BARR

VRWJPO XP-SWMM Model Update

Prepared for
City of Farmington

December 2014

4700 West 77th Street
Minneapolis, MN 55435-4803
Phone: 952.832.2600
Fax: 952.832.2601

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Certifications

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.

Brandon Barnes PE #: 49540

December 23, 2014

Date

Executive Summary

This report describes the methodology and results of hydrologic and hydraulic modeling of the North Creek, South Creek, Middle Creek, subwatershed, and other areas within the City of Farmington and tributary to the Vermillion River. The Vermillion River begins in the southwestern portion of Scott County and flows east through the central portion of Dakota County towards the Mississippi River near Hastings, Minnesota. The study area, roughly 15 square miles, includes the entire City of Farmington as well as area outside the municipal boundary that is tributary to the City's creeks and streams. This includes much of the City of Lakeville, as shown in Figure EX-1.

Previous modeling analyses of the Vermillion River watershed were completed in 2009 and 2010 for the Vermillion River Watershed Joint Powers Organization (VRWJPO). These analyses used subwatersheds that were generally 160 to 640 acres in area. The resulting calibrated XP-SWMM model was primarily a single-tiered network (i.e., flow was primarily routed through an overland network of drainage ways, natural stream sections, and roadway culverts and generally excluded detailed storm sewer networks). The VRWJPO used the peak flows and runoff volumes from the 2010 analysis to set flow and volume standards at the community standard locations defined in the 2009 study.

This study modified the Farmington portion of the VRWJPO XP-SWMM model to include smaller subwatersheds, regional stormwater ponds, storm sewer connections between stormwater ponds, and storm sewer outlets to North Creek, Middle Creek, South Creek, and the Vermillion River as shown in Figure EX-2. The updated portion of the XP-SWMM model now includes sections of two-tiered network (i.e., flows are simultaneously routed through detailed storm sewer and overland networks). The updated XP-SWMM model was used to simulate the 1-, 2-, 10-, 50-, and 100-year 4-day events without further calibration. The resulting flow rates and runoff volumes were compared to the established rates and volumes at the community standard locations.

Using identical rainfall data, the updated model results were compared to the 2010 model at study-area gages used to calibrate the model in 2009. The comparison indicated that the updated model closely matched the stage hydrographs for the 2- and 100-year events. Therefore, the updated model could still be considered calibrated at the gage locations. However, modeling results for the 100-year event indicate there is an increase in peak flow rates and runoff volume at community standard locations near the Farmington municipal boundary.

The existing-conditions model was then used to simulate the 4-day rainfall event based on rainfall depths published in Atlas 14. At community standard locations near the Farmington municipal boundary the peak discharge rates increased an average of 22 percent for the 2-year event and 105 percent for the 100-year event. The runoff volume was very similar for the 2-year event because there was not a significant change in precipitation depths. However, runoff volume increased an average 46 percent for the 100-year event. Figure EX-3 shows the 100-year peak flow rates for the 2010 XP-SWMM model to the 2014 updated XP-SWMM model using Atlas 14 rainfall depths.

Finally, a future-conditions model was developed by modifying the updated model to reflect future development conditions throughout the City. Using Atlas 14 rainfall depths, the model was used to estimate the regional stormwater basin and outlet sizes that would be required to maintain existing-conditions peak flow rates at VRWJPO community standard locations. Future ponds were not sized to mitigate localized flooding concerns upstream of community standard locations. It is anticipated that these areas would be addressed as development or redevelopment occurs within the City. Increases in simulated runoff volume due to planned development were tabulated to aid planning for future volume-control practices. These typically occur on a smaller scale than what was considered in the updated XP-SWMM model.

When using the model to assess development impacts to flow-rate standards it is important to consider the hydrologic and hydraulic scale for which the model was originally developed and calibrated. It is also necessary to recognize that the model should be used as a tool to assess the relative impacts of development rather than to establish absolute values, since a detailed recalibration was not completed as part of this current update effort. Future model updates should include recalibration using post-2005 storm events to improve the model's representation of real-world conditions.

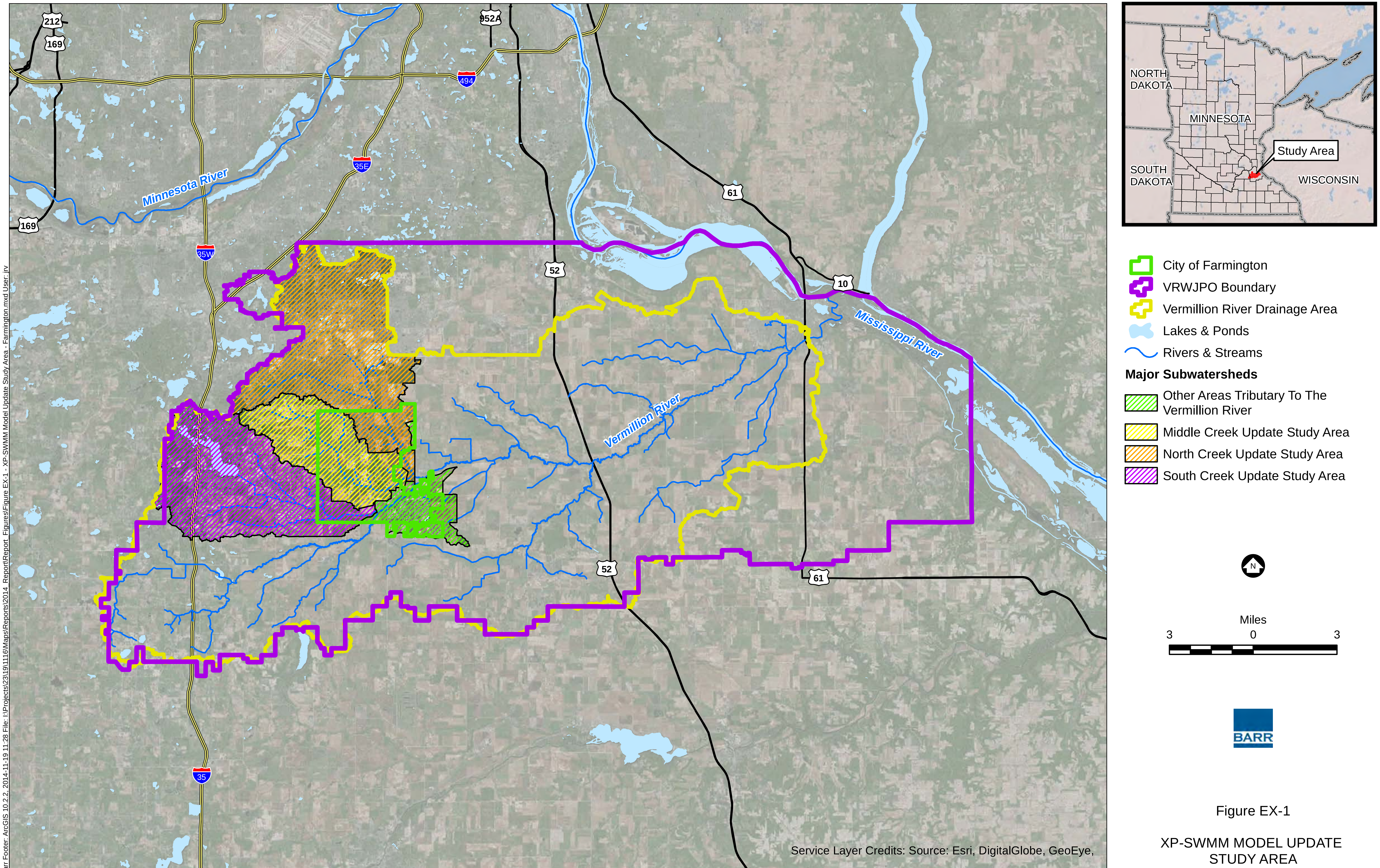


Figure EX-1

XP-SWMM MODEL UPDATE STUDY AREA

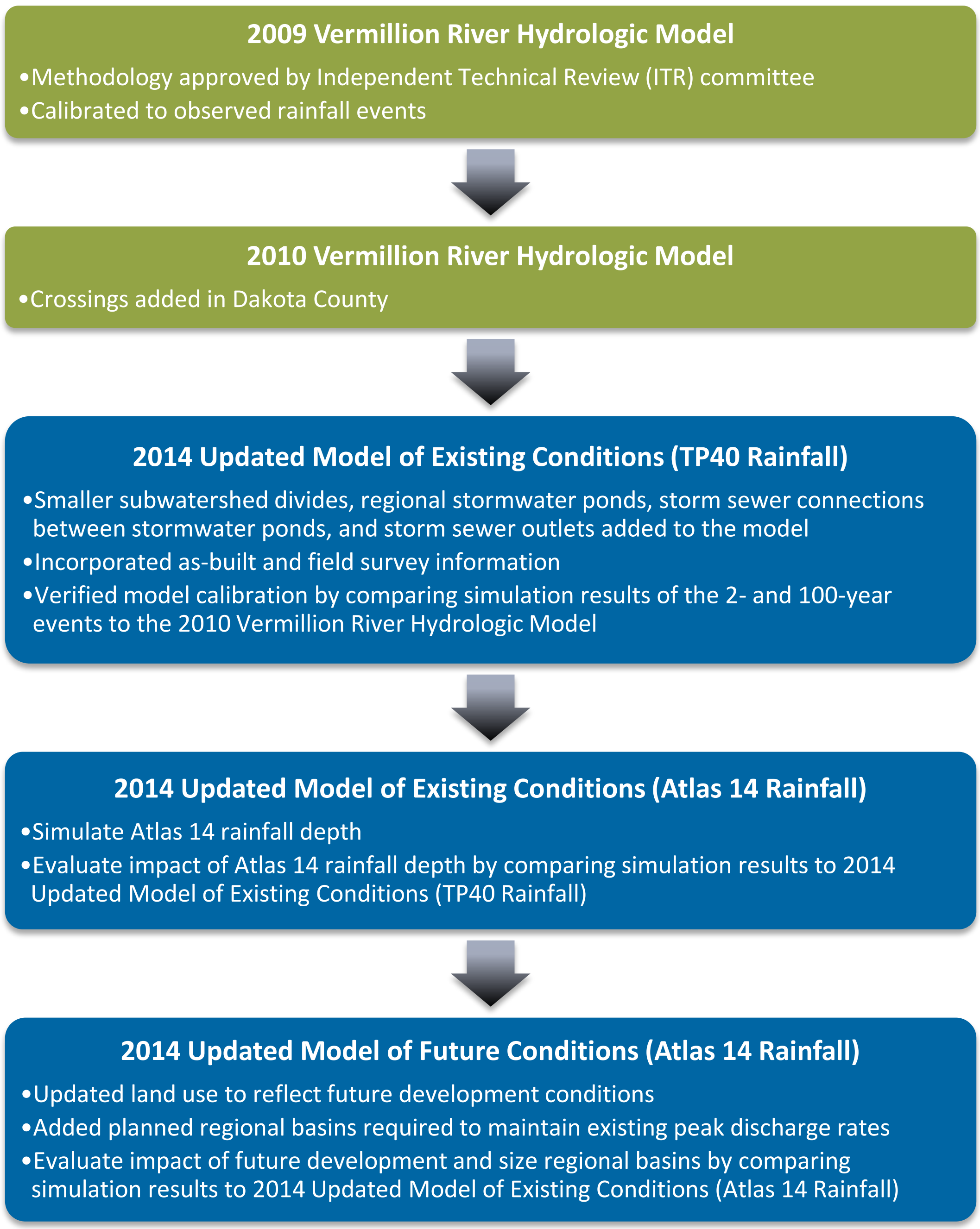
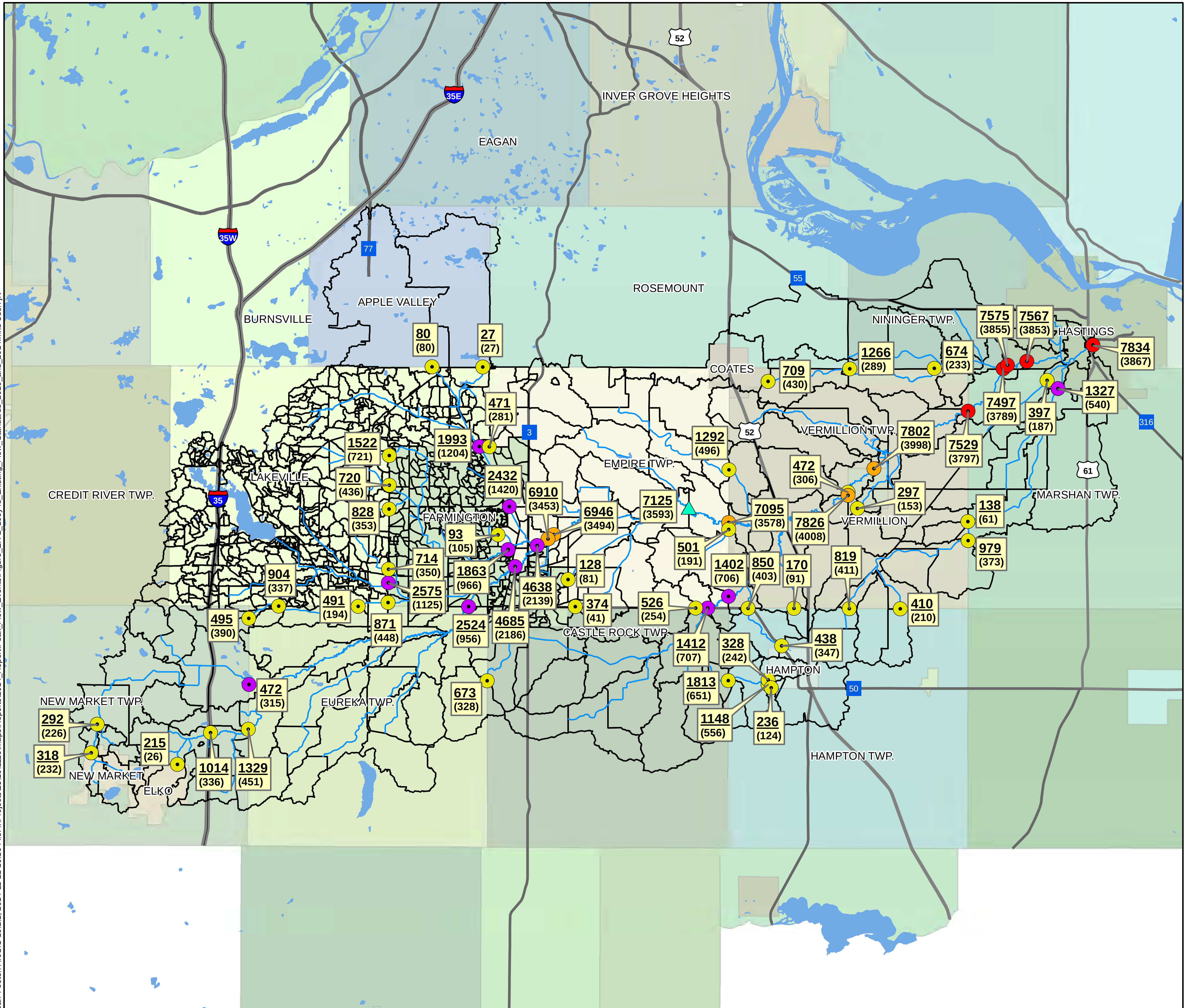


Figure EX-2 Hydrologic Model Update Process



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station
- SWMM Links
- Watersheds
- Lakes

100-Year Peak Flow Rate (CFS)

7125 — 2014 Model (Atlas 14 Rainfall)
(3593) — 2010 Model (TP40 Rainfall)

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure EX-3

2010 (TP40) AND 2014 (ATLAS 14) COMMUNITY
FLOW STANDARD LOCATIONS
EXISTING CONDITIONS
100-YEAR, 4-DAY PEAK FLOW

1.0 Methodology

1.1 Existing Conditions

The 2010 VRWJPO existing-conditions XP-SWMM model was developed to simulate land use within the watershed in 2005. Additional hydrologic and hydraulic detail was added to the 2010 VRWJPO XP-SWMM model to revise the existing conditions modeling within Farmington (Figure EX-1). Hydrologic and hydraulic model inputs were based on the methodology presented in *Vermillion River Watershed Hydrologic Study of Existing Conditions* (Barr 2009) and information provided by the Cities of Lakeville and Farmington. For purposes of this modeling revision effort, "existing conditions" represents 2005 land use and storm sewer conditions.

1.1.1 Hydrologic Model Parameters

Hydrologic model parameters were calculated using the calibrated values and methodology defined in *Vermillion River Watershed Hydrologic Study of Existing Conditions* (Barr 2009). The following sections summarize how individual model parameters were calculated. Appendix A includes a summary of updated hydrologic parameters within Farmington.

1.1.1.1 Subwatershed Divides

The modeled subwatershed divisions within the City of Farmington generally corresponded to the subwatershed divisions in the City's Local Surface Water Management Plan (LSWMP), as shown in Figure 1-1. The subwatershed divisions provided by the City were modified in GIS to include contributing areas from outside the municipal boundary and to reflect existing drainage patterns. Figure 1-1 shows a comparison of the original subwatershed divisions provided by the City of Farmington and the revised subwatershed divisions used in the updated XP-SWMM model.

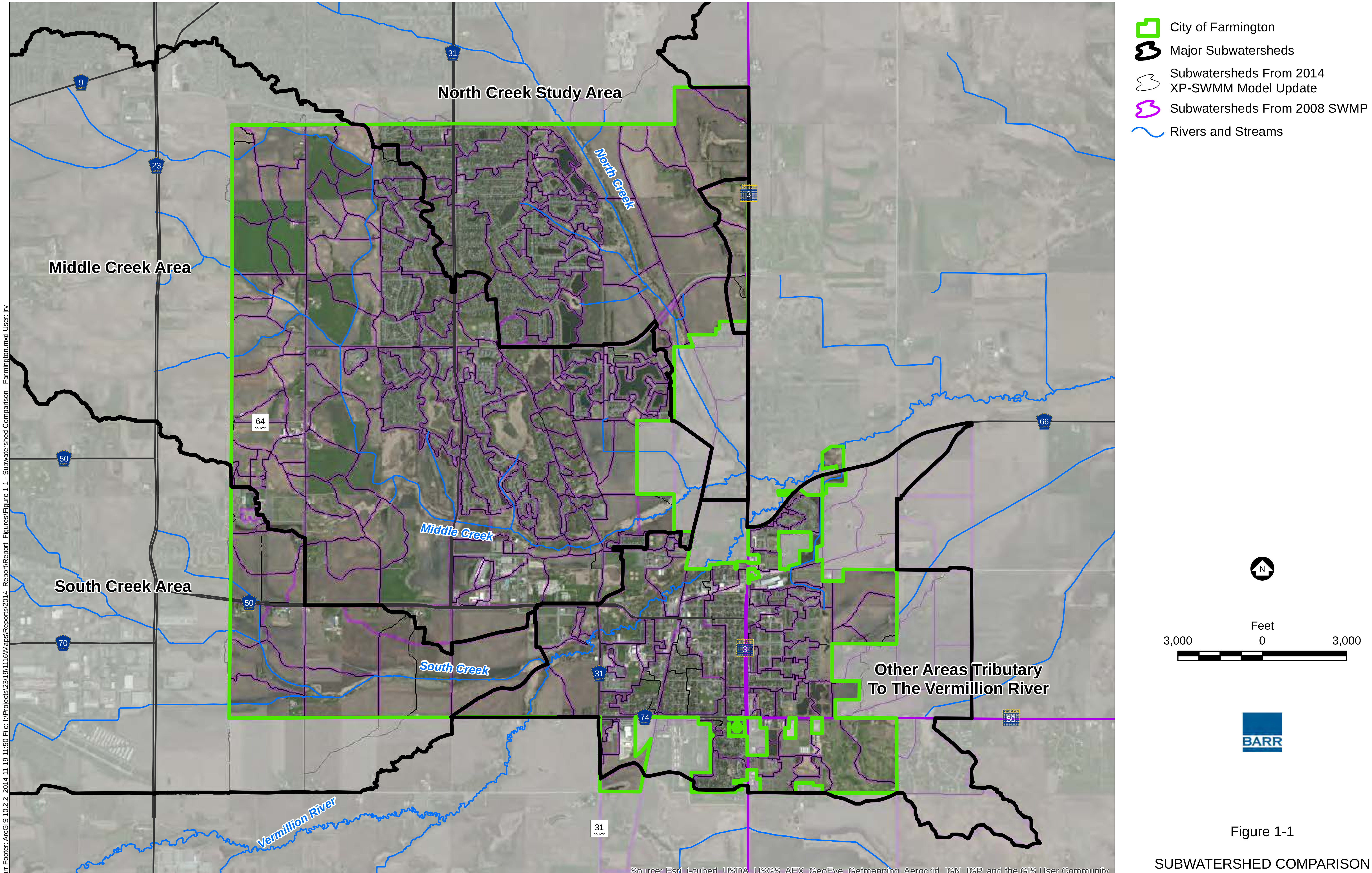


Figure 1-1

SUBWATERSHED COMPARISON

1.1.1.2 Impervious Area

Land cover within a watershed affects the quantity and timing of runoff. Each land use generates a different quantity of runoff due, primarily, to the amount of impervious area within that land cover. The impervious area input into the XP-SWMM model is, by definition, hydraulically connected to the drainage systems being analyzed. This directly connected impervious percentage includes driveways, rooftops, and parking areas that are directly connected to the stormwater collection system. Runoff from the portion of a rooftop draining onto adjacent pervious areas was not treated as connected impervious area.

The percent of directly connected impervious area associated with each land-use type was calculated using 2005 land-cover data developed by Applied Ecological Services (AES) and based on the Minnesota Land Cover Classification System (MLCCS) for the western portion of the Vermillion River watershed and the 2005 Metropolitan Council land-use classifications. The AES land-cover data set is shown in Figure 1-2, and the impervious percentages assigned to each land-cover classification are listed in Table 1-1.

Table 1-1 Land Cover, Percent Impervious

AES Land-Cover Classification [1]	Total Percent Impervious (%)	Directly Connected Percent Impervious (%)
Asphalt	100%	100% or 0%[2]
Concrete	100%	100% or 0%[2]
Commercial Roof	100%	86% or 0%[3]
Residential Roof	100%	33% or 0%[4]
Forest	0%	0%
Corn	0%	0%
Tall Grass	0%	0%
Lawn	0%	0%
Bare Soil	0%	0%
Pond	100%	100%
Reservoir	100%	100%
Wetland	6%	6%

[1] 2005 land cover classifications from Applied Ecological Services. Dataset provided in 2007
[2] Assumed to be 100 percent directly connected. In agricultural, airport, and farmstead Metropolitan Council land-use classifications assumed to be 0 percent impervious.
[3] Assumed to be 86 percent directly connected. In airport Metropolitan Council land-use classification assumed to be 0 percent.
[4] Assumed to be 33 percent directly connected. In agricultural, airport, and farmstead Metropolitan Council land-use classifications assumed to be 0 percent.

