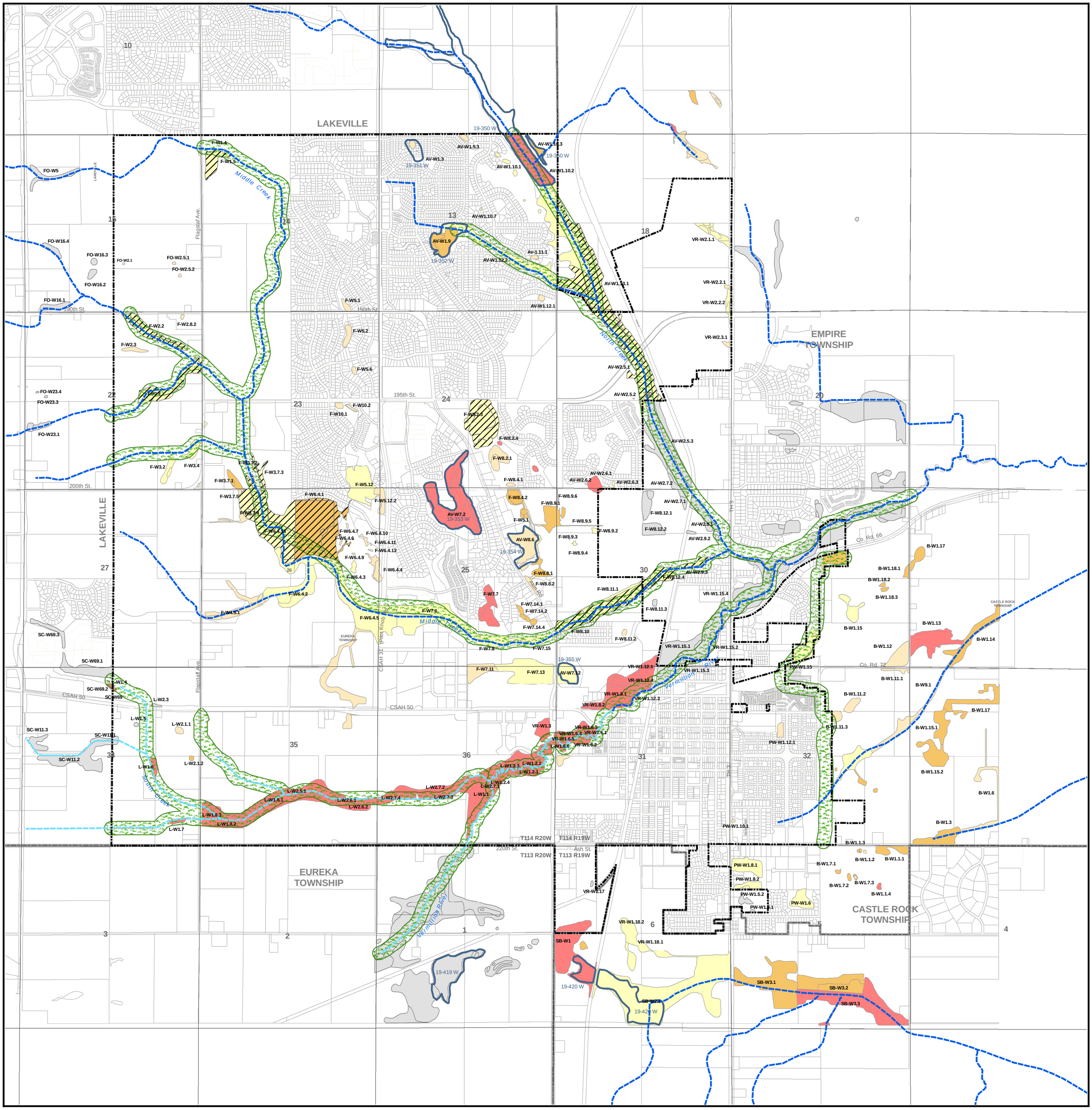

Disclaimer: This map is a compilation of various data sources and is for reference only. Contact the City Planning Department for details about the content of this map. The wetland boundaries are approximate and do not preclude a property owner from the need to have a wetland delineation performed.