The percentages from Table 1-1 were used to calculate the percentage of directly connected impervious area for each 2005 Met Council land-use classification based on the land-cover types within each area. The 2005 Met Council land-use dataset is shown in Figure 1-3, and the percent impervious assigned to land-use classifications are listed in Table 1-2.

Table 1-2 Land Use, Percent Impervious

2005 Metropolitan Council Land-Use Classification	Directly Connected Percent Impervious (Percent)
Agricultural	0.0
Airport	0.0
Extractive (e.g., gravel pits)	5.7
Farmstead	0.0
Golf Course	4.8
Industrial and Utility	59.1
Institutional	34.3
Major Highway	54.2
Manufactured Housing Parks	32.3
Mixed-Use Commercial and Other	97.6
Mixed-Use Industrial	55.5
Mixed-Use Residential	28.4
Multifamily	47.3
Office	70.9
Park, Recreational, or Preserve	11.0
Retail and Other Commercial	75.7
Seasonal/Vacation	15.7
Single Family, Attached	30.3
Single Family, Detached	20.6
Undeveloped	6.5
Water	100.0

Land-use classifications from Metropolitan Council, June 2005.

The directly connected impervious area for each subwatershed was calculated using the same methodology as detailed *Vermillion River Watershed Hydrologic Study of Existing Conditions* (Barr 2009) using the AES land-cover data. In locations that the AES dataset did not cover, the percent impervious values from the 2005 Metropolitan Council land-use classifications were used.

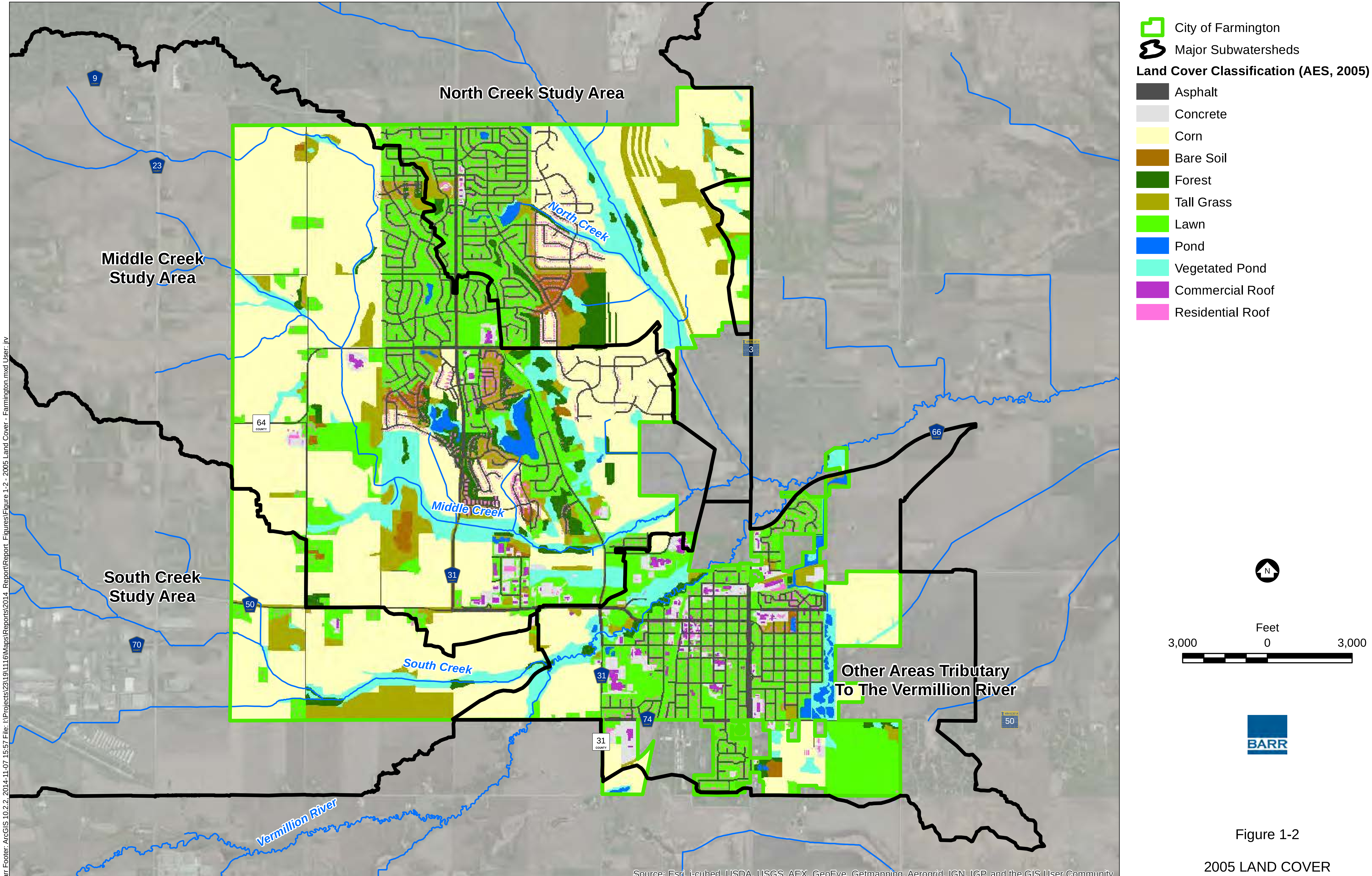


Figure 1-2

2005 LAND COVER

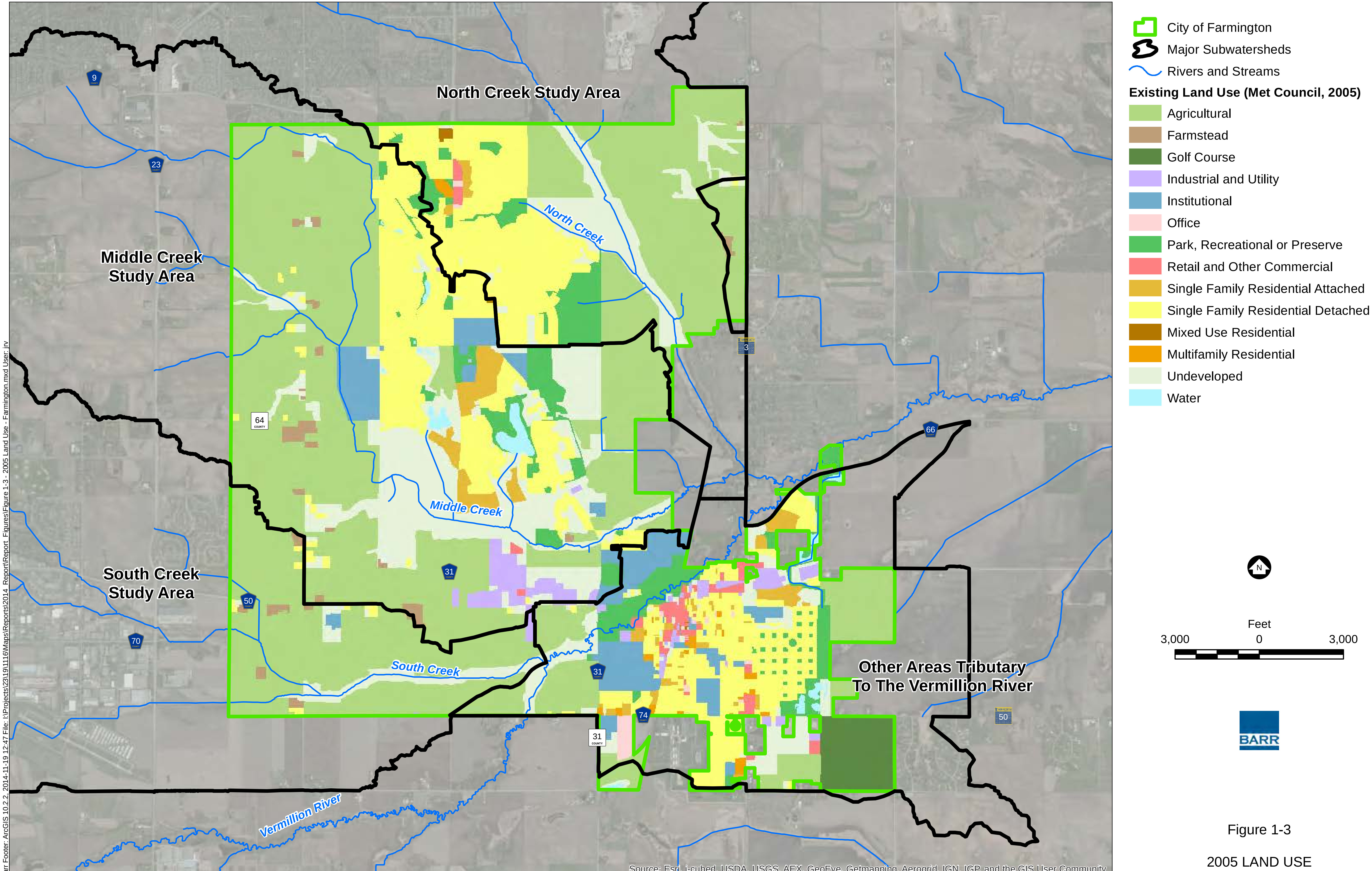


Figure 1-3

2005 LAND USE

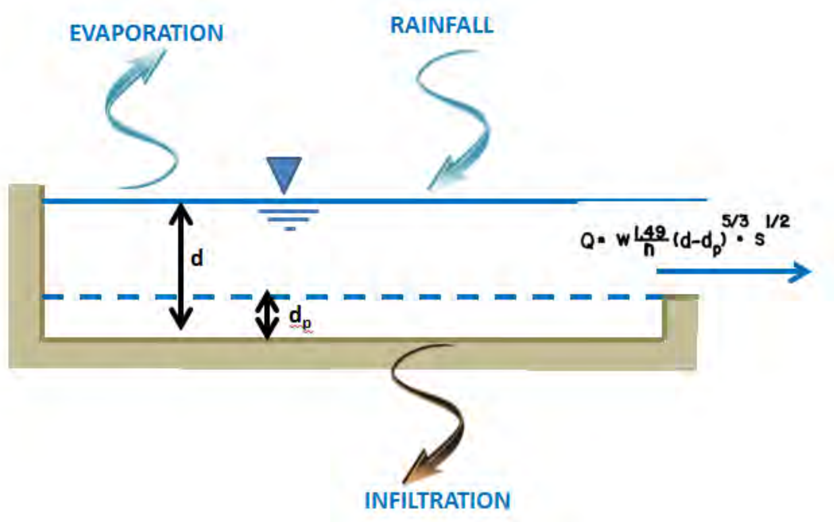
1.1.1.3 Watershed Slope

The average watershed slope was calculated in GIS. The methodology used to calculate the watershed slope for the updated areas is the same used for other watersheds within the VRWJPO XP-SWMM model. The area-weighted average watershed slope (feet/feet) for each subwatershed for both existing and future conditions was estimated using GIS and a digital elevation model (DEM) created from Dakota County LiDAR data (2005). LiDAR, which stands for light detection and ranging, is a remote sensing technology that measures the distance to the earth's surface, which can be converted to elevation. LiDAR data is typically provided in the form of a digital elevation model (DEM) which can be used to generate contour data.

The 2005 LiDAR data were used to calculate watershed slope in the calibrated 2009 XP-SWMM model. For comparison purposes the watershed slope was also calculated using the 2011 LiDAR data that is publically available from the MnDNR. On average the two datasets produced similar values for watershed slope. Therefore, the 2005 dataset that was used to define watershed slope for the 2009 calibrated model was also used for the updated model.

1.1.1.4 Watershed Width

In XP-SWMM, surface runoff from subwatersheds is routed to the stormwater system via the nonlinear reservoir methodology. During each time-step XP-SWMM calculates the surface runoff from the subwatershed as shown in Figure 1-4.



In the equation, "Q" is the flow rate from the subwatershed (cfs), "n" is the Manning's roughness coefficient, "d" is the depth of water (ft), "d_p" is the depression storage (ft), and "s" is the slope (ft/ft).

Figure 1-4 Nonlinear Reservoir Schematic of a Subwatershed Used in XP-SWMM

The flow rate from a subwatershed is directly related to the watershed slope, overland flow surface roughness, depression storage, and width parameter. As the watershed width increases, the flow rate from the subwatershed also increases. With a higher runoff rate, less runoff is stored within the subwatershed and less infiltration occurs. This increases the runoff volume for a given rainfall event. However, as the watershed width decreases the opposite occurs; the flow rate from the subwatershed decreases, infiltration increases, and less runoff volume is generated.

The SWMM user's manual (Storm Water Management Model; Version 4 User's Manual, U.S. EPA 1988) suggests estimating the watershed width for a given subwatershed by dividing the watershed area by the longest flow path. This is the methodology described in the *Vermillion River Watershed Hydrologic Study of Existing Conditions* (Barr 2009) and used for this model update.

1.1.1.5 Infiltration Parameters

Infiltration is the movement of water into the soil surface. For a given storm event, the infiltration rate will vary with time. The infiltration rate at the beginning of the storm is the maximum rate because the soil surface is typically drier and full of air spaces. As the storm event continues, the infiltration rate will gradually decrease as the air space fills with water. For long storms, the infiltration rate will reach a constant value—the minimum infiltration rate or the soil's hydraulic conductivity. The Horton infiltration equation was used to simulate the relationship between infiltration rate and time.

The Natural Resource Conservation Service (NRCS) soil survey geographic database (SSURGO) released in July 2006 was used to determine the hydrologic soil group classifications of the soils within the study area. Horton infiltration input parameters for each hydrologic soil group were previously calibrated for the study area as described in the *Vermillion River Watershed Hydrologic Study of Existing Conditions* (Barr 2009). Composite infiltration parameter values were estimated by computing an area-weighted average for each parameter based on the percentage of each soil type within the subwatershed, using the calibrated values from 2009.

1.1.1.6 Depression Storage and Overland Flow Roughness

Depression storage, which includes the areas that must be filled with water prior to generating runoff from both pervious and impervious areas, was set for each land-use classification based on the values described in the *Vermillion River Watershed Hydrologic Study of Existing Conditions* (Barr 2009). The methodology defined in this study was also used to assign overland flow roughness values for each land-use classification.

1.1.2 Hydraulic Model Parameters

Hydraulic information in the model consists of storm sewer, pond outlets, and natural channels. The following sections describe the sources of hydraulic information for each portion of the stormwater conveyance system. Hydraulic model inputs are also summarized in Appendix B.

1.1.2.1 Storm Sewer Data

Storm sewer data were added to the GIS database developed for the 2009 VRWJPO XP-SWMM model. The GIS database was used to expedite data entry into the XP-SWMM model and provide a single source of information for developing the XP-SWMM model. The GIS database was populated with as-built drawings, GIS layers, and survey data provided by the City of Farmington. Data included pipe invert elevations, lengths, diameters, shape, and material type.

In some locations survey data was not collected and the GIS files or as-built plans provided by the City were missing sections of storm sewer or culvert information. In these areas, the invert elevations were estimated based on LiDAR data or interpolated from locations where invert information was available. Missing pipe diameters were assumed to be equivalent to the next known downstream pipe size. By using the same diameter as the downstream pipe or culvert, the model does not restrict flow through the system. The amount of unknown or missing pipe information was relatively small and represented less than 15% of the entire storm sewer system within the City.

1.1.2.2 Stormwater Storage Areas

Stormwater storage-area locations, such as ponds and wetlands, were identified based on information provided by the City of Farmington, aerial photographs, and LiDAR data. Storage-elevation curves for the ponds were calculated in ArcGIS based on Dakota County LiDAR data (2011). Pond outlet structure information was taken from as-built drawings, as provided. In areas where as-built plans were not available, overflow elevations were based on LiDAR data.

1.1.2.3 Stream Cross Sections

Stream cross sections used in the XP-SWMM model were developed using GIS and a DEM created from Dakota County LiDAR data (2011). The most restrictive cross section for a given reach was selected in accordance with the methodology presented in the *Vermillion River Watershed Hydrologic Study of Existing Conditions* (Barr 2009).

1.2 Future Conditions

A future-conditions XP-SWMM model, reflecting 2030 land-use classifications, was developed by updating the existing-conditions XP-SWMM model. The future-conditions model was then used to size regional stormwater detention ponds to achieve the 2014 existing-conditions peak flow rate at municipal standard locations. The following sections discuss the modifications made to the existing-conditions XP-SWMM model to evaluate 2030 development conditions.

1.2.1 Impervious Area Updates

The directly connected impervious percentage for future conditions was estimated using the 2030 land-use classifications in the City of Farmington's 2008 LSWMP and the City of Lakeville's 2008 Water Resources Management Plan (WRMP). Some future land-use categories in Farmington's LSWMP differed from the Met Council land-use categories. Where the land-use categories were identically named, the impervious percentage value for the existing land use was assigned to the corresponding future use. Where future land-use categories did not have a clear connection to existing land-use categories, the future land use was based on a comparison between future land-use classifications and existing fully developed areas of Farmington. Future-conditions land-use categories are shown in Figure 1-5. Existing and associated future-conditions land-use categories and their impervious percentages are presented in Table 1-3.

When calculating the directly connected impervious area for planned development conditions it was assumed that the percent of directly connected impervious area in the watershed did not decrease compared to existing conditions.

Table 1-3 Land Use, Percent Impervious

2005 Metropolitan Council Land-Use Classification[1]	2030 Farmington Land-Use Classification[2]	2030 Directly Connected Percent Impervious (Percent)
Agricultural	Urban Reserve	0.0
Park, Recreational, or Preserve	Park/Open Space	11.0
Park, Recreational, or Preserve	Restricted Development	11.0
Single Family, Detached	Low Density	20.6
Single Family, Detached	Low/Medium	20.6
Mixed Use, Residential	Mixed Use (Commercial/Residential)	28.4
Single Family, Attached	Medium Density	30.3
Institutional	Public/Semipublic	34.3
Multifamily	High Density	47.3
Industrial and Utility	Industrial	59.1
Retail and Other Commercial	Commercial	75.7
Water	Water	100

[1] Land-use classifications from Metropolitan Council, June 2005
[2] Land-use classifications based on City of Farmington 2030 land use as shown in 2008 City of Farmington LSWMP

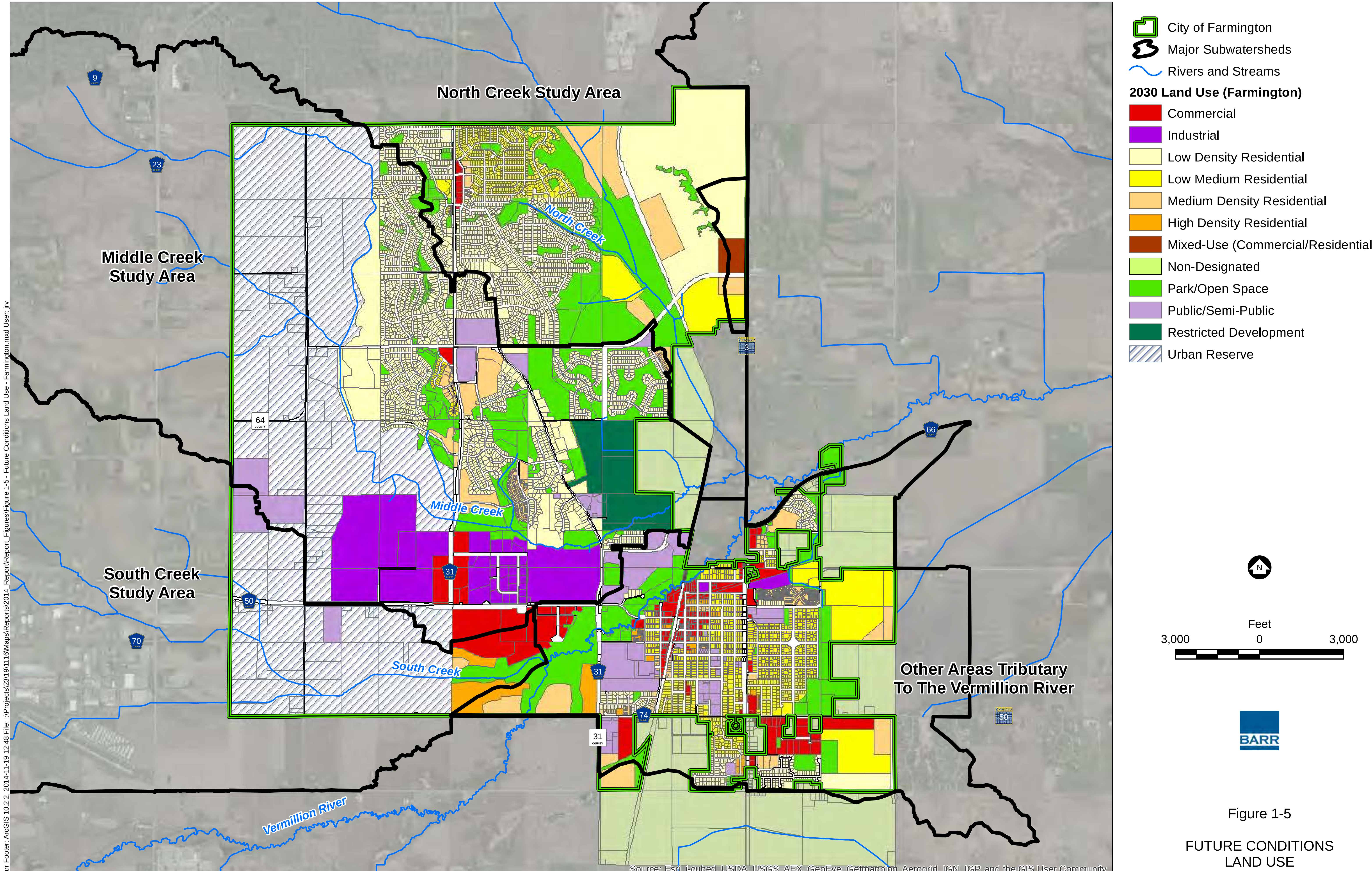


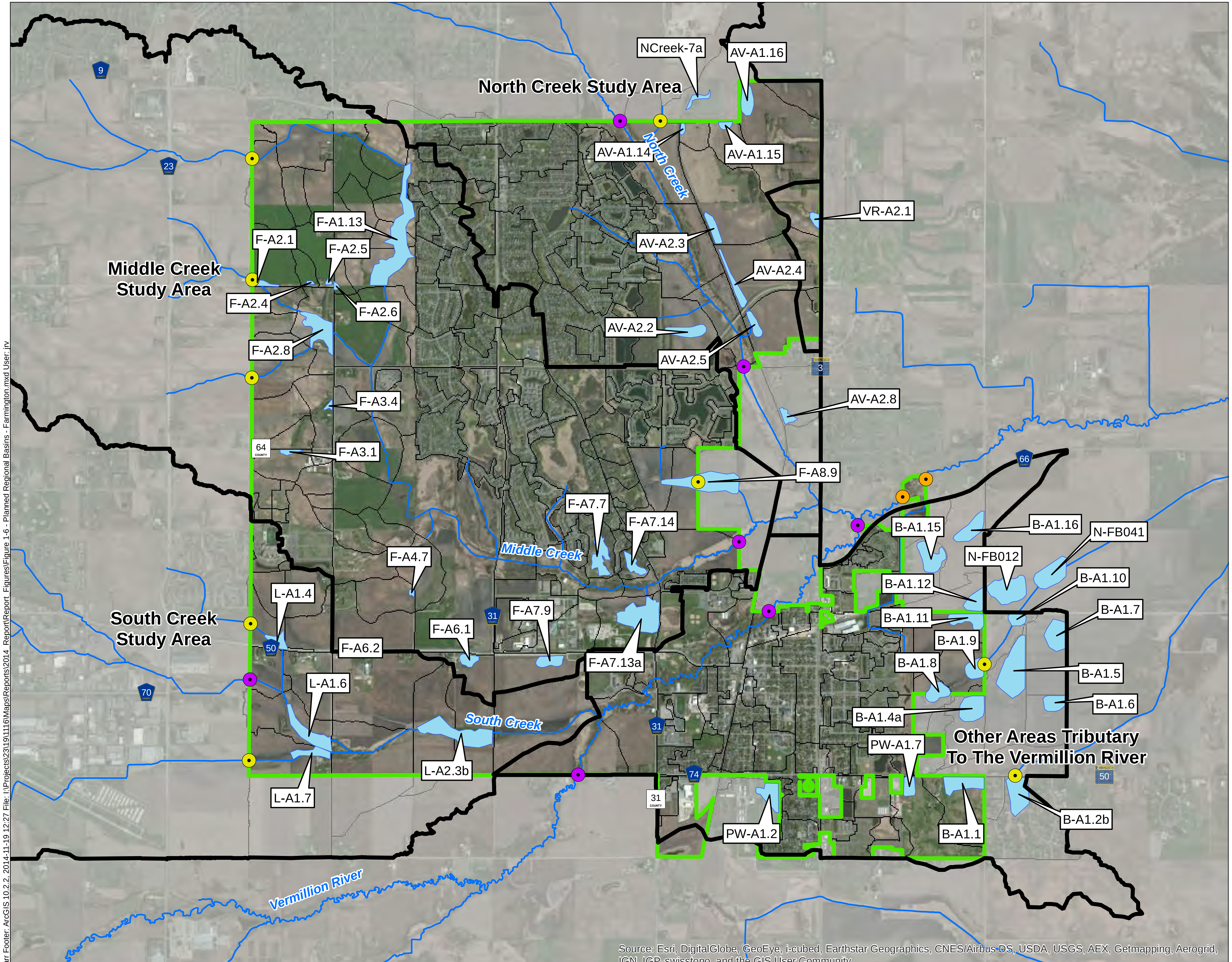
Figure 1-5

FUTURE CONDITIONS LAND USE

1.2.2 Storm Sewer and Pond Updates

Planned storm sewer pipes and regional stormwater ponds within the City of Farmington were taken from Appendix B of the 2008 Farmington LSWMP. These are shown in Figure 1-6. Pond outlet details, pipe sizes, and storage-elevation curves were taken from the proposed conditions HydroCAD models provided by the City. Outlet structures listed in the LSWMP were assumed to be typical 48-inch-diameter overflow structures.

A total of 16 regional stormwater basins were added to the Middle Creek subwatershed, nine were added to the North Creek subwatershed, four were added along South Creek, and 18 were added to the other areas tributary to the Vermillion River.



City of Farmington
Major Subwatersheds
Subwatersheds
Planned Regional Basin*
Rivers and Streams

Tributary Drainage Area

0-10 square miles
10-67.5 square miles
67.5-170 square miles
170-225 square miles

*Basin is assumed to be located at the watershed outlet.

NCL-85 Planned Basin Name

Feet
3,000 0 3,000

BARR

Figure 1-6

PLANNED REGIONAL BASINS

1.3 Precipitation Data

The 4-day design event was identified by the VRWJPO as the critical event for the Vermillion River watershed, and used to estimate peak flows and total runoff volumes at community standard locations. Two different 4-day design events were simulated with the XP-SWMM model. The first event was based primarily on precipitation depths published in Technical Paper 40 (TP40). The second was based on precipitation depths published in Atlas 14. The following sections present the rainfall depths used to develop the design events simulated with the XP-SWMM model.

1.3.1 Technical Paper 40 Rainfall Depths

The design event used in the XP-SWMM model is developed by combining precipitation totals from shorter duration storm events that have an equal return period to create the hyetograph for the overall 4-day event. The 4-day point precipitation totals are included in Table 1-4. The precipitation totals for the 2-, 10-, 50-, and 100-year return periods were defined in the U.S. Army Corps of Engineers (USACE) July 1998 study of the Vermillion River. This study used Technical Paper 40, Technical Paper 49, and the National Weather Service Hydro-35 to determine the point precipitation for each return frequency. The precipitation totals for the 1-year return period were calculated for the 2009 study of the Vermillion River based on precipitation values defined by the 1998 study of the Vermillion River.

Table 1-4 Hypothetical Rainfall Event Point Precipitation from Technical Paper 40 (inches)

	Return Frequency				
Duration	1 Year	2 Year	10 Year	50 Year	100 Year
5 minutes	0.4	0.43	0.59	0.76	0.84
15 minutes	0.7	0.84	1.2	1.6	1.7
1 hour	1.1	1.4	2.1	2.7	3.0
2 hours	1.3	1.7	2.5	3.2	3.5
3 hours	1.45	1.8	2.7	3.5	3.9
6 hours	1.7	2.1	3.2	4.0	4.5
12 hours	2.02	2.5	3.7	4.7	5.3
24 hours	2.2	2.8	4.2	5.4	6.0
2 days	2.6	3.3	4.8	6.3	7.0
4 days	3.2	4.0	5.6	7.5	8.3

Frequency-based rainfall distributions (hyetographs) were developed using the alternating-block method and precipitation depths from the shorter duration storms that have been spatially adjusted based on the analyzed drainage area (HEC-HMS User's Manual, USACE 2000). The design event hyetograph was developed so that the peak of the storm occurs at the center with decreasing intensities on either end. Following this methodology, critical storm events of lesser duration are nested in the overall 4-day event distribution for similar drainage areas. Consequently, only one design event is required to obtain critical flows throughout the watershed (i.e., the drainage area of any subwatershed is irrelevant because the critical duration storm event for each subwatershed is nested within the 4-day precipitation hyetograph.). As shown in Figure 1-7, design events of shorter duration and similar drainage area are nested within the 4-day hyetographs used as the design event precipitation input in the XP-SWMM model. This methodology is similar to the methodology used to develop the standard SCS Type II 24-hour storm hyetograph; therefore, the 4-day frequency-based design storm has similar peak intensity to the SCS Type II 24-hour design event and shorter duration frequency-based storms as shown in Figure 1-8.

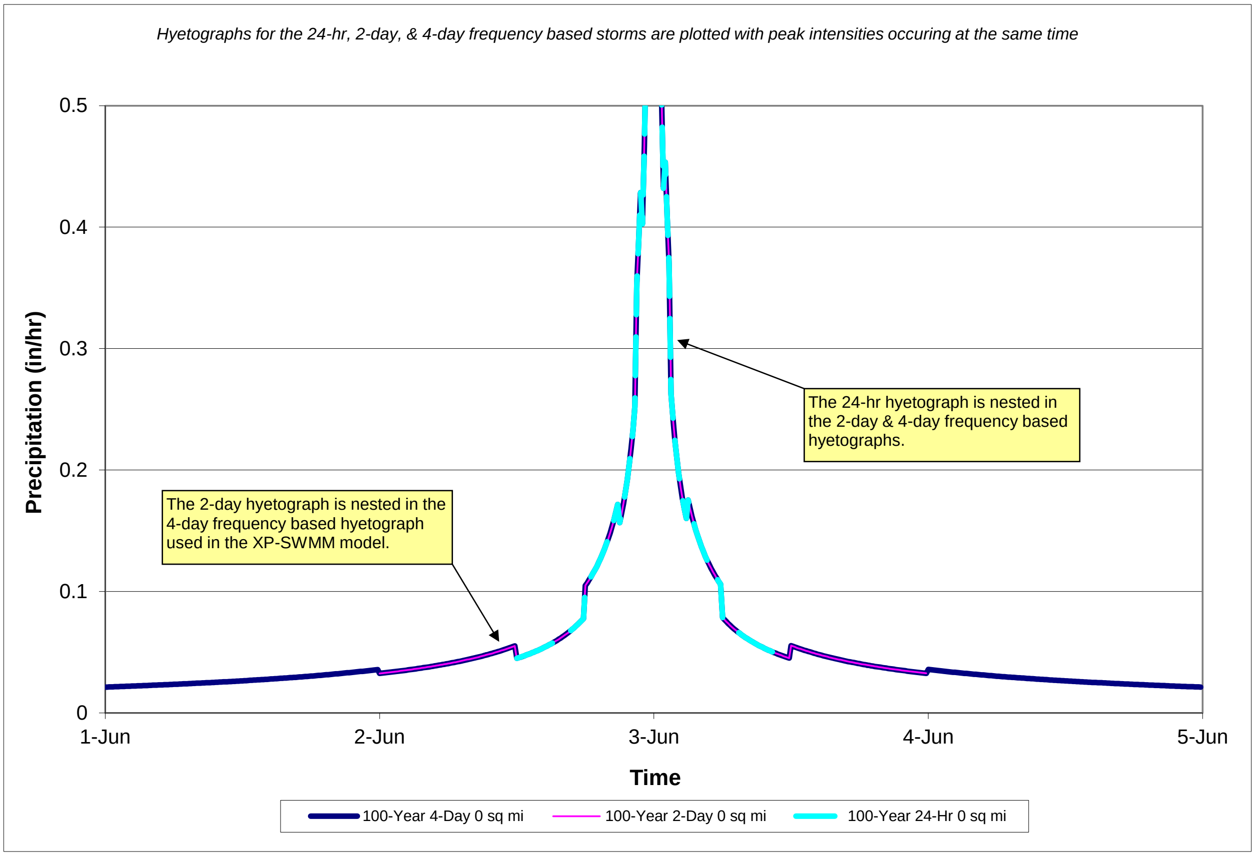


Figure 1-7 Nested Frequency-Based Storms of Shorter Duration Based on TP40 Precipitation

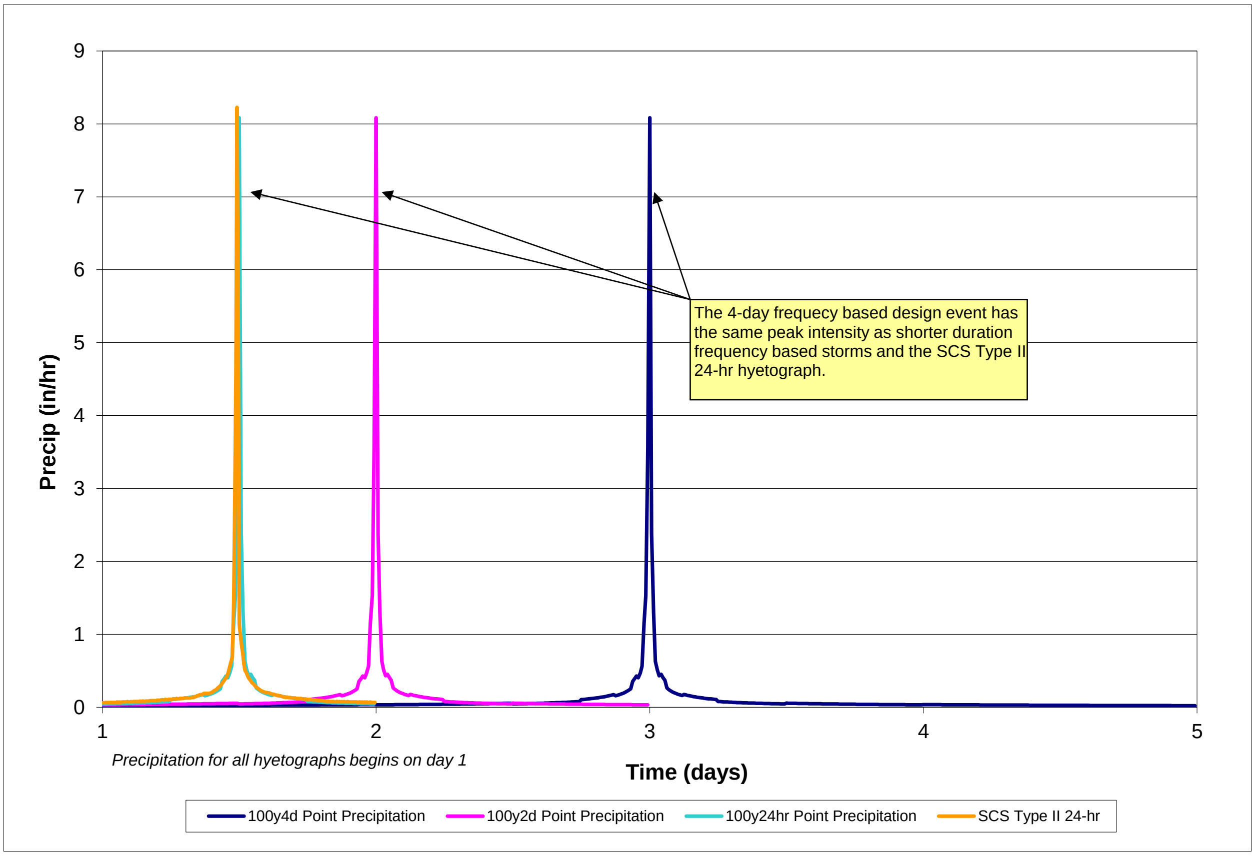


Figure 1-8 Frequency-Based and SCS Type II Peak Intensity Using TP40 Precipitation

1.3.2 Atlas 14 Rainfall Depths

In 2013 the National Oceanic and Atmospheric Administration (NOAA) released Atlas 14, Volume 8, which revised precipitation frequency estimates for 11 Midwestern states, including Minnesota. The estimates serve as an update to the U.S. Weather Bureau's *Technical Paper No. 40* (TP40), published in 1961, which was the primary source for precipitation depths used in the 2009 Vermillion River XP-SWMM model. The Atlas 14 rainfall estimates were developed for individual rainfall monitoring stations with long, consistent periods of record. After estimates were developed for individual stations, they were interpolated between stations to account for the spatial variability of rainfall depths.

Since Atlas 14 rainfall depths are interpolated spatially, rainfall estimates can vary across an area as large as the Vermillion River watershed. Therefore, it is important to characterize the spatial variability of precipitation estimates before selecting values to use for developing hyetographs for the hydrologic model.

Five locations, shown in Figure 1-9, were selected to characterize the spatial variability of Atlas 14 rainfall depths within the Vermillion River watershed. Precipitation depth-duration curves for each location were developed for the 100-year event and are shown in Figure 1-10. The five depth-duration curves are very similar, indicating that there is little spatial variability in the 100-year rainfall depth over the Vermillion

River watershed and suggesting that a single representative location within the watershed can be used to select precipitation depths. Depth-duration curves for the 1-, 2-, 10-, and 50-year events (not shown) are also very similar throughout the watershed. This indicates that a single representative location within the watershed can be used to select rainfall depths for the other modeled events.

The Atlas 14 dataset includes the Farmington precipitation monitoring station (NWS Cooperative Station ID 21-2737), shown in Figure 1-9, which is centrally located within the Vermillion River watershed. As shown in Figure 1-10, the largest difference in rainfall depth between the Farmington station and any of the watershed extents is 0.18 inches.

Because the Farmington station is centrally located in the watershed and the Atlas 14 rainfall depths vary little across the watershed, Atlas 14 rainfall depths from the Farmington station were selected to develop rainfall distributions for the Vermillion River XP-SWMM model. The 4-day precipitation depths from the Farmington monitoring station are included in Table 1-5.

Table 1-5 Hypothetical Rainfall Event Point Precipitation from Atlas 14 (inches)

	Return Frequency				
Duration	**1 Year**	**2 Year**	**10 Year**	**50 Year**	**100 Year**
5 minutes	0.35	0.42	0.64	0.92	1.05
10 minutes	0.52	0.62	0.94	1.35	1.54
15 minutes	0.63	0.75	1.15	1.64	1.88
30 minutes	0.89	1.06	1.64	2.37	2.72
1 hour	1.16	1.38	2.18	3.27	3.81
2 hours	1.43	1.70	2.71	4.17	4.91
3 hours	1.59	1.89	3.04	4.77	5.67
6 hours	1.86	2.20	3.55	5.60	6.68
12 hours	2.13	2.49	3.88	5.96	7.04
24 hours	2.46	2.80	4.16	6.29	7.41
2 days	2.85	3.18	4.51	6.65	7.79
3 days	3.12	3.45	4.83	6.99	8.14
4 days	3.33	3.69	5.12	7.31	8.45

The rainfall precipitation depths from the Farmington monitoring station were used to develop rainfall hyetographs following current guidance suggested by the Minnesota Department of Transportation and the Minnesota Department of Natural Resources for developing hyetographs using Atlas 14 precipitation depths. This methodology is consistent with the methodology used to develop design rainfall hyetographs for the VRWJPO XP-SWMM model, although the resulting hyetograph is “stepped” rather than smoothed, as shown in Figure 1-11.

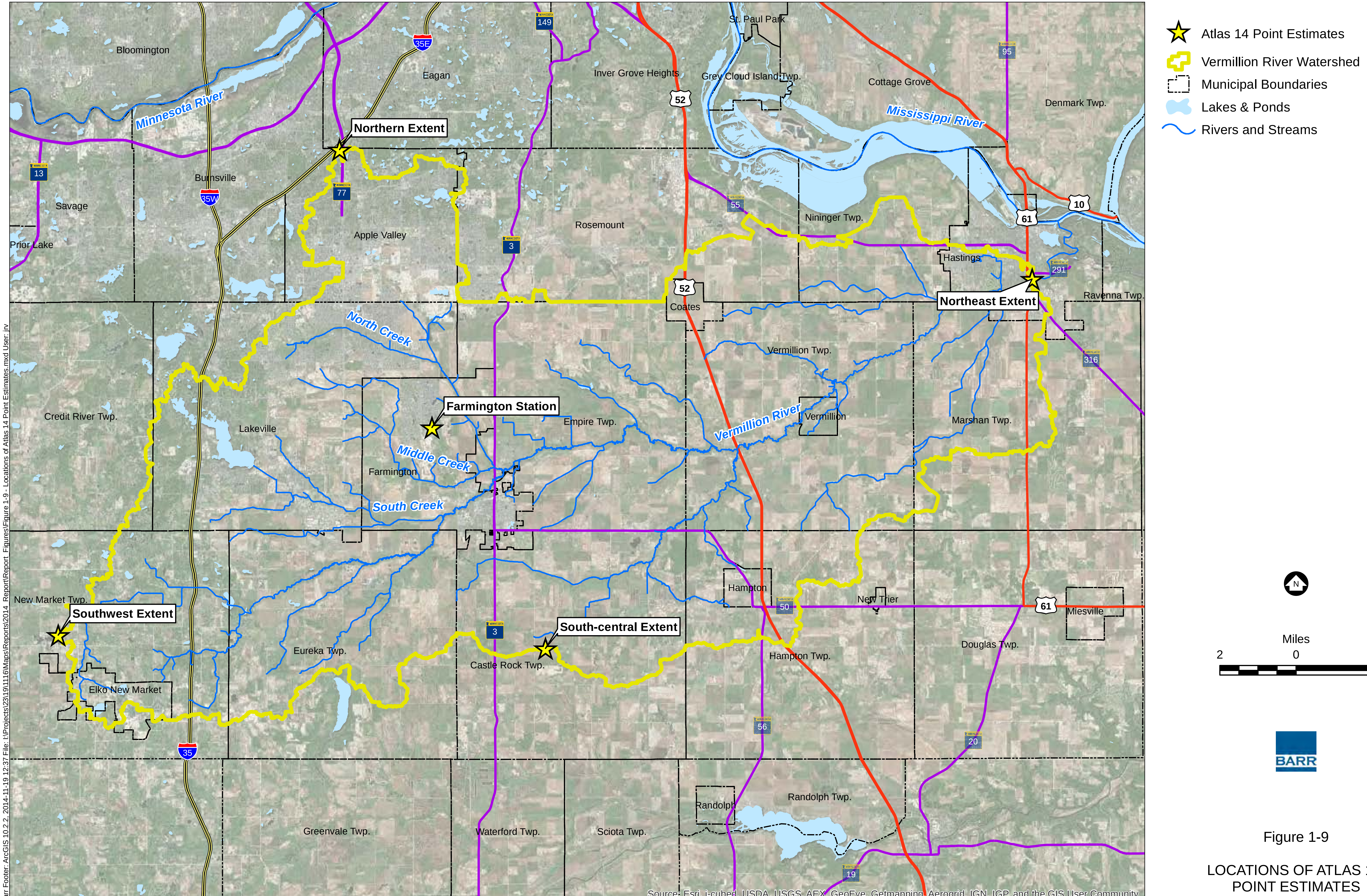


Figure 1-9

LOCATIONS OF ATLAS 14 POINT ESTIMATES

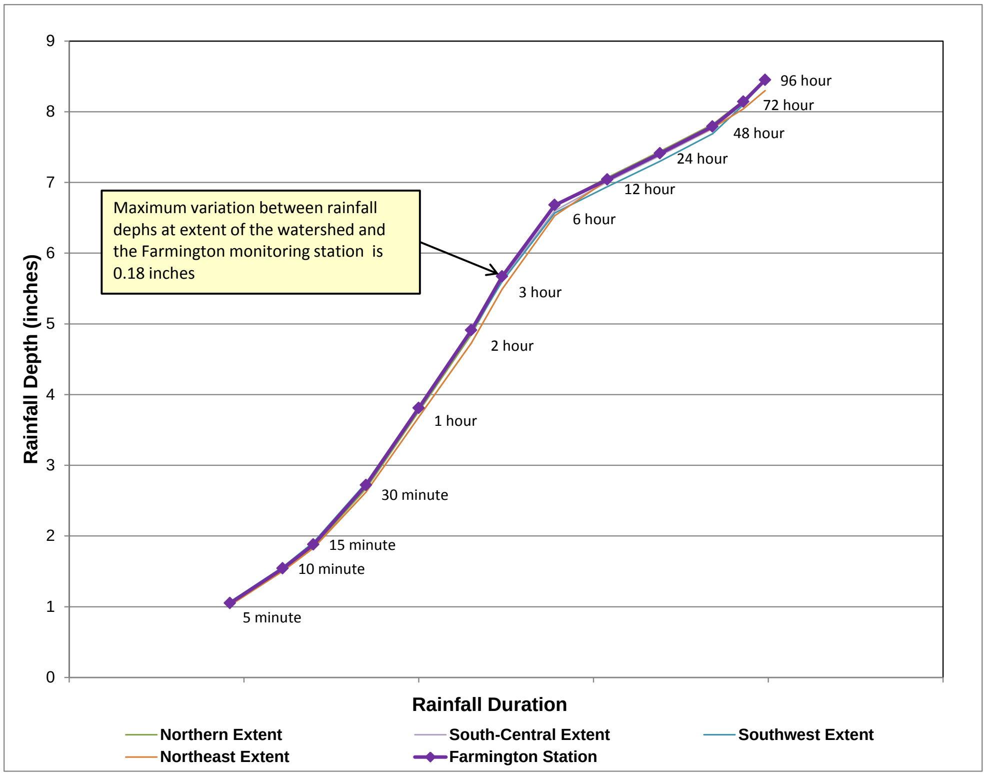


Figure 1-10 Atlas 14 100-Year Rainfall Depth-Duration Curves at Locations within the Vermillion River Watershed

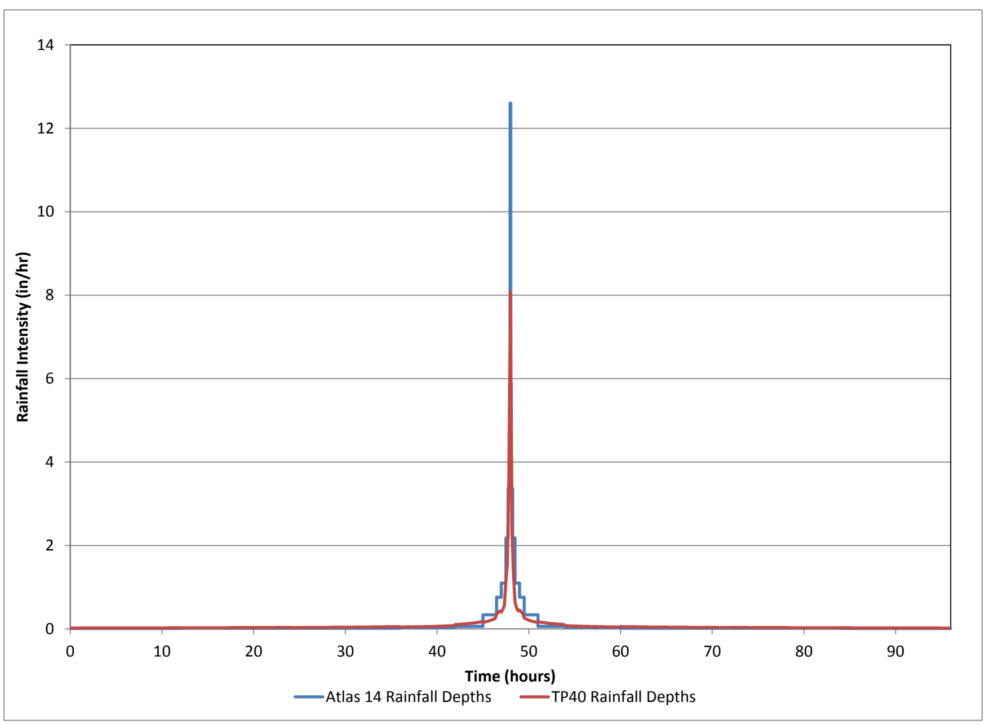


Figure 1-11 Comparison of Frequency-Based Rainfall Events Using Rainfall Depths from Technical Paper 40 and Atlas 14

2.0 Modeling Results

The XP-SWMM model was used to simulate three different combinations of development conditions and rainfall depths. First, the model was updated to include the trunk storm sewer system and development ponds included in the Farmington and Lakeville LSWMPs. The updated model was used to simulate the 4-day event based on rainfall depths published in TP40. Peak discharge rates and runoff volumes from the updated model were compared to the 2010 VRWJPO XP-SWMM model at community standard locations. Differences between the two models are reviewed and presented in Section 2.1.

The second simulation was performed using the updated existing-condition model to simulate the 4-day event based on rainfall depths published in both Atlas 14 and TP40. The differences in peak discharge rates and runoff volumes between the two models at community standard locations were reviewed to quantify the impact of using the larger rainfall depths published in Atlas 14. These are presented in Section 2.2.

Finally, the updated model was revised to reflect future development conditions, including future land use and the planned regional stormwater basins from Farmington's LSWMP. The future-conditions model was used to evaluate peak flow rates and runoff volumes at community standard locations using the rainfall depths published in Atlas 14. Simulation results for the future-conditions model were compared to the updated existing-conditions model that also used Atlas 14 rainfall depths. The differences between these two models are presented in Section 2.3.

2.1 Existing-Conditions Technical Paper 40 Rainfall Depths

Following updates to the XP-SWMM model, the 1-, 2-, 10-, 50-, and 100-year design event peak flow rates and runoff volumes were compared to the VRWJPO standards at each of the 61 community standard locations. Discussion of model results is provided in the following sections.

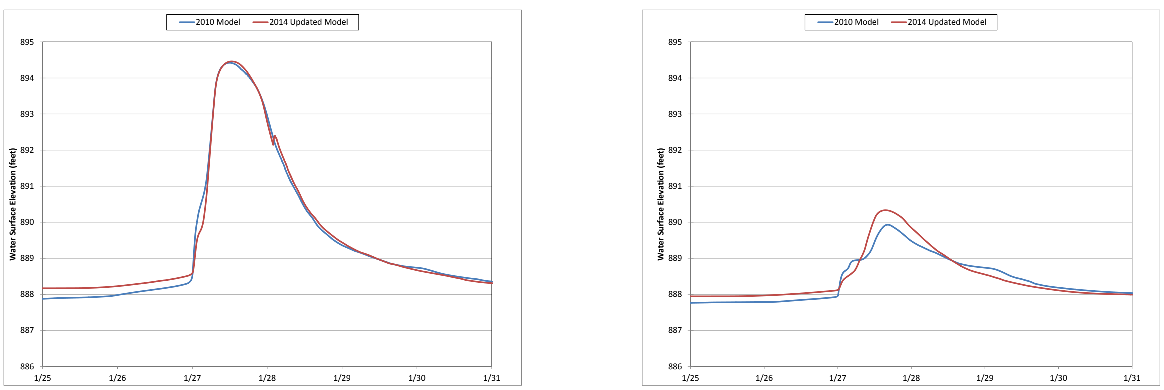
2.1.1 Water Surface Elevation at VRWJPO Gage Locations

Updates to the XP-SWMM model consisted of subdividing watersheds to simulate runoff to stormwater ponds within Farmington and adding storm sewer and culvert information provided by the City to connect stormwater ponds to the creeks. These updates can affect the amount of runoff volume reaching the creek and the timing of the runoff hydrograph.

Watershed divisions developed for the 2010 model were generally between 0.25 and 2.0 square miles. The watershed size used in the 2010 model was selected to simulate hydrologic processes in watersheds of similar scale. Uniform adjustments to hydrologic parameters may not be applicable if the subwatershed size varies significantly. The 238 subwatersheds from the 2010 model were subdivided into 932 subwatersheds varying is size from 0.5 to 815 acres (.0001 to 1.3 square miles). The average updated watershed size was 45 acres (< 0.1 square miles).

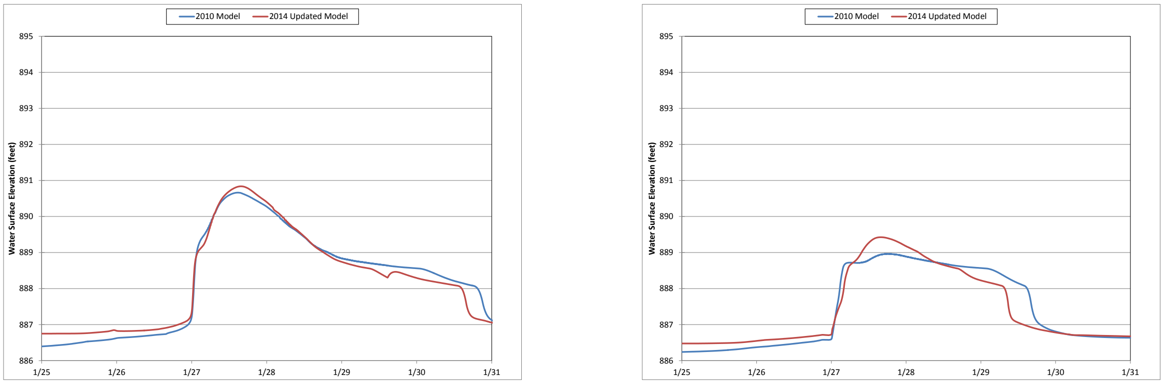
In addition, detail was added in the stormwater system. The 2010 model included 849 links to route the stormwater through the system. These represented culverts, pipe segments, or creek reaches. The updated model includes more than 3,000 links to route stormwater from ponds within Lakeville and Farmington to the creek. As a result, the hydrograph timing may be affected as the updated model routes flow through the main stormwater conveyance system within Farmington.

To verify that the updated model could still be considered adequately calibrated, simulation results from the model were compared to results from the 2010 model at four gage stations used to calibrate the 2010 model. Figure 2-1 through Figure 2-4 show a comparison of simulation results for the 100-year and 2-year events. In general, the simulation results from the updated 2014 model match simulation results from the 2010 model for both the overall timing of the hydrograph and peak water surface elevation. Differences that precede the beginning of the rainfall event can be attributed to a constant inflow from Apple Valley due to a shorter "warm-up" period used for the 2010 model. For the 2-year event the maximum difference in peak water surface elevation of 0.7 feet occurs at the USGS gage (gage 05345000) and for the 100-year event the maximum difference of 0.2 feet occurs at MC-801. The simulation results indicate that—based on the available information—the XP-SWMM model can still be considered calibrated. The small increase in water surface elevation may be attributed to applying hydrologic parameters developed for subwatersheds of a larger scale to subwatersheds with much smaller drainage areas.



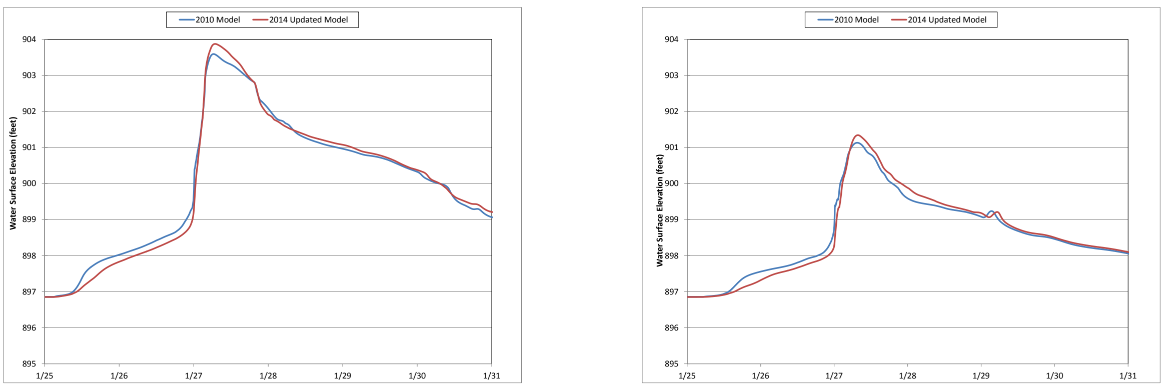
The differences in peak elevation during the 100-year event and the 2-year event are <0.1 feet and 0.4 feet, respectively.

Figure 2-1 2010 XP-SWMM Model and 2014 Updated XP-SWMM Model Simulation Results at Gage NC-808



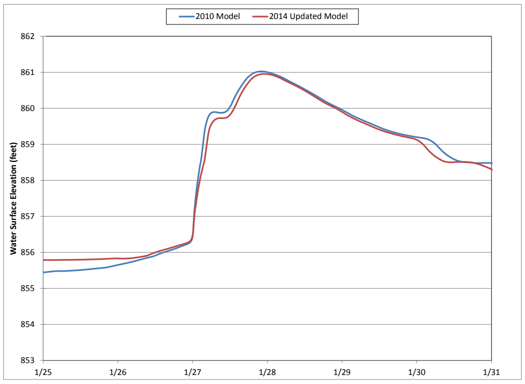
The differences in peak elevation during the 100-year event and the 2-year event are 0.2 feet and 0.5 feet, respectively.

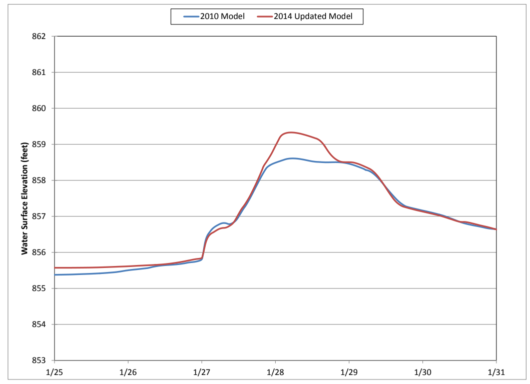
Figure 2-2 2010 XP-SWMM Model and 2014 Updated XP-SWMM Model Simulation Results at Gage MC-801



The differences in peak elevation during the 100-year event and the 2-year event are 0.3 feet and 0.2 feet, respectively.

Figure 2-3 2010 XP-SWMM Model and 2014 Updated XP-SWMM Model Simulation Results at Gage VR-807





The differences in peak elevation during the 100-year event and the 2-year event are -0.1 feet and 0.7 feet, respectively.

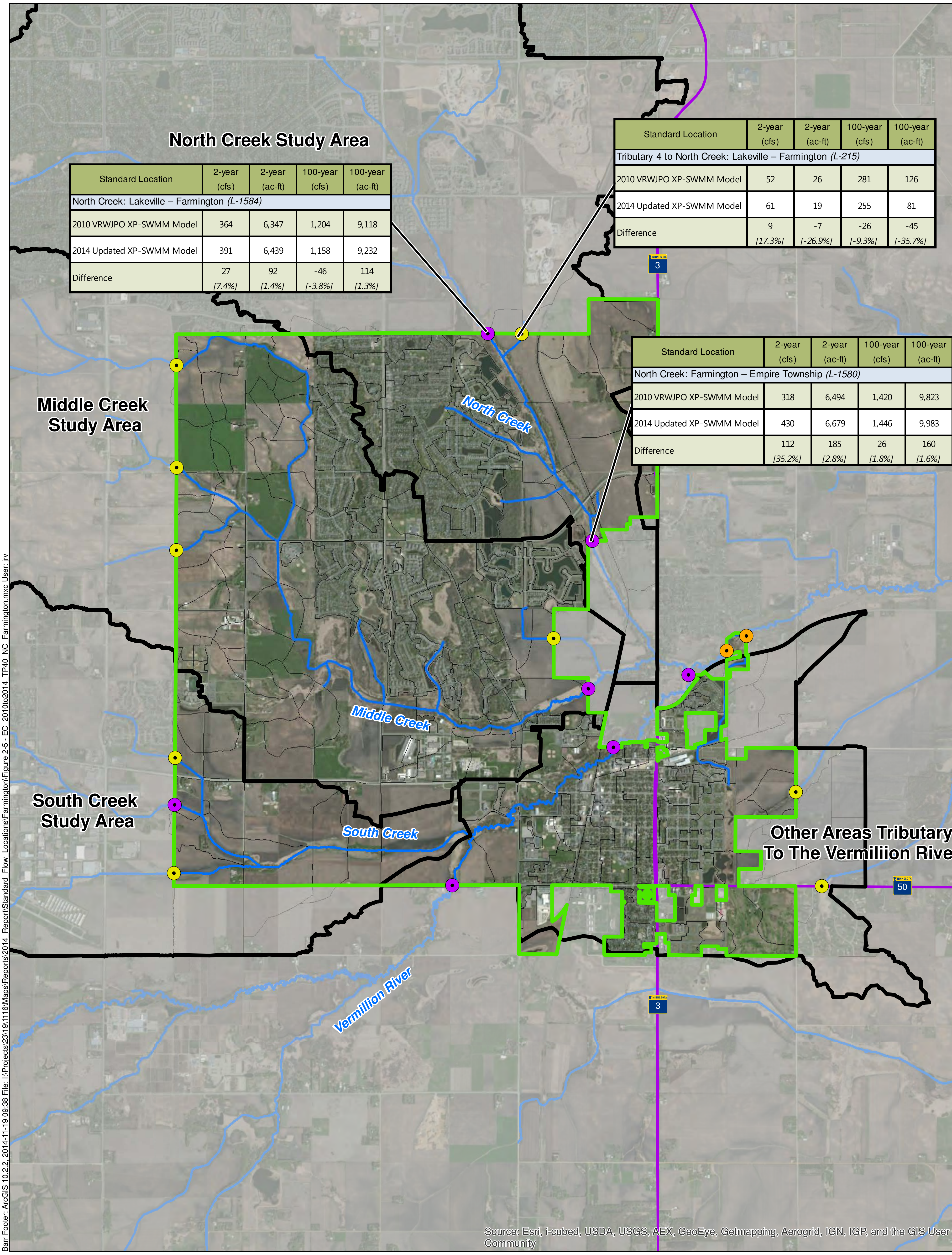
Figure 2-4 2010 XP-SWMM Model and 2014 Updated XP-SWMM Model Simulation Results at USGS Gage

2.1.2 Peak Flow Rates and Runoff Volume at Community Standard Locations

Peak flow rates at community standard locations near the Farmington municipal boundary increased on average by 8% for the 100-year event and 22% for the 2-year event. The largest increase for both events occurred on the Vermillion River at the municipal boundary between Farmington and Empire Township. The largest decrease for both events occurred on Tributary 1 to Middle Creek. These lower flow rates were a result of adding detail to the stormwater system upstream of this community standard location, which reduced the peak discharge.

The largest increase in runoff volume also occurred at the municipal boundary between Farmington and Empire Township; runoff volume increased by 832 acre-feet and 435 acre-feet for the 100-year and 2-year events, respectively. The increase in runoff volume for the 100-year event is equivalent to 0.02 feet or 0.2 inches over the upstream drainage area modified for the model update. This increased volume is a result of two changes to the model. The first is the approach for simulating inflows from Apple Valley and the second is the methodology used to calculate the watershed-width parameters. Both of these changes are discussed later in this section.

The updated peak flow rates and runoff volume at community standard locations near the Farmington municipal boundary are shown in Figure 2-5 through Figure 2-8 for the 2- and 100-year events.



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
North Creek: Lakeville – Farmington *(L-1584)*				
2010 VRWJPO XP-SWMM Model	364	6,347	1,204	9,118
2014 Updated XP-SWMM Model	391	6,439	1,158	9,232
Difference	27 *[7.4%]*	92 *[1.4%]*	-46 *[-3.8%]*	114 *[1.3%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 4 to North Creek: Lakeville – Farmington *(L-215)*				
2010 VRWJPO XP-SWMM Model	52	26	281	126
2014 Updated XP-SWMM Model	61	19	255	81
Difference	9 *[17.3%]*	-7 *[-26.9%]*	-26 *[-9.3%]*	-45 *[-35.7%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
North Creek: Farmington – Empire Township *(L-1580)*				
2010 VRWJPO XP-SWMM Model	318	6,494	1,420	9,823
2014 Updated XP-SWMM Model	430	6,679	1,446	9,983
Difference	112 *[35.2%]*	185 *[2.8%]*	26 *[1.8%]*	160 *[1.6%]*

Barr Footer: ArcGIS 10.2.2, 2014-11-19 09:38 File: I:\Projects\23\19\1116\Maps\Reports\2014_Report\Standard_Flow_Locations\Farmington\Figure 2-5 - EC_2010to2014_TP40_NC_Farmington.mxd User: jrv

City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

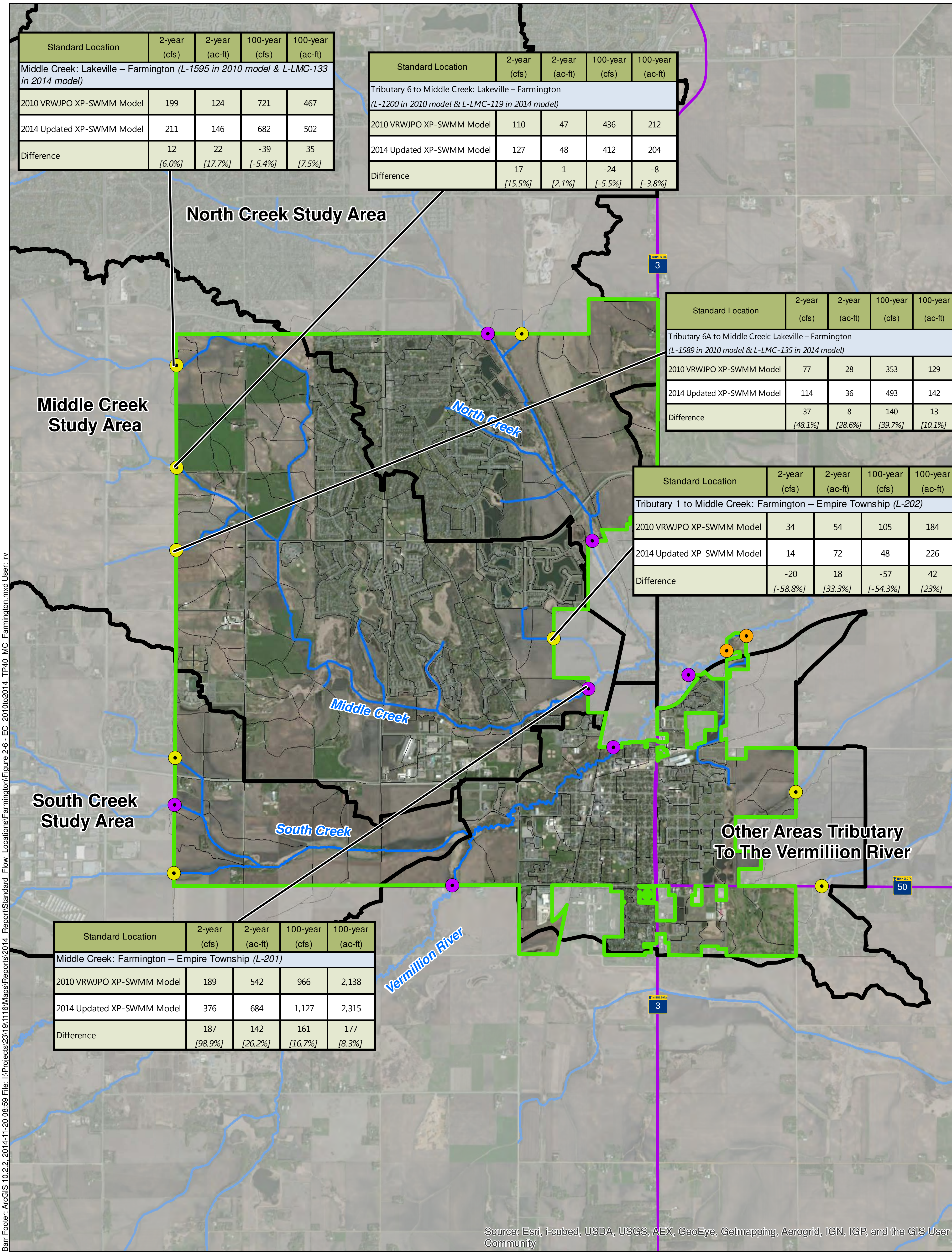
Feet

3,500 0 3,500

BARR

Figure 2-5

NORTH CREEK
EXISTING CONDITIONS
COMPARISONS OF
2010 TO 2014
2-YEAR AND 100-YEAR PEAK
RATES BASED ON TP40 RAINFALL



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Middle Creek: Lakeville – Farmington *(L-1595 in 2010 model & L-LMC-133 in 2014 model)*				
2010 VRWJPO XP-SWMM Model	199	124	721	467
2014 Updated XP-SWMM Model	211	146	682	502
Difference	12 *[6.0%]*	22 *[17.7%]*	-39 *[-5.4%]*	35 *[7.5%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6 to Middle Creek: Lakeville – Farmington *(L-1200 in 2010 model & L-LMC-119 in 2014 model)*				
2010 VRWJPO XP-SWMM Model	110	47	436	212
2014 Updated XP-SWMM Model	127	48	412	204
Difference	17 *[15.5%]*	1 *[2.1%]*	-24 *[-5.5%]*	-8 *[-3.8%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6A to Middle Creek: Lakeville – Farmington *(L-1589 in 2010 model & L-LMC-135 in 2014 model)*				
2010 VRWJPO XP-SWMM Model	77	28	353	129
2014 Updated XP-SWMM Model	114	36	493	142
Difference	37 *[48.1%]*	8 *[28.6%]*	140 *[39.7%]*	13 *[10.1%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 1 to Middle Creek: Farmington – Empire Township *(L-202)*				
2010 VRWJPO XP-SWMM Model	34	54	105	184
2014 Updated XP-SWMM Model	14	72	48	226
Difference	-20 *[-58.8%]*	18 *[33.3%]*	-57 *[-54.3%]*	42 *[23%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Middle Creek: Farmington – Empire Township *(L-201)*				
2010 VRWJPO XP-SWMM Model	189	542	966	2,138
2014 Updated XP-SWMM Model	376	684	1,127	2,315
Difference	187 *[98.9%]*	142 *[26.2%]*	161 *[16.7%]*	177 *[8.3%]*

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City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

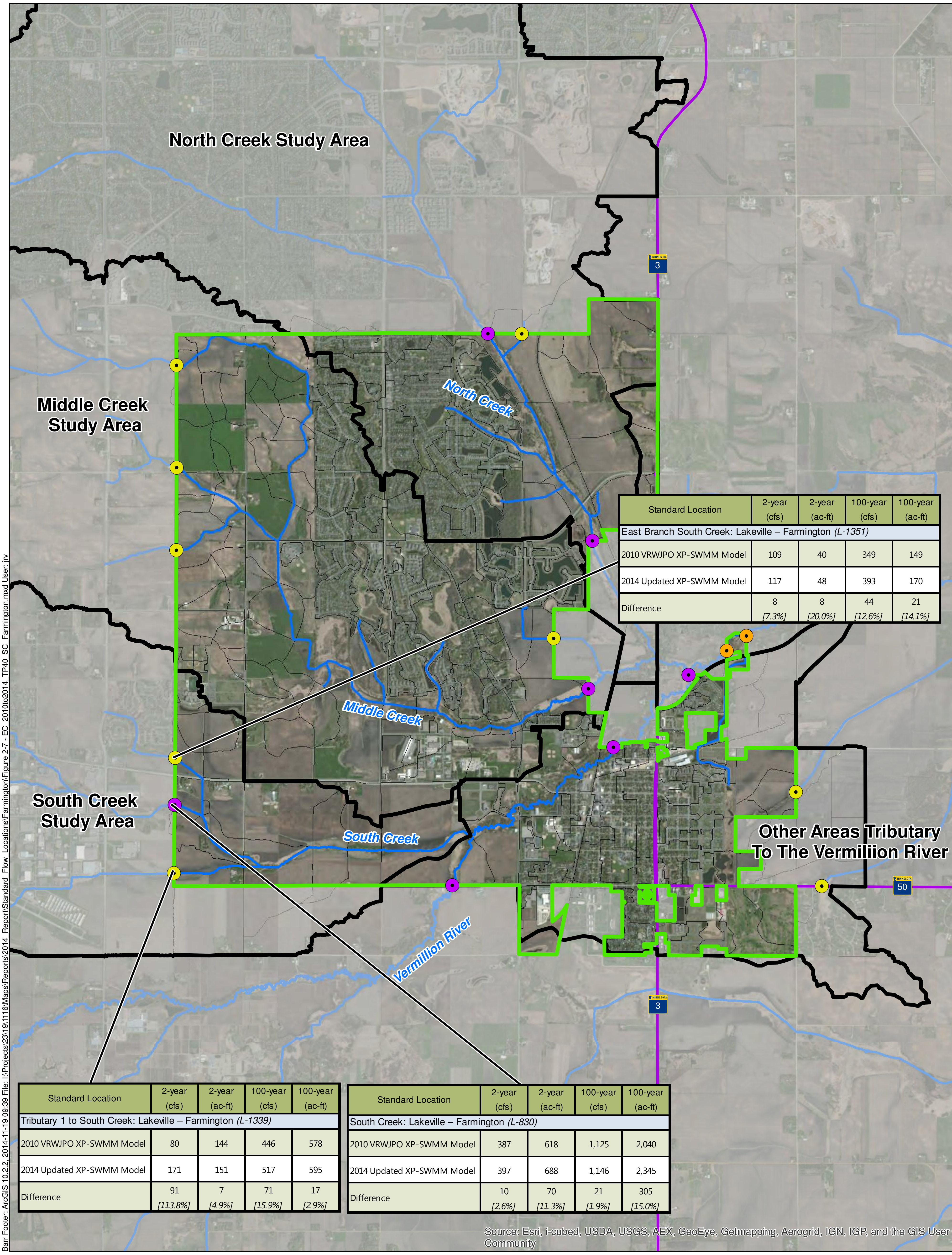
- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

Feet
3,500 0 3,500

BARR

Figure 2-6

MIDDLE CREEK
EXISTING CONDITIONS
COMPARISONS OF
2010 TO 2014
2-YEAR AND 100-YEAR PEAK
RATES BASED ON TP40 RAINFALL



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
East Branch South Creek: Lakeville – Farmington *(L-1351)*				
2010 VRWJPO XP-SWMM Model	109	40	349	149
2014 Updated XP-SWMM Model	117	48	393	170
Difference	8 *[7.3%]*	8 *[20.0%]*	44 *[12.6%]*	21 *[14.1%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 1 to South Creek: Lakeville – Farmington *(L-1339)*				
2010 VRWJPO XP-SWMM Model	80	144	446	578
2014 Updated XP-SWMM Model	171	151	517	595
Difference	91 *[113.8%]*	7 *[4.9%]*	71 *[15.9%]*	17 *[2.9%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
South Creek: Lakeville – Farmington *(L-830)*				
2010 VRWJPO XP-SWMM Model	387	618	1,125	2,040
2014 Updated XP-SWMM Model	397	688	1,146	2,345
Difference	10 *[2.6%]*	70 *[11.3%]*	21 *[1.9%]*	305 *[15.0%]*

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City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

N

Feet

3,500 0 3,500

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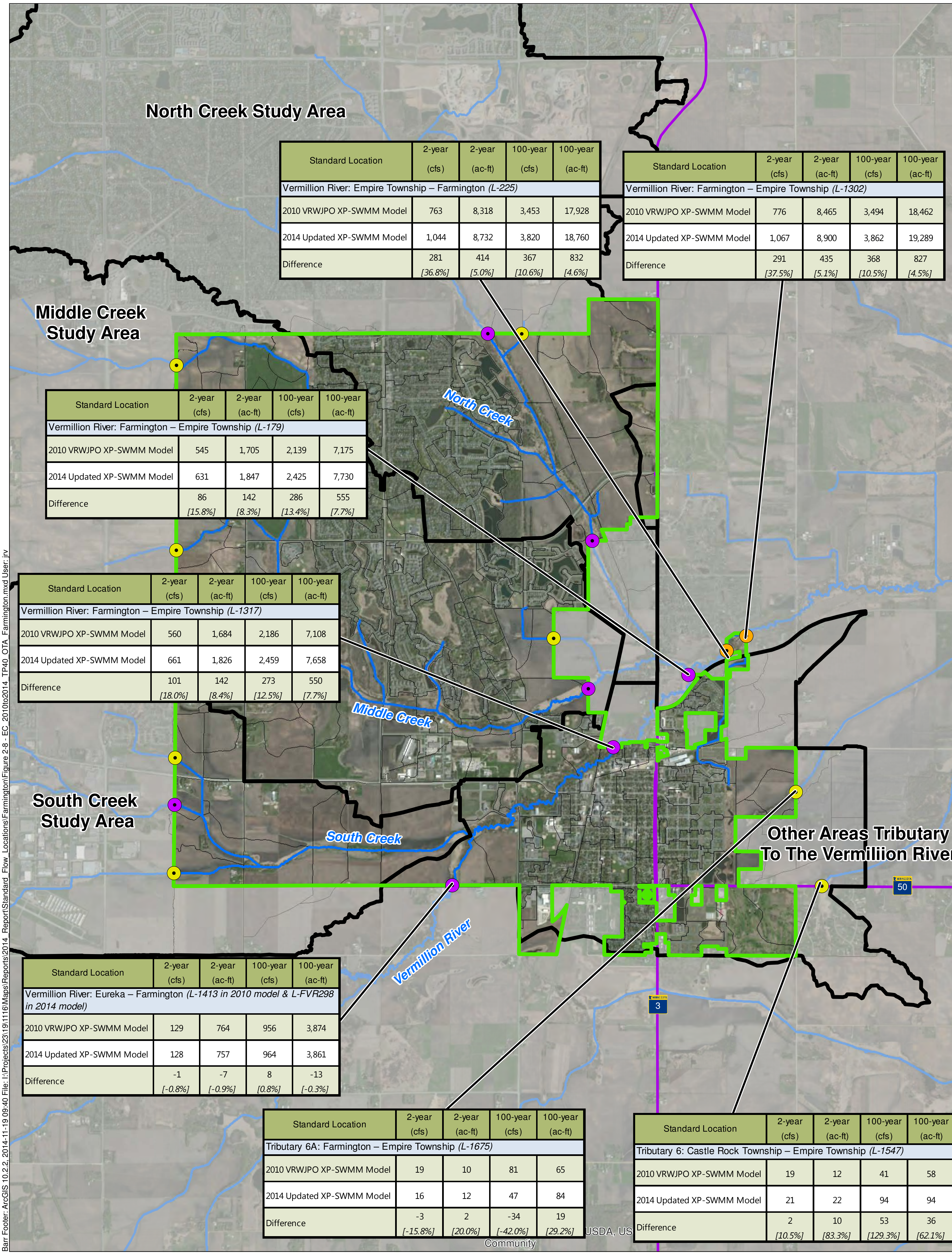
Figure 2-7

SOUTH CREEK EXISTING CONDITIONS COMPARISONS OF 2010 TO 2014 2-YEAR AND 100-YEAR PEAK RATES BASED ON TP40 RAINFALL



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Empire Township – Farmington *(L-225)*				
2010 VRWJPO XP-SWMM Model	763	8,318	3,453	17,928
2014 Updated XP-SWMM Model	1,044	8,732	3,820	18,760
Difference	281 *[36.8%]*	414 *[5.0%]*	367 *[10.6%]*	832 *[4.6%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-1302)*				
2010 VRWJPO XP-SWMM Model	776	8,465	3,494	18,462
2014 Updated XP-SWMM Model	1,067	8,900	3,862	19,289
Difference	291 *[37.5%]*	435 *[5.1%]*	368 *[10.5%]*	827 *[4.5%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-179)*				
2010 VRWJPO XP-SWMM Model	545	1,705	2,139	7,175
2014 Updated XP-SWMM Model	631	1,847	2,425	7,730
Difference	86 *[15.8%]*	142 *[8.3%]*	286 *[13.4%]*	555 *[7.7%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-1317)*				
2010 VRWJPO XP-SWMM Model	560	1,684	2,186	7,108
2014 Updated XP-SWMM Model	661	1,826	2,459	7,658
Difference	101 *[18.0%]*	142 *[8.4%]*	273 *[12.5%]*	550 *[7.7%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Eureka – Farmington *(L-1413 in 2010 model & L-FVR298 in 2014 model)*				
2010 VRWJPO XP-SWMM Model	129	764	956	3,874
2014 Updated XP-SWMM Model	128	757	964	3,861
Difference	-1 *[-0.8%]*	-7 *[-0.9%]*	8 *[0.8%]*	-13 *[-0.3%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6A: Farmington – Empire Township *(L-1675)*				
2010 VRWJPO XP-SWMM Model	19	10	81	65
2014 Updated XP-SWMM Model	16	12	47	84
Difference	-3 *[-15.8%]*	2 *[20.0%]*	-34 *[-42.0%]*	19 *[29.2%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6: Castle Rock Township – Empire Township *(L-1547)*				
2010 VRWJPO XP-SWMM Model	19	12	41	58
2014 Updated XP-SWMM Model	21	22	94	94
Difference	2 *[10.5%]*	10 *[83.3%]*	53 *[129.3%]*	36 *[62.1%]*

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City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

Feet

3,500 0 3,500

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Figure 2-8

OTHER TRIBUTARY AREAS
EXISTING CONDITIONS
COMPARISONS OF
2010 TO 2014
2-YEAR AND 100-YEAR PEAK
RATES BASED ON TP40 RAINFALL

At some community standard locations the peak discharge rate or runoff volume differed from the 2010 XP-SWMM model. These locations are described below:

North Creek Community Standard Locations *(L-1580 & L-1584)* – The increase in runoff volume at the North Creek community standard locations is primarily a result of how inflows from Apple Valley are simulated in the XP-SWMM model. There are two locations that hydraulically connect the City of Apple Valley to the downstream watershed. One connection is the pumped outlet from Cobblestone Lake; the other is the outlet from McNamara Pond. Subwatersheds were delineated to both of these outlets at the beginning of the original model development in 2009. However, the Cities of Apple Valley and Lakeville reached an agreement defining the maximum allowable flow rates at these locations prior to calibrating the model. Therefore, the flow standards are based on the agreement between Apple Valley and Lakeville, rather than the modeled flows provided by Apple Valley. In 2009, the agreed-upon flow rates were reviewed by the Independent Technical Review (ITR) Committee and incorporated into the final flow standards. Based on discussions with the ITR Committee during the development of the 2009 VRWJPO XP-SWMM model it was determined that Apple Valley inflows would not be incorporated into the calibration or validation events. This is because no flow was generated from either Apple Valley subwatershed during the selected calibration events. The inflows are entered into the models as a constant discharge rather than a stormwater runoff hydrograph. Therefore, it takes time for the constant inflows to fill channel storage and reach an equilibrium water surface elevation along North Creek and the Vermillion River.

The 2009 VRWJPO XP-SWMM model was run for 4 days before the rainfall event to allow base flows in the Vermillion River (on the order of 10-50 cfs, depending on location) to reach an equilibrium. The 4-day-initialization period was selected during model calibration and left constant for simulation of the design events. However, the updated modeling suggests a 4-day-initialization period is not enough time for the constant inflows from Apple Valley to reach equilibrium throughout the entire Vermillion River model. To allow the constant discharge to reach equilibrium throughout the model prior to the rainfall event, the initialization period was extended to 24 days. As a result, the updated model simulates additional runoff volume (constant discharge from Apple Valley) at downstream community standard locations.

South Creek Community Standard Locations *(L-1351, L-830, L-1339)* – Runoff volume increased at each of the South Creek community standard locations. The increase in runoff volume is a result of detail added to the XP-SWMM model in this area. In the 2010 model the tributary area upstream of these community standard locations was divided into 22 subwatersheds, varying from 67–5,033 acres. The 2014 updated model subdivides the area into 310 subwatersheds varying from 0.5–817 acres. The difference in runoff volume is a result of applying consistent methodology to calculate watershed width for both large and small watersheds. For the 2014 updated model, watershed width was calculated as watershed area divided by longest flow path, as described in Section 1.1.1.4, the same methodology used for the 2010 model. Following this methodology, as the number of subwatersheds increases, the total width (i.e., the sum of individual subwatershed widths for all watersheds) also increases. As discussed in Section 1.1.1.4, as watershed width increases there is a small increase in runoff rate and volume from a given subwatershed. These small increases result in larger cumulative volume differences at the community standard locations. In general, as more detail is incorporated into the XP-SWMM model (i.e., the more a subwatershed is subdivided) the larger the difference in runoff volume. This is especially true in undeveloped portions of the watershed, where increased runoff rates result in less infiltration and abstraction. Therefore, the largest difference in runoff volume at the community standard locations occurs on South Creek at L-830, which has the largest tributary area.

Middle Creek Community Standard Location (*L-LMC-133)* – The reduction in peak discharge rate at this location for the 100-year event was a result of adding additional detail to the stormwater system in Lakeville. The 2009 XP-SWMM model included a single subwatershed for the drainage area upstream of Dodd Boulevard., which resulted in Dodd Boulevard overtopped during the 100-year event. The 2014 model includes four subwatersheds, including two additional stormwater ponds upstream of Dodd Boulevard. When the additional detail was added to the model Dodd Boulevard did not overtop and the peak discharge rate for the 100-year event at the community standard location decreased. The discharge rate for the 2-year event was similar because Dodd Boulevard did not overtop in either the 2009 or the 2014 XP-SWMM model.

Tributary 1 to Middle Creek Community Standard Location *(L-202)* – The reduction in peak discharge rate at this location for the 2- and 100-year events is a result of adding additional detail to the stormwater system in Farmington. The subwatershed upstream of the community standard location was subdivided into 11 subwatersheds in the 2014 model and field crossings were added. Based on information provided by the City of Farmington, the field crossing immediately upstream of this standard location is a 15-inch culvert. This restricts flow and reduces the peak discharge at the community standard location.

Middle Creek Community Standard Location *(L-201)* – The runoff volume at this standard location increased by 142 acre-feet and 177 acre-feet for the 2- and 100-year events, respectively. This equates to only 0.2 – 0.3 inches of runoff over the upstream tributary area. Updates made within Lakeville account for increases of 31 acre-feet and 40 acre-feet (2- and 100-year events). The remaining difference results from a decrease in the amount of runoff abstracted and infiltrated during the simulations. This can be attributed to application of the same methodology used for the 2010 model (Section 1.1.1.4), which increased watershed width.

Vermillion River Community Standard Locations *(L-1317, L-179, L-225, and L-1302)* – The runoff volume increases at community standard locations on the Vermillion River for the 2- and 100-year events. This is a result of updates made on Middle Creek, South Creek, and North Creek.

Tributary 6A Community Standard Location *(L-1675)* – The reduction in peak discharge rate at this standard location is a result of updating the subwatershed divisions—reducing the tributary area from 156 acres in the 2010 model to 134 acres in the updated model. An increase in runoff volume for the 100-year event is a result of overflow from the west. Additional detail was added to the Prairie Waterway in Farmington. During the 100-year event stormwater from the pond in subwatershed PG-A1.12b overtops the embankment and flows to Tributary 6A.

Tributary 6 Community Standard Location *(L-1547)* – The increase in runoff volume and peak discharge at this standard location is a result of updating the subwatershed divisions—increasing the tributary area from 252 acres in the 2010 model to 350 acres in the updated model.

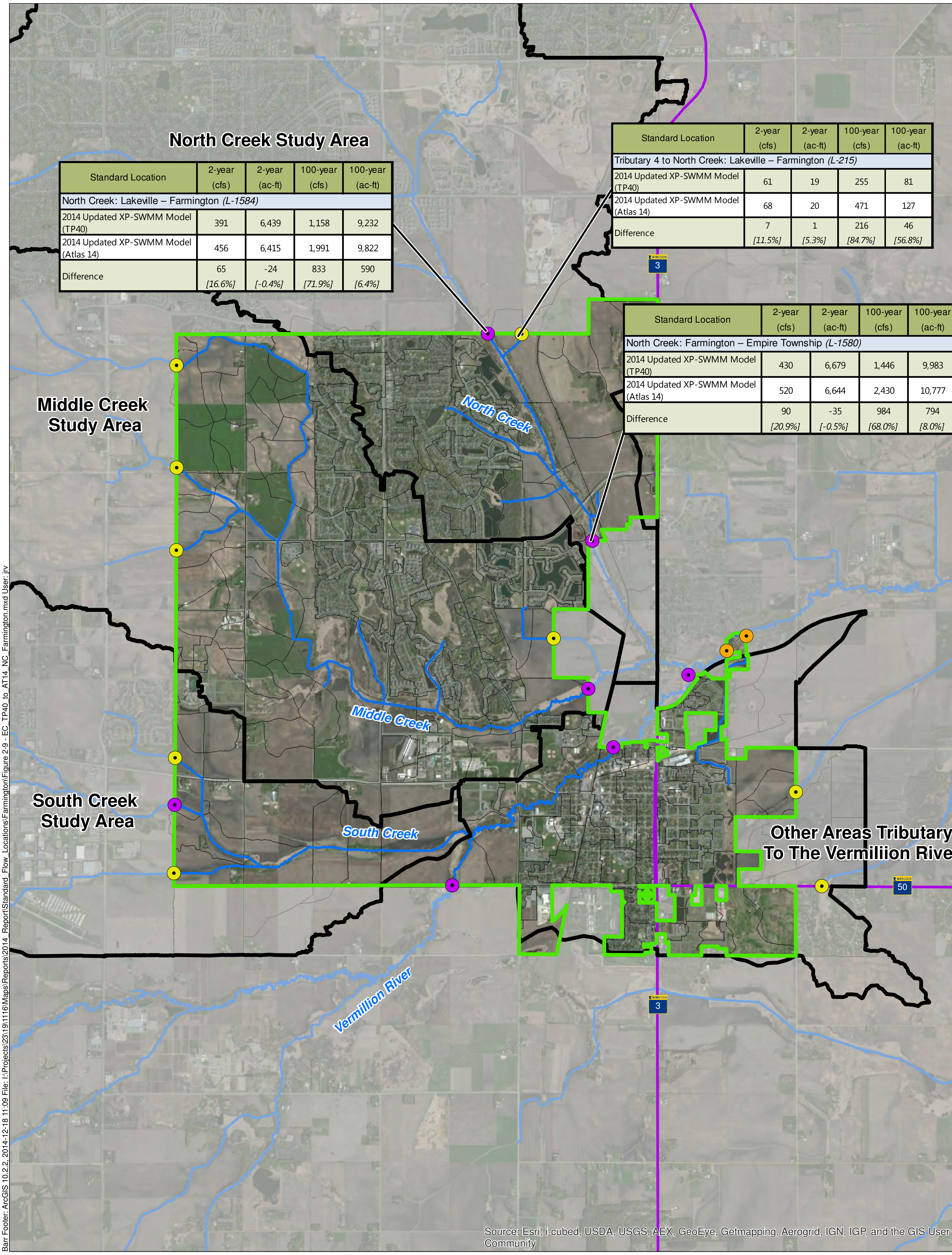
2.2 Existing Conditions – Atlas 14 Rainfall Depths

Following revisions to the XP-SWMM model, the 1-, 2-, 10-, 50-, and 100-year design events were simulated based on the rainfall depths published in Atlas 14. The peak discharge rates and runoff volumes for the Atlas 14 design events were compared to the peak discharge rates and runoff volumes calculated using the TP40 design events with the updated XP-SWMM model. A comparison of peak flow and runoff volume results is included in Appendix C. Appendix C also includes figures illustrating peak flows and total runoff volumes at each VRWJPO community standard location. The following sections provide additional discussion regarding the Atlas 14 model results.

2.2.1 Peak Flow Rates and Runoff Volume at Community Standard Locations

Peak flow rates increased throughout the Vermillion River watershed as a result of applying the rainfall depths published in Atlas 14. On average, the peak discharge at community standard locations near the Farmington municipal boundary increased by 105 percent for the 100-year event. The increase was less for more frequent (smaller) rainfall events. For these events, the differences between the rainfall depths published in TP40 and Atlas 14 are smaller. The Atlas 14 simulation results were validated by comparing the simulated results to the discharge-frequency curve at the USGS monitoring station and comparing the simulated 100-year peak flow rates along the Vermillion River to the peak flow rates used for the 2010 Dakota County DFIRM.

The updated peak flow rates at community standard locations for the 2- and 100-year events based on Atlas 14 rainfall depths are summarized in Figure 2-9 through Figure 2-12. Results for the 1-year, 10-year, and 50-year events are included in Appendix C.



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
North Creek: Lakeville – Farmington *(L-1584)*				
2014 Updated XP-SWMM Model (TP40)	391	6,439	1,158	9,232
2014 Updated XP-SWMM Model (Atlas 14)	456	6,415	1,991	9,822
Difference	65 *[16.6%]*	-24 *[-0.4%]*	833 *[71.9%]*	590 *[6.4%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 4 to North Creek: Lakeville – Farmington *(L-215)*				
2014 Updated XP-SWMM Model (TP40)	61	19	255	81
2014 Updated XP-SWMM Model (Atlas 14)	68	20	471	127
Difference	7 *[11.5%]*	1 *[5.3%]*	216 *[84.7%]*	46 *[56.8%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
North Creek: Farmington – Empire Township *(L-1580)*				
2014 Updated XP-SWMM Model (TP40)	430	6,679	1,446	9,983
2014 Updated XP-SWMM Model (Atlas 14)	520	6,644	2,430	10,777
Difference	90 *[20.9%]*	-35 *[-0.5%]*	984 *[68.0%]*	794 *[8.0%]*

City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

Feet

3,500 0 3,500

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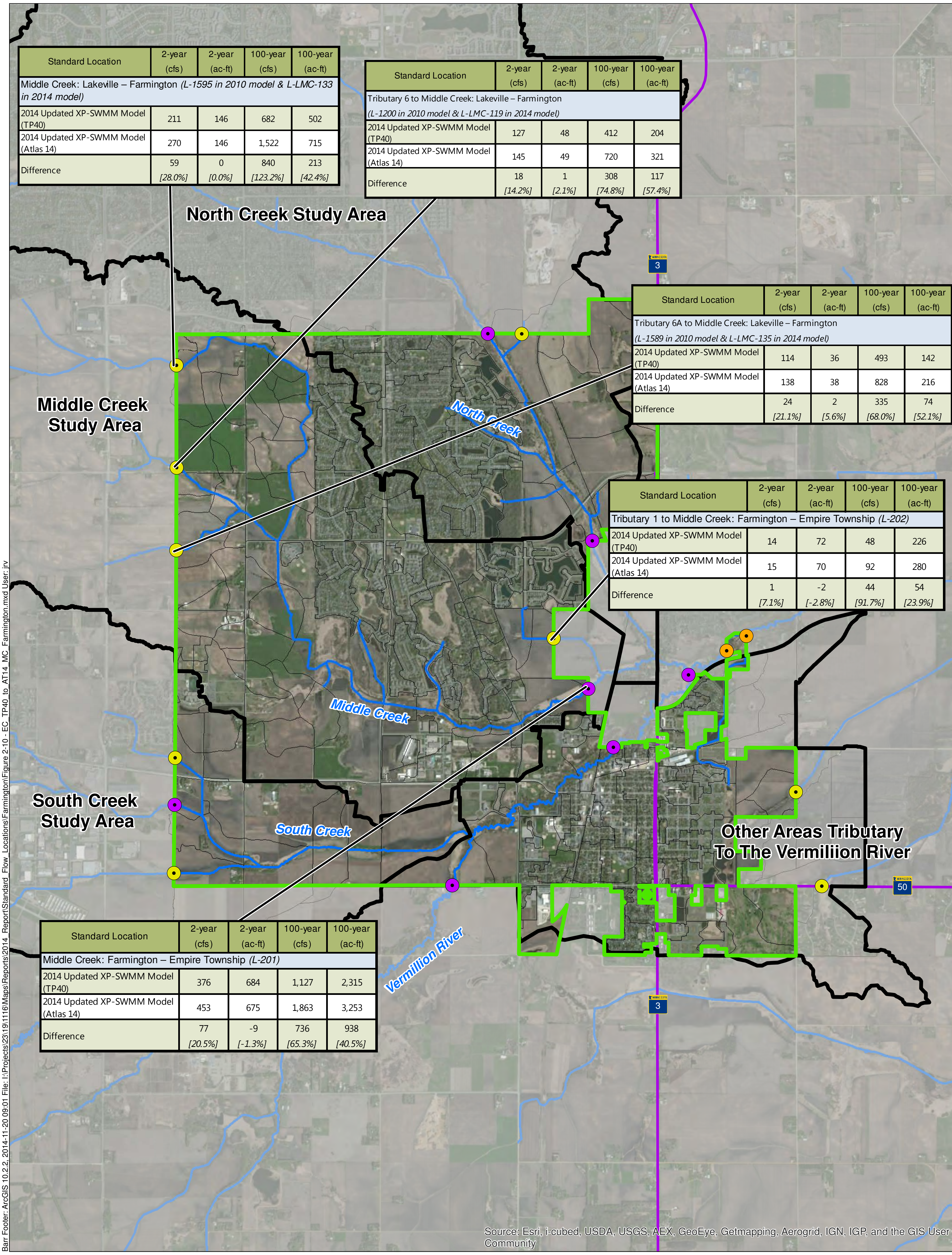
Figure 2-9

NORTH CREEK EXISTING CONDITIONS COMPARISONS OF 2-YEAR AND 100-YEAR PEAK RATES FOR TP40 TO ATLAS14



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Middle Creek: Lakeville – Farmington *(L-1595 in 2010 model & L-LMC-133 in 2014 model)*				
2014 Updated XP-SWMM Model (TP40)	211	146	682	502
2014 Updated XP-SWMM Model (Atlas 14)	270	146	1,522	715
Difference	59 *[28.0%]*	0 *[0.0%]*	840 *[123.2%]*	213 *[42.4%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6 to Middle Creek: Lakeville – Farmington *(L-1200 in 2010 model & L-LMC-119 in 2014 model)*				
2014 Updated XP-SWMM Model (TP40)	127	48	412	204
2014 Updated XP-SWMM Model (Atlas 14)	145	49	720	321
Difference	18 *[14.2%]*	1 *[2.1%]*	308 *[74.8%]*	117 *[57.4%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6A to Middle Creek: Lakeville – Farmington *(L-1589 in 2010 model & L-LMC-135 in 2014 model)*				
2014 Updated XP-SWMM Model (TP40)	114	36	493	142
2014 Updated XP-SWMM Model (Atlas 14)	138	38	828	216
Difference	24 *[21.1%]*	2 *[5.6%]*	335 *[68.0%]*	74 *[52.1%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 1 to Middle Creek: Farmington – Empire Township *(L-202)*				
2014 Updated XP-SWMM Model (TP40)	14	72	48	226
2014 Updated XP-SWMM Model (Atlas 14)	15	70	92	280
Difference	1 *[7.1%]*	-2 *[-2.8%]*	44 *[91.7%]*	54 *[23.9%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Middle Creek: Farmington – Empire Township *(L-201)*				
2014 Updated XP-SWMM Model (TP40)	376	684	1,127	2,315
2014 Updated XP-SWMM Model (Atlas 14)	453	675	1,863	3,253
Difference	77 *[20.5%]*	-9 *[-1.3%]*	736 *[65.3%]*	938 *[40.5%]*

Barr Footer: ArcGIS 10.2.2, 2014-11-20 09:01 File: I:\Projects\23\19\1116\Maps\Reports\2014_Report\Standard_Flow_Locations\Farmington\Figure 2-10 - EC_TP40_to_AT14_MC_Farmington.mxd User: jrv

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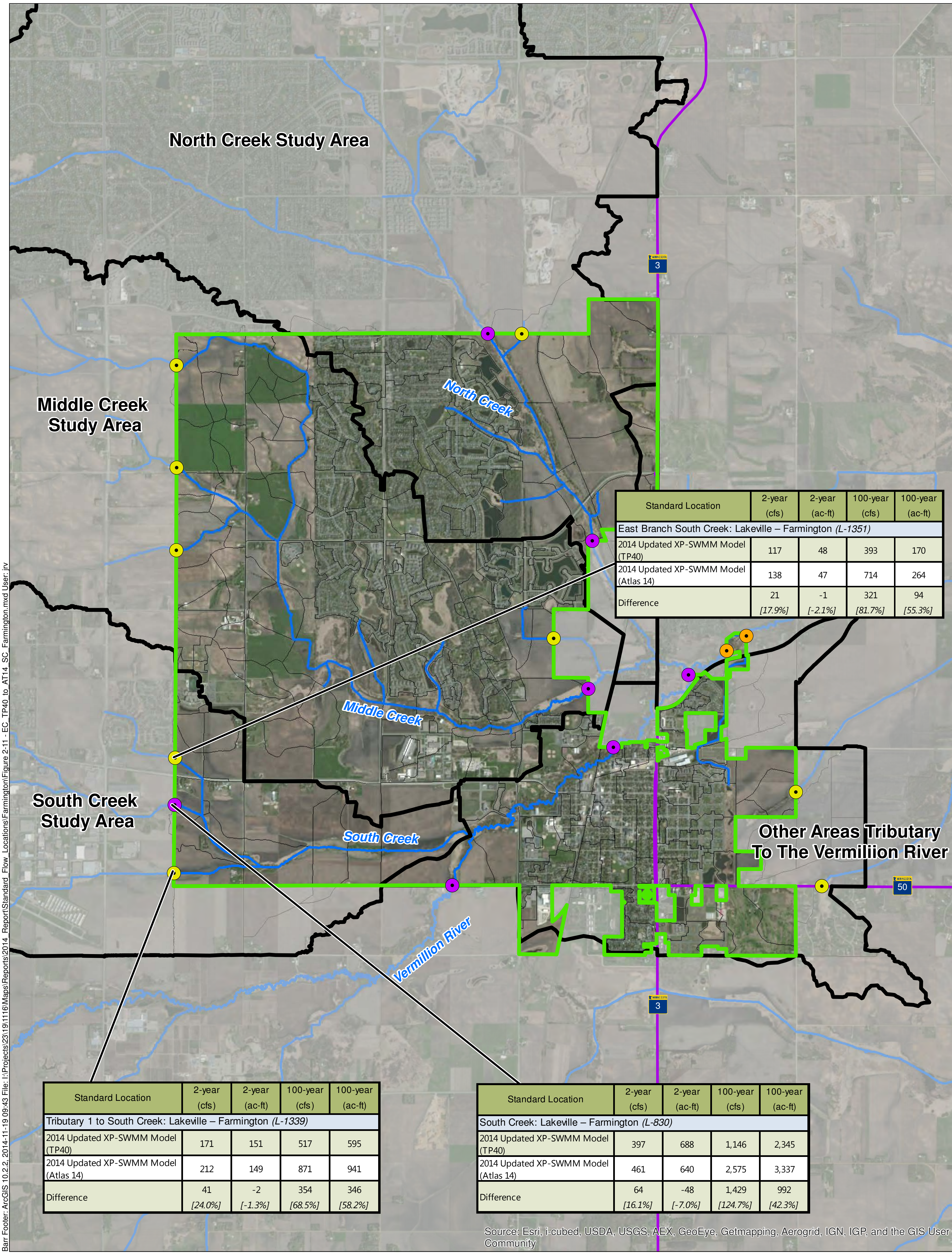
Figure 2-10

MIDDLE CREEK EXISTING CONDITIONS COMPARISONS OF 2-YEAR AND 100-YEAR PEAK RATES FOR TP40 TO ATLAS14



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
East Branch South Creek: Lakeville – Farmington *(L-1351)*				
2014 Updated XP-SWMM Model (TP40)	117	48	393	170
2014 Updated XP-SWMM Model (Atlas 14)	138	47	714	264
Difference	21 *[17.9%]*	-1 *[-2.1%]*	321 *[81.7%]*	94 *[55.3%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 1 to South Creek: Lakeville – Farmington *(L-1339)*				
2014 Updated XP-SWMM Model (TP40)	171	151	517	595
2014 Updated XP-SWMM Model (Atlas 14)	212	149	871	941
Difference	41 *[24.0%]*	-2 *[-1.3%]*	354 *[68.5%]*	346 *[58.2%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
South Creek: Lakeville – Farmington *(L-830)*				
2014 Updated XP-SWMM Model (TP40)	397	688	1,146	2,345
2014 Updated XP-SWMM Model (Atlas 14)	461	640	2,575	3,337
Difference	64 *[16.1%]*	-48 *[-7.0%]*	1,429 *[124.7%]*	992 *[42.3%]*

City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

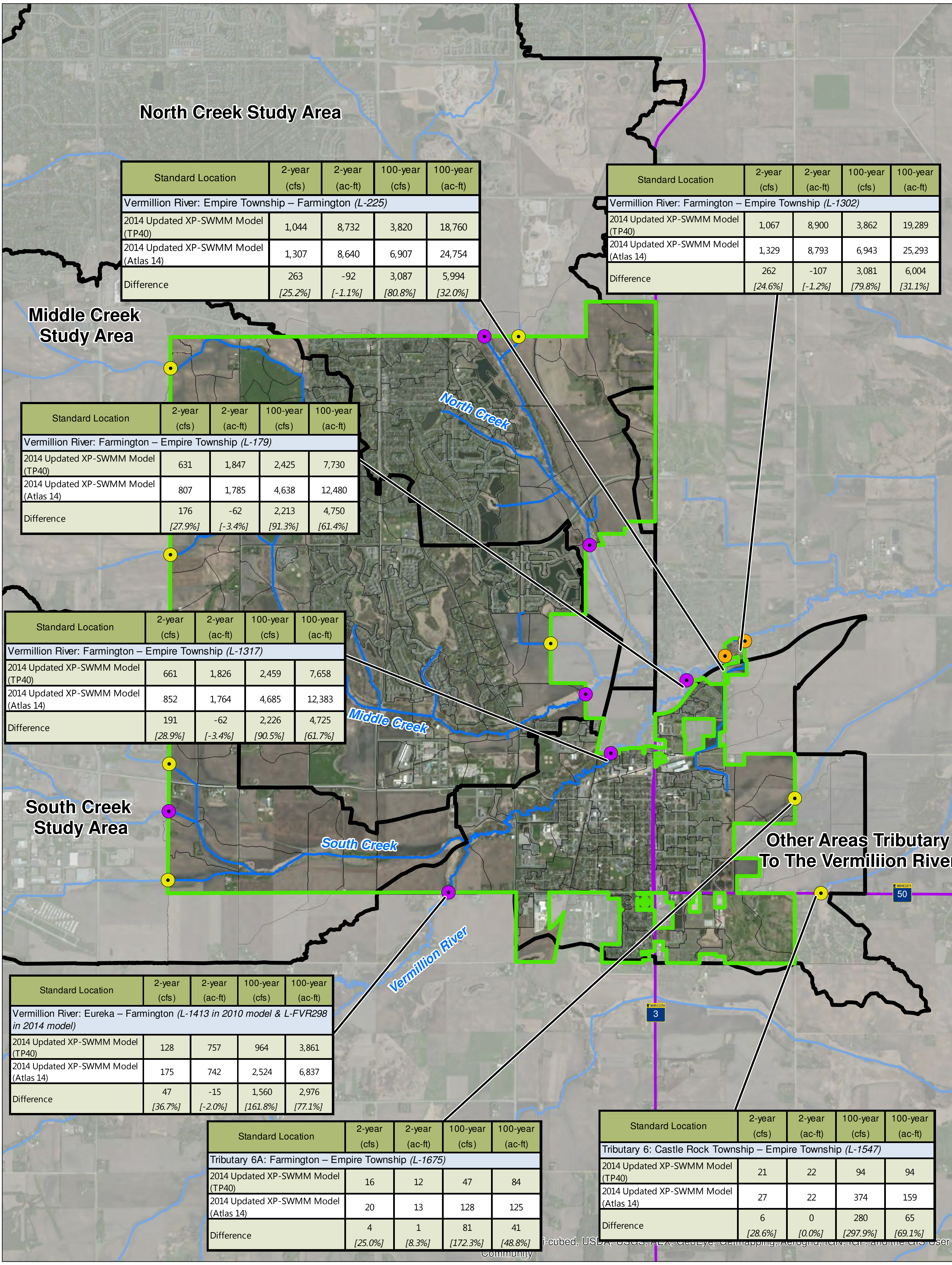
Feet

3,500 0 3,500

BARR

Figure 2-11

SOUTH CREEK EXISTING CONDITIONS COMPARISONS OF 2-YEAR AND 100-YEAR PEAK RATES FOR TP40 TO ATLAS14



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Empire Township – Farmington *(L-225)*				
2014 Updated XP-SWMM Model (TP40)	1,044	8,732	3,820	18,760
2014 Updated XP-SWMM Model (Atlas 14)	1,307	8,640	6,907	24,754
Difference	263 *[25.2%]*	-92 *[-1.1%]*	3,087 *[80.8%]*	5,994 *[32.0%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-1302)*				
2014 Updated XP-SWMM Model (TP40)	1,067	8,900	3,862	19,289
2014 Updated XP-SWMM Model (Atlas 14)	1,329	8,793	6,943	25,293
Difference	262 *[24.6%]*	-107 *[-1.2%]*	3,081 *[79.8%]*	6,004 *[31.1%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-179)*				
2014 Updated XP-SWMM Model (TP40)	631	1,847	2,425	7,730
2014 Updated XP-SWMM Model (Atlas 14)	807	1,785	4,638	12,480
Difference	176 *[27.9%]*	-62 *[-3.4%]*	2,213 *[91.3%]*	4,750 *[61.4%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-1317)*				
2014 Updated XP-SWMM Model (TP40)	661	1,826	2,459	7,658
2014 Updated XP-SWMM Model (Atlas 14)	852	1,764	4,685	12,383
Difference	191 *[28.9%]*	-62 *[-3.4%]*	2,226 *[90.5%]*	4,725 *[61.7%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Eureka – Farmington *(L-1413 in 2010 model & L-FVR298 in 2014 model)*				
2014 Updated XP-SWMM Model (TP40)	128	757	964	3,861
2014 Updated XP-SWMM Model (Atlas 14)	175	742	2,524	6,837
Difference	47 *[36.7%]*	-15 *[-2.0%]*	1,560 *[161.8%]*	2,976 *[77.1%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6A: Farmington – Empire Township *(L-1675)*				
2014 Updated XP-SWMM Model (TP40)	16	12	47	84
2014 Updated XP-SWMM Model (Atlas 14)	20	13	128	125
Difference	4 *[25.0%]*	1 *[8.3%]*	81 *[172.3%]*	41 *[48.8%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6: Castle Rock Township – Empire Township *(L-1547)*				
2014 Updated XP-SWMM Model (TP40)	21	22	94	94
2014 Updated XP-SWMM Model (Atlas 14)	27	22	374	159
Difference	6 *[28.6%]*	0 *[0.0%]*	280 *[297.9%]*	65 *[69.1%]*

City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

Feet
3,500 0 3,500

BARR

Figure 2-12

OTHER TRIBUTARY AREAS EXISTING CONDITIONS COMPARISONS OF 2-YEAR AND 100-YEAR PEAK RATES FOR TP40 TO ATLAS14

2.2.2 Comparison to the Discharge-Frequency Curve at the USGS Monitoring Station

The simulated peak discharge at the USGS monitoring station was compared to the discharge frequency curve developed as part of the 2009 study and updated with data from 2008–2013, as shown in Figure 2-13.

The peak discharges from the Atlas 14 XP-SWMM model are within the 90 percent confidence limits for the 100-year, 50-year, and 10-year events, while the 2-year event plots slightly above the 90 percent confidence limits. By comparison, the discharges calculated by the 2010 VRWJPO XP-SWMM model under-estimate the discharge at the USGS station for the 100-year, 50-year, and 10-year events. In general, the peak flow rates calculated by the updated XP-SWMM model using rainfall depths published in Atlas 14 are within the expected confidence limits.

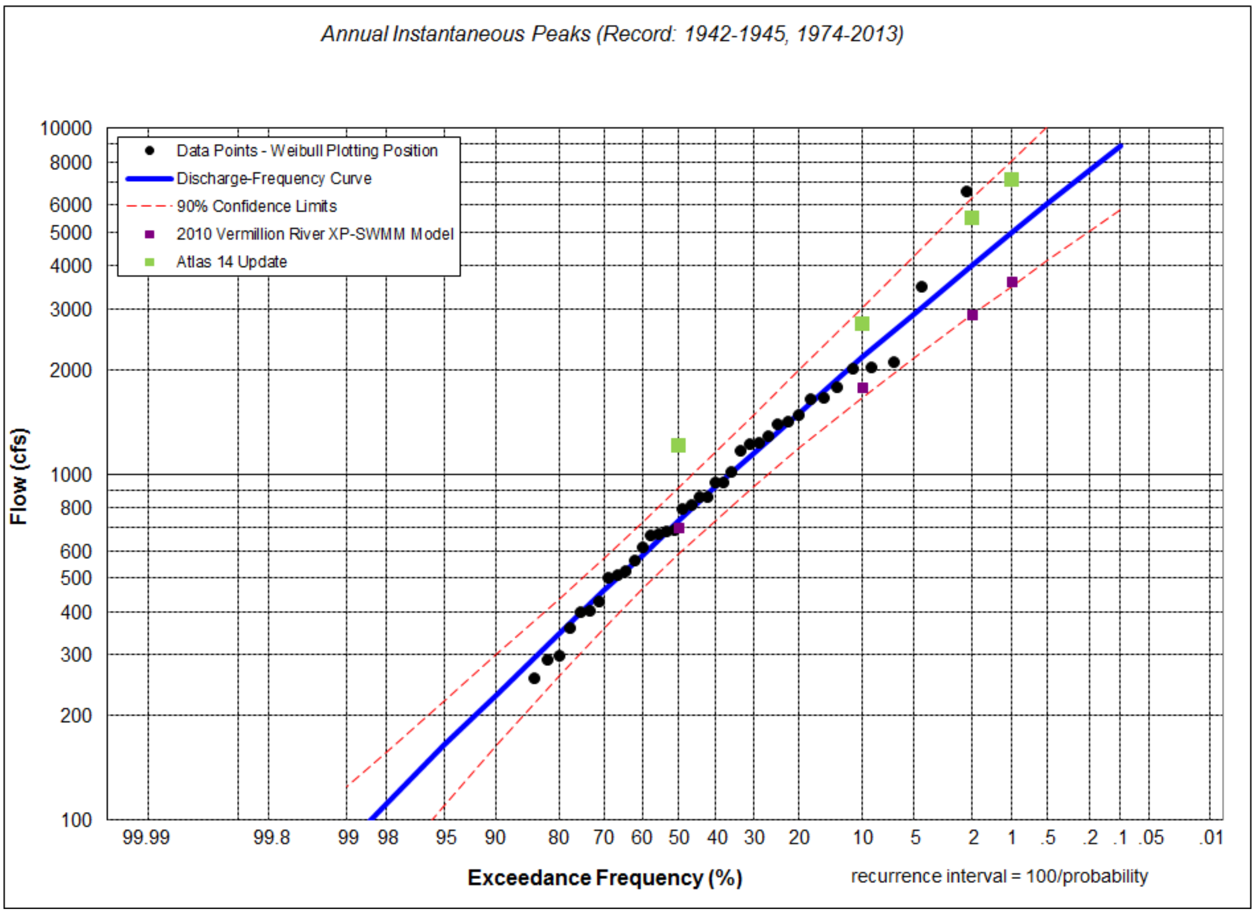


Figure 2-13 Discharge Frequency Curve at the USGS Monitoring Station

2.2.3 Dakota County DFIRM Flows

The XP-SWMM 100-year Atlas 14 simulated peak flows were also compared to flows calculated for the 2010 Dakota County DFIRM study at standard locations along the Vermillion River. DFIRM flows for the Vermillion River were obtained from the HEC-HMS mode developed by Montgomery Watson Harza, which was based on the USACE HEC-1 model calibrated to the 1998 frequency curve. A complete comparison of calibrated XP-SWMM model and DFIRM flows is included in Table 2-1.

Table 2-1 Comparison to 100-year Discharge from Dakota County DFIRM

XP-SWMM Link	Upstream Municipality	Downstream Municipality	2010 Vermillion River XP-SWMM 100-Year Peak Flow (cfs) [1,4]	2014 Updated Vermillion River XP-SWMM 100-Year Peak Flow (cfs) [2,4]	100-Year Flow from Dakota County DFIRM(cfs) [3]
L-1473	New Market Twp.	Eureka Twp.	451 *(5%)*	1,329 *(210%)*	429
L-179	Farmington	Empire Twp.	2,139 *(-55%)*	4,583 *(-3%)*	4,712
L-225	Empire Twp.	Farmington	3,453 *(-27%)*	6,887 *(46%)*	4,712
L-1302	Farmington	Empire Twp.	3,494 *(-26%)*	6,923 *(47%)*	4,712
L-581	Empire Twp.	Vermillion Twp.	3,578 *(-39%)*	7,072 *(21%)*	5,834
L-1034	Marshan Twp.	Nininger Twp.	3,789 *(-52%)*	7,476 *(-4%)*	7,823
L-1031	Nininger Twp.	Hastings	3,855 *(-51%)*	7,554 *(-3%)*	7,823
WOMP	Hastings	-	3,867 *(-54%)*	7,837 *(-7%)*	8,424

[1] 2010 XP-SWMM model results using rainfall depths from TP40
[2] 2014 XP-SWMM model results using Atlas 14 rainfall depth
[3] Peak flow rates from the Dakota County DFIRM on the Vermillion River are based on the HEC-HMS model completed in 2002 by Montgomery Watson Harza. The HEC-HMS model was originally based on a HEC-1 model calibrated to the discharge-frequency curve completed in 1998 by the USACE.
[4] The percent difference from the discharge used for the Dakota County DFIRM is provided in *italics*.

Near the upstream end of the Vermillion River (i.e., near New Market and Eureka Township) the 2014 XP-SWMM model using Atlas 14 rainfall depths over-estimates the peak discharge compared to the Dakota County DFIRM. However, for the larger drainage areas the Atlas 14 simulation results better match the discharge values used in the Dakota County DFIRM.

2.3 Future Conditions – Atlas 14 Rainfall Depths

Following revisions to the XP-SWMM model, the 1-, 2-, 10-, 50-, and 100-year design event peak flow rates and runoff volumes for future conditions were compared to existing conditions at each of the 61 standard locations throughout the Vermillion River watershed. The following sections provide additional discussion regarding the future-conditions model results for peak flow rates and total runoff volume at community standard locations.

2.3.1 Pond Sizing

Planned regional stormwater basins listed in the 2008 Farmington LSWMP were added to the future-conditions XP-SWMM model. The size of each basin, as represented in the HydroCAD models provided by the City, was not modified. The outlet for proposed regional ponding basins was modified so that the peak flow rates from the future-conditions model were equal to or less than peak flow rates from the existing-conditions XP-SWMM model. Table 2-2 includes the estimated storage volume and outlet structure for planned regional ponds to prevent peak flow rates from increasing at community standard locations.

The planned regional ponds were sized without accounting for smaller development stormwater retention basins or infiltration basins that will be necessary to meet the VRWJPO volume standards. Therefore, there is potential for the size of planned regional basins to be reduced when smaller stormwater BMPs are considered. Planned regional ponds were also evaluated without considering localized flooding concerns within the City. As such, it is possible that the size or configuration of the basins may need to be revised to mitigate for existing flood-prone areas within the City.

Table 2-2 Future Conditions Basins

Basin Name, 2014 Model Update	Basin Name, 2008 LSWMP	Downstream Reference Link	NWL	2-year			100-year			Basin Outlet
				Peak Elevation (ft)	Storage Volume (ac-ft)	Peak Flow (cfs)	Peak Elevation (ft)	Storage Volume (ac-ft)	Peak Flow (cfs)	
Farmington North Creek Future Conditions Basins										
AV-A1.14	AV-P1.14	L-FNC-994	934.0	935.2	0.9	12	939.6	3.9	24	Outlet structure[1]
AV-A1.15	AV-P1.15	L-FNC-993	960.0	961.8	3.3	5	966.0	10.3	38	Outlet structure[1]
AV-A1.16	AV-P1.16	L-FNC-992	942.0	944.1	21.0	7	949.1	60.3	42	Outlet structure[1]
AV-A2.2	AV-P2.2	L-1649a	903.0	904.7	27.3	11	906.3	46.2	92	Outlet structure[1]
AV-A2.3	AV-P2.3	L-FNC-990	906.0	907.8	17.1	14	913.2	52.7	67	Outlet structure[1]
AV-A2.4	AV-P2.4	Multiple Links	902.0	904.1	16.3	14	908.8	48.8	78	Outlet structure[1]
AV-A2.5	AV-P2.5	L-1182	901.5	903.1	10.8	16	906.2	25.0	78	Outlet structure[1]
AV-A2.8	AV-P2.8	L-FNC-997	896.0	899.0	9.4	20	903.0	19.4	109	Outlet structure[1]
NCreek-7a	---[2]	L-215	927.0	929.6	0.5	102	933.6	7.7	184	36 in dia. pipe
Farmington Middle Creek Future Conditions Basins										
F-A1.13	F-A1.13	L-FMC186	932.0	936.9	2.4	278	943.6	51.4	1150	6 ft x 5 ft box culvert
F-A2.1	F-A2.1	L-FMC020	944.5	948.3	8.4	98	951.6	17.3	606	72 in dia. pipe
F-A2.4	F-A2.4	L-FMC257	964.0	965.3	1.3	0	970.8	5.1	13	Outlet structure[1]
F-A2.5	F-A2.5	L-FMC259	959.0	961.5	3.9	9	968.5	14.8	18	Outlet structure[1]
F-A2.6	F-A2.6	L-FMC261	965.0	966.2	1.2	3	969.4	3.4	6	Outlet structure[1]
F-A2.8	F-A2.8	L-1199	923.8	928.4	0.1	180	933.4	28.6	1091	5 ft x 8 ft box culvert
F-A3.1	F-A3.1	L-FMC250	973.0	974.6	4.1	4	979.2	12.5	40	Outlet structure[1]
F-A3.4	F-A3.4	L-FMC247	931.0	933.0	15.3	27	936.6	33.8	182	30 in dia. pipe
F-A4.7	F-A4.7	L-FMC234	924.0	926.6	7.0	8	930.7	16.4	76	Outlet structure[1]
F-A6.1	F-A6.1	L-FMC233	915.4	915.9	14.6	2	917.5	24.2	19	Outlet structure[1]
F-A6.2	F-A6.2	L-FMC448	925.0	926.5	5.3	11	928.4	31.6	22	Outlet structure[1]
F-A7.7	F-A7.7	L-FMC073	905.0	905.5	13.5	1	906.8	27.2	4	Outlet structure[1]
F-A7.9	F-A7.9	L-FMC072	906.6	907.7	22.1	5	909.7	42.9	21	Outlet structure[1]
F-A7.13a	F-A7.13	L-198	900.0	901.1	11.7	30	904.5	116.2	258	Weir overflow
F-A7.14	F-A7.14	L-FMC058	902.0	902.9	3.4	3	904.9	13.2	9	Outlet structure[1]
F-A8.9	F-A8.9	L-202	894.5	895.3	29.7	6	897.5	87.2	92	36 in dia. pipe

Table 2-2 Future Conditions Basins

Basin Name, 2014 Model Update	Basin Name, 2008 LSWMP	Downstream Reference Link	NWL	2-year			100-year			Basin Outlet
				Peak Elevation (ft)	Storage Volume (ac-ft)	Peak Flow (cfs)	Peak Elevation (ft)	Storage Volume (ac-ft)	Peak Flow (cfs)	
Farmington South Creek Future Conditions Basins										
L-A1.4	L-A1.4	L-1353	926.2	929.0	0.4	114	931.8	5.1	363	Two 4 ft x 7 ft box culverts
L-A1.6	L-A1.6	L-1350	916.9	922.2	1.1	476	926.5	32.8	2678	Three 5 ft x 10 ft box culverts
L-A1.7	L-A1.7	L-1341	919.1	922.5	0.5	170	927.9	27.8	642	5 ft x 10 ft box culvert
L-A2.3b	L-A2.3	L-FSC001	910.0	914.7	26.5	603	921.8	297.1	2582	One 7 ft x 12 ft box culvert, two 6 x 12 box culverts
Farmington Other Tributary Areas to the Vermillion River Future Conditions Basins										
B-A1.1	B-A1.1	L-FVR012	890.5	891.2	14.4	3	893.2	42.0	25	Outlet structure[1]
B-A1.2b	B-A1.2	L-1547	887.6	890.5	3.5	23	893.1	34.6	168	24 in dia. pipe
B-A1.4a	B-A1.4a	L-FVR467	890.0	890.3	22.2	1	891.6	40.3	4	Outlet structure[1]
B-A1.5	B-A1.5	L-FVR469	885.8	886.4	5.3	2	887.6	25.2	9	Outlet structure[1]
B-A1.6	B-A1.6	L-FVR472	886.0	886.7	12.9	2	888.7	28.2	6	Outlet structure[1]
B-A1.7	B-A1.7	L-FVR008	885.0	885.7	20.2	2	887.3	39.0	4	Outlet structure[1]
B-A1.8	B-A1.8	L-FVR013	891.0	891.5	25.1	1	892.8	45.5	29	18 in dia. pipe
B-A1.9	B-A1.9	L-1675	887.0	887.0	8.8	2	891.5	46.0	5	Outlet structure[1]
B-A1.10	B-A1.10	L-FVR012	884.0	885.0	11.2	3	888.3	30.5	25	Outlet structure[1]
B-A1.11	B-A1.11	L-FVR018	886.2	886.8	16.2	28	889.2	38.5	28	Outlet structure[1]
B-A1.12	B-A1.12	L-FVR016	885.6	885.7	1.1	2	886.8	8.7	4	12 in dia. pipe
B-A1.15	B-A1.15	L-FVR025	887.5	887.9	5.9	1	889.7	30.0	8	Outlet structure[1]
B-A1.16	B-A1.16	L-FVR023	884.0	884.6	24.4	0	887.2	60.9	4	Outlet structure[1]
N-FB012	B-A1.13	L-FVR480	883.0	884.4	1.0	2	884.7	2.3	4	24 in dia. pipe
N-FB041	B-A1.14	L-FVR483	882.0	882.6	23.6	2	884.5	51.5	6	Outlet structure[1]
PW-A1.2	PW-A1.2	L-FVR136	905.5	905.8	2.5	0	906.5	5.0	3	Outlet structure[1]
PW-A1.7	PW-A1.7	L-FVR078	891.0	892.8	13.8	6	898.0	46.0	12	Outlet structure[1]
VR-A2.1	VR-A2.1	L-FVR309	971.0	975.0	3.4	6	978.7	13.3	37	Outlet structure[1]

[1] Outlet structure based on City of Farmington standard detail plate STO-17.

[2] A new basin was simulated in subwatershed NCreek-7

2.3.2 Peak Flow Rates and Runoff Volume at Community Standard Locations

The future-conditions peak flow rates at community standard locations near Farmington for the 2- and 100-year events based on Atlas 14 rainfall depths are summarized in Figure 2-14 through Figure 2-17. At some community standard locations the peak discharge rate differed from the updated 2014 existing-conditions simulation using Atlas 14 rainfall depths. These locations are described below:

North Creek Community Standard Locations *(L-1580, L-1584, & L-215)* – Peak flow rates at the community standard locations on North Creek are generally less than peak flow rates from the updated 2014 existing-conditions simulation. The maximum increase of 34 cfs occurred at Tributary 4 to North Creek (L-215) during the 2-year event. The maximum decrease of 287 cfs occurred at the same location during the 100-year event. At this location there is a planned basin upstream of the railroad tracks. The outlet from the planned basin was assumed to be a 36-inch-diameter culvert. This culvert does not restrict flows for more frequent events, but is restrictive during larger rainfalls. It is assumed that the outlet structure will be evaluated in more detail as development occurs.

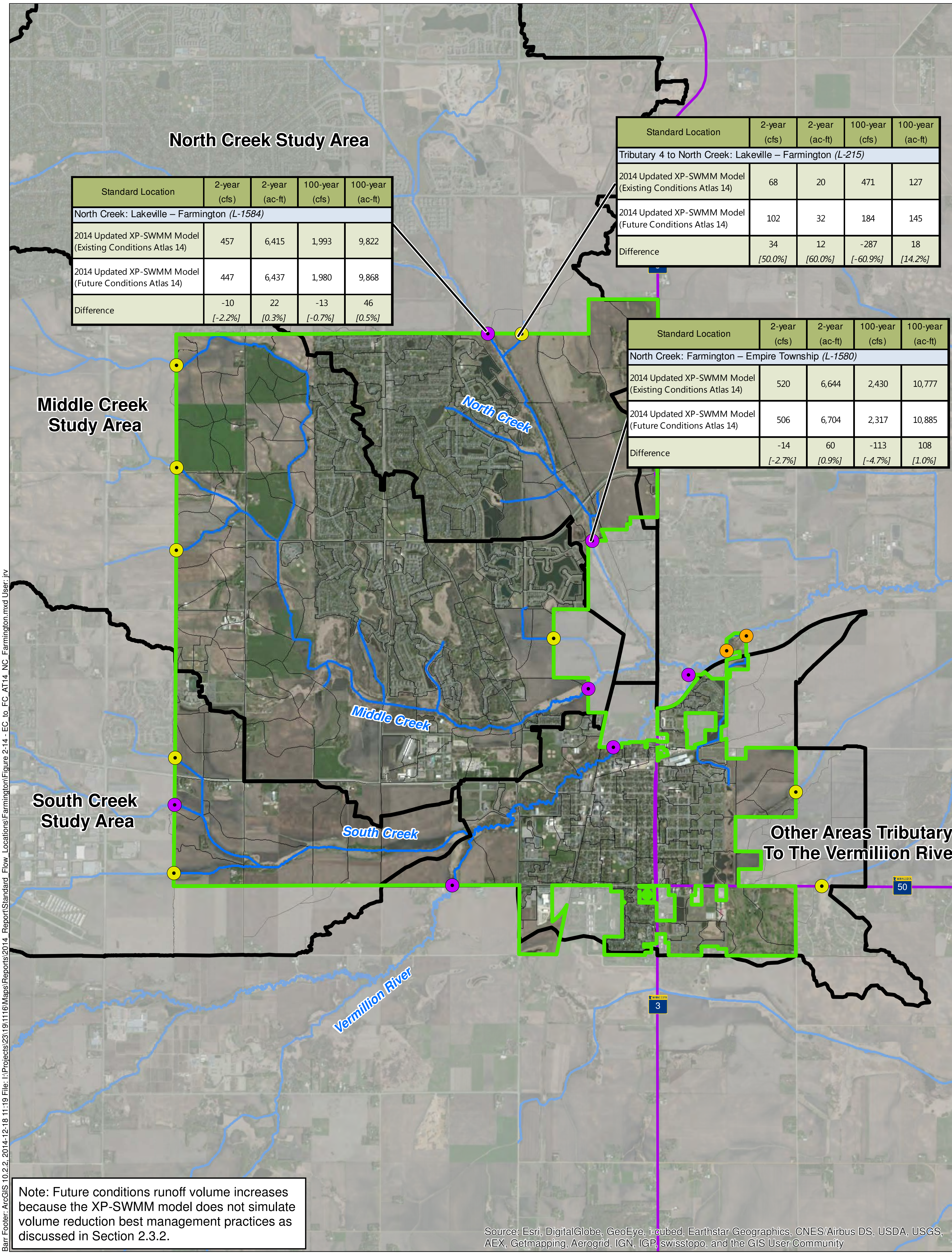
Middle Creek Community Standard Location *(L-LMC-133)* – Compared to the updated 2014 existing-conditions simulation, peak discharge at this location is reduced by 27 percent for the 2-year event and 49 percent for the 100-year event. The roadway upstream of this location overtops during the 100-year event, resulting in a large peak flow rate at the community standard location. With the proposed pond, less discharge is conveyed over the upstream roadway, which significantly reduces the peak discharge for the 100-year event. Because the roadway does not overtop for more frequent events (i.e., 2-year) the reduction in peak discharge is less.

South Creek Community Standard Locations *(L-1351, L-830, L-1339)* – The reduction in peak discharge rates at the community standard locations on South Creek were a result of planned regional basins in Lakeville. These basins were sized to meet peak discharge rates for the rainfall events evaluated. In general, pond outlets were sized to meet peak discharge rates for smaller events, while overflows were included to allow ponds to overtop during larger events. As a result, the discharge rates for more frequent events (i.e., 2-year) were similar to existing conditions, while the restrictive outlet typically resulted in greater reductions to the peak discharge for larger rainfall events (i.e., 100-year). The large reductions for the 100-year event indicate that the planned regional basins will adequately reduce discharge rates to meet VRWJPO standards and that less restrictive overflows could, potentially, be constructed. It is assumed that a more detailed evaluation of the overflows will be completed when development occurs within the watershed.

Other Tributary Area to the Vermillion River Community Standard Locations *(L-1547)* – Peak discharge at this location is reduced by 55 percent, and peak runoff volume is reduced by 3 percent during the 100-year event. This area is located just outside the Farmington municipal boundary. According to the HydroCAD model provided by the City, there is no planned development in this area within the next several years. As a result, the impervious area did not significantly increase. However, the City's LSWMP included three stormwater ponds in subwatersheds that reduce peak discharge rates

(B-A1.2a, B-A1.2b, and B-A1.1). In addition, a planned basin in subwatershed PW-A1.7 eliminates overflow from the west, reducing the runoff volume at this location during the 100-year event.

Runoff Volume Differences – Runoff volume increased at each community standard location near the Farmington municipal boundary. The increase in total runoff volume is attributed to land-use modifications between existing and future conditions. In general, development occurred in the drainage area—increasing the percentage of impervious area and, subsequently, the volume of stormwater runoff. Planned regional ponding basins were incorporated in the XP-SWMM model to control peak flow rates; however, infiltration basins specific to each development are the preferred method for runoff management. Several other options can address this increased runoff volume and should be considered on a site-by-site basis. In some areas, a high groundwater table and other unique geographic features limit the City's ability to infiltrate high runoff volumes. Because individual development strategies to meet the runoff volume criteria are unknown, volume reduction best management practices were not included in the model.



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
North Creek: Lakeville – Farmington *(L-1584)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	457	6,415	1,993	9,822
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	447	6,437	1,980	9,868
Difference	-10 *[-2.2%]*	22 *[0.3%]*	-13 *[-0.7%]*	46 *[0.5%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 4 to North Creek: Lakeville – Farmington *(L-215)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	68	20	471	127
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	102	32	184	145
Difference	34 *[50.0%]*	12 *[60.0%]*	-287 *[-60.9%]*	18 *[14.2%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
North Creek: Farmington – Empire Township *(L-1580)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	520	6,644	2,430	10,777
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	506	6,704	2,317	10,885
Difference	-14 *[-2.7%]*	60 *[0.9%]*	-113 *[-4.7%]*	108 *[1.0%]*

Barr Footer: ArcGIS 10.2.2, 2014-12-18 11:19 File: I:\Projects\23\19\1116\Maps\Reports\2014_Report\Standard_Flow_Locations\Farmington\Figure 2-14 - EC_to_FC_AT14_NC_Farmington.mxd User: jrv

City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

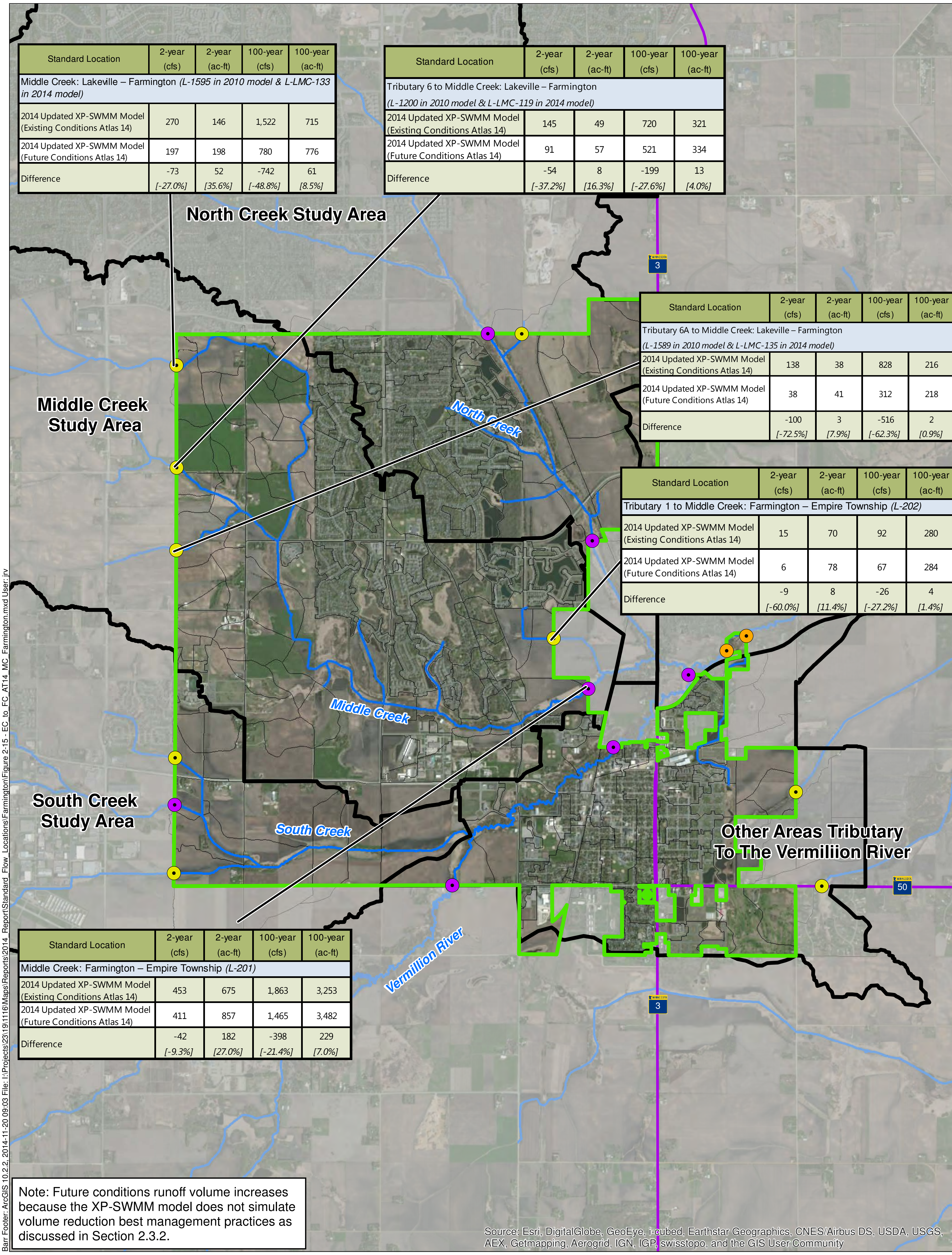
Feet

3,500 0 3,500

BARR

Figure 2-14

NORTH CREEK
COMPARISONS OF
PEAK 2-YEAR AND 100-YEAR RATES
FOR EXISTING CONDITIONS (2005)
TO FUTURE CONDITIONS (2030)
BASED ON ATLAS 14 RAINFALL



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Middle Creek: Lakeville – Farmington *(L-1595 in 2010 model & L-LMC-133 in 2014 model)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	270	146	1,522	715
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	197	198	780	776
Difference	-73 *[-27.0%]*	52 *[35.6%]*	-742 *[-48.8%]*	61 *[8.5%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6 to Middle Creek: Lakeville – Farmington *(L-1200 in 2010 model & L-LMC-119 in 2014 model)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	145	49	720	321
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	91	57	521	334
Difference	-54 *[-37.2%]*	8 *[16.3%]*	-199 *[-27.6%]*	13 *[4.0%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6A to Middle Creek: Lakeville – Farmington *(L-1589 in 2010 model & L-LMC-135 in 2014 model)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	138	38	828	216
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	38	41	312	218
Difference	-100 *[-72.5%]*	3 *[7.9%]*	-516 *[-62.3%]*	2 *[0.9%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 1 to Middle Creek: Farmington – Empire Township *(L-202)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	15	70	92	280
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	6	78	67	284
Difference	-9 *[-60.0%]*	8 *[11.4%]*	-26 *[-27.2%]*	4 *[1.4%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Middle Creek: Farmington – Empire Township *(L-201)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	453	675	1,863	3,253
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	411	857	1,465	3,482
Difference	-42 *[-9.3%]*	182 *[27.0%]*	-398 *[-21.4%]*	229 *[7.0%]*

Note: Future conditions runoff volume increases because the XP-SWMM model does not simulate volume reduction best management practices as discussed in Section 2.3.2.

City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

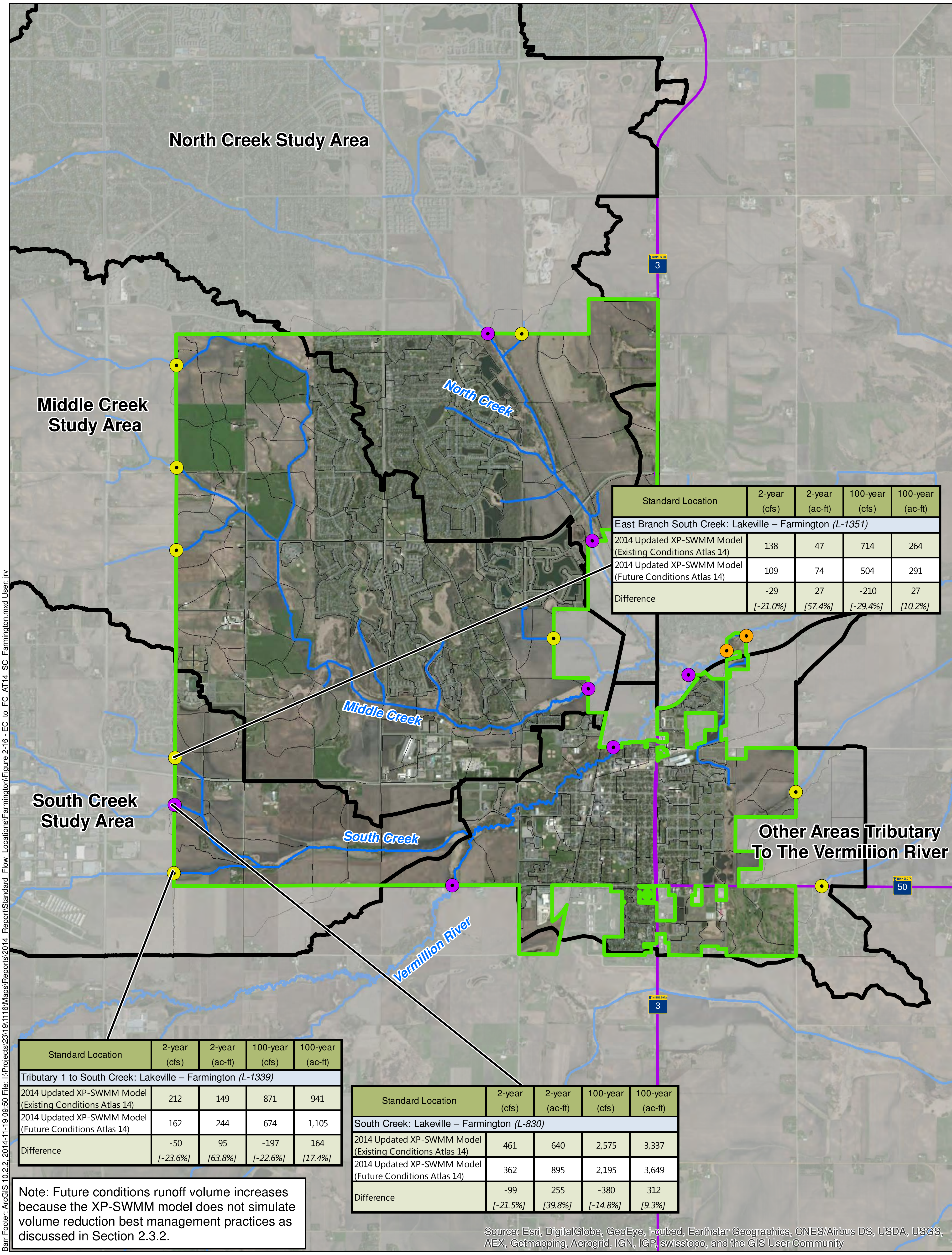
Feet

3,500 0 3,500

BARR

Figure 2-15

MIDDLE CREEK
COMPARISONS OF
PEAK 2-YEAR AND 100-YEAR RATES
FOR EXISTING CONDITIONS (2005)
TO FUTURE CONDITIONS (2030)
BASED ON ATLAS 14 RAINFALL



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
East Branch South Creek: Lakeville – Farmington *(L-1351)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	138	47	714	264
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	109	74	504	291
Difference	-29 *[-21.0%]*	27 *[57.4%]*	-210 *[-29.4%]*	27 *[10.2%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 1 to South Creek: Lakeville – Farmington *(L-1339)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	212	149	871	941
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	162	244	674	1,105
Difference	-50 *[-23.6%]*	95 *[63.8%]*	-197 *[-22.6%]*	164 *[17.4%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
South Creek: Lakeville – Farmington *(L-830)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	461	640	2,575	3,337
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	362	895	2,195	3,649
Difference	-99 *[-21.5%]*	255 *[39.8%]*	-380 *[-14.8%]*	312 *[9.3%]*

Note: Future conditions runoff volume increases because the XP-SWMM model does not simulate volume reduction best management practices as discussed in Section 2.3.2.

City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

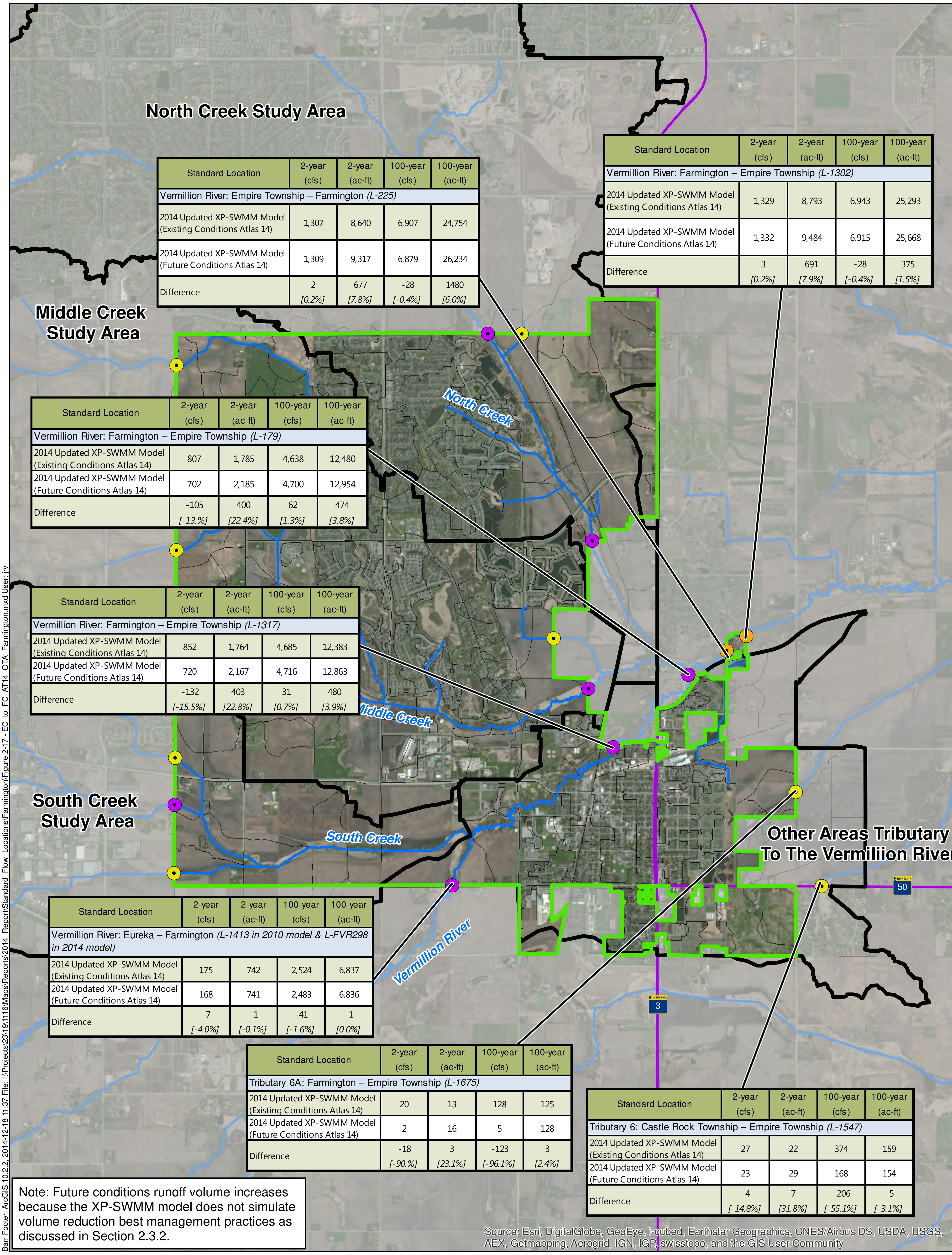
- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

Feet
3,500 0 3,500

BARR

Figure 2-16

SOUTH CREEK
COMPARISONS OF
PEAK 2-YEAR AND 100-YEAR RATES
FOR EXISTING CONDITIONS (2005)
TO FUTURE CONDITIONS (2030)
BASED ON ATLAS 14 RAINFALL



Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Empire Township – Farmington *(L-225)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	1,307	8,640	6,907	24,754
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	1,309	9,317	6,879	26,234
Difference	2 *[0.2%]*	677 *[7.8%]*	-28 *[-0.4%]*	1480 *[6.0%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-1302)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	1,329	8,793	6,943	25,293
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	1,332	9,484	6,915	25,668
Difference	3 *[0.2%]*	691 *[7.9%]*	-28 *[-0.4%]*	375 *[1.5%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-179)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	807	1,785	4,638	12,480
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	702	2,185	4,700	12,954
Difference	-105 *[-13.%]*	400 *[22.4%]*	62 *[1.3%]*	474 *[3.8%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Farmington – Empire Township *(L-1317)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	852	1,764	4,685	12,383
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	720	2,167	4,716	12,863
Difference	-132 *[-15.5%]*	403 *[22.8%]*	31 *[0.7%]*	480 *[3.9%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Vermillion River: Eureka – Farmington *(L-1413 in 2010 model & L-FVR298 in 2014 model)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	175	742	2,524	6,837
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	168	741	2,483	6,836
Difference	-7 *[-4.0%]*	-1 *[-0.1%]*	-41 *[-1.6%]*	-1 *[0.0%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6A: Farmington – Empire Township *(L-1675)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	20	13	128	125
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	2	16	5	128
Difference	-18 *[-90.%]*	3 *[23.1%]*	-123 *[-96.1%]*	3 *[2.4%]*

Standard Location	2-year (cfs)	2-year (ac-ft)	100-year (cfs)	100-year (ac-ft)
Tributary 6: Castle Rock Township – Empire Township *(L-1547)*				
2014 Updated XP-SWMM Model (Existing Conditions Atlas 14)	27	22	374	159
2014 Updated XP-SWMM Model (Future Conditions Atlas 14)	23	29	168	154
Difference	-4 *[-14.8%]*	7 *[31.8%]*	-206 *[-55.1%]*	-5 *[-3.1%]*

Note: Future conditions runoff volume increases because the XP-SWMM model does not simulate volume reduction best management practices as discussed in Section 2.3.2.

City of Farmington
Major Subwatersheds
Subwatersheds
Rivers and Streams

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles

Feet

3,500 0 3,500

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Figure 2-17

OTHER TRIBUTARY AREAS COMPARISONS OF PEAK 2-YEAR AND 100-YEAR RATES FOR EXISTING CONDITIONS (2005) TO FUTURE CONDITIONS (2030) BASED ON ATLAS 14 RAINFALL

3.0 Conclusions / Recommendations

This study modified the Farmington portion of the VRWJPO XP-SWMM model to include smaller subwatersheds, regional stormwater ponds, storm sewer connections between stormwater ponds, and storm sewer outlets to North Creek, Middle Creek, South Creek, and the Vermillion River. The updated XP-SWMM model was used to simulate the 1-, 2-, 10-, 50-, and 100-year 4-day events without further calibration. The resulting flow rates and runoff volumes were compared to the established rates and volumes at the community standard locations.

Using identical rainfall data, the updated model results were compared to the 2010 model at study-area gages used to calibrate the model in 2009. The comparison indicated that the updated model closely matched the stage hydrographs for the 2- and 100-year events. Therefore, the updated model could be used to define baseline conditions for planning purposes within the watershed.

The existing-conditions model was then used to simulate the 4-day rainfall event based on rainfall depths published in Atlas 14. At community standard locations near the Farmington municipal boundary the peak discharge rates increased an average of 22 percent for the 2-year event and 105 percent for the 100-year event. The runoff volume was very similar for the 2-year event because there was not a significant change in precipitation depths. However, runoff volume increased an average 46 percent for the 100-year event.

Finally, a future-conditions model was developed by modifying the updated model to reflect future development conditions throughout the City. Using Atlas 14 rainfall depths, the model was used to estimate the regional stormwater basin and outlet sizes that would be needed to maintain existing-conditions peak flow rates at VRWJPO community standard locations. Future ponds were not sized to mitigate localized flooding concerns upstream of community standard locations. It is anticipated that these areas would be addressed as development or redevelopment occurs within the City. Increases in simulated runoff volume due to planned development were tabulated to aid planning for future volume-control practices. These typically occur on a smaller scale than what was considered in the updated XP-SWMM model.

When using the model to assess development impacts to flow-rate standards it is important to consider the hydrologic and hydraulic scale for which the model was originally developed and calibrated. It is also necessary to recognize that the model should be used as a tool to assess the relative impacts of development rather than to establish absolute values, since a detailed recalibration was not completed as part of this current update effort. Future model updates should include recalibration using post-2005 storm events to improve the model’s representation of real-world conditions.

4.0 References

Applied Ecological Services. 2007. *Thermal Land Cover Classification Data Set*.

Barr Engineering. June 2008. *Lakeville Water Resources Management Plan*. Prepared for the City of Lakeville, MN.

Barr Engineering. July, 2009. *Vermillion River Watershed Hydrologic Study of Existing Conditions*. Prepared for the Vermillion River Watershed Joint Powers Organization.

Barr Engineering. August, 2010. *2010 Addendum Vermillion River Watershed Hydrologic Study of Existing Conditions*. For the Vermillion River Watershed Joint Powers Organization. Minneapolis, MN.

Bonestroo. July, 2008. *Local Surface Water Management Plan*. Prepared for the City of Farmington, MN.

Metropolitan Council. June 2005. *Generalized Land Use 2005 for the Twin Cities Metropolitan Area*.

Perica, Sanja, et al. NOAA Atlas 14 Volume 8, Version 2. *Precipitation-Frequency Atlas of the United States, Midwestern States.* Silver Spring, MD : NOAA, National Weather Service, 2013.

National Weather Service. 1961. Technical Paper 40: *Rainfall Frequency Atlas for the United States for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years.* U.S. Department of Commerce, Washington DC.

National Weather Service. June, 1977. *NOAA Technical Memorandum NWS Hydro-35. Five- to 60-Minute Precipitation Frequency for the Eastern and central United States*. Silver Spring, MD: NOAA.

U.S. Army Corps of Engineers. July 1998. *Vermillion River Watershed Hydrologic Study*. For the Vermillion River Watershed Management Organization. St. Paul, MN.

U.S. Army Corps of Engineers. 2000. *HEC-HMS Technical Reference Manual*.

U.S. Department of Commerce.1964. *Technical Paper 49: Two to Ten-Day Precipitation for Return Periods of 2 to 100 Years in the Contiguous United States*. Washington DC.

U.S. Environmental Protection Agency. 1988. *Storm Water Management Model. Version 4. User's Manual.*

Appendix A

Hydrologic Model Inputs

Table A-1 Farmington North Creek Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington North Creek												
AV-A1.1	42.7	6.3	862	0.080	0.326	0.014	0.183	0.06	1.13	0.16	0.00115	89
AV-A1.10	132.8	1.8	1364	0.020	0.295	0.014	0.192	0.06	1.15	0.10	0.00115	31
AV-A1.10.1	11.4	0.4	677	0.011	0.304	0.014	0.196	0.06	1.00	0.05	0.00115	25
AV-A1.10.2	6.1	0	315	0.012	0.300	0.014	0.197	0.06	1.00	0.02	0.00115	23
AV-A1.10.3	6.8	3.2	265	0.010	0.317	0.014	0.191	0.06	1.00	0.11	0.00115	26
AV-A1.10.4	12.0	0	435	0.007	0.300	0.014	0.197	0.06	1.00	0.08	0.00115	24
AV-A1.10.5	13.6	0	451	0.008	0.300	0.014	0.197	0.06	1.00	0.10	0.00115	23
AV-A1.10.6	19.3	0	577	0.009	0.300	0.014	0.197	0.06	1.00	0.04	0.00115	23
AV-A1.10.7	8.8	0	314	0.009	0.300	0.014	0.197	0.06	1.00	0.03	0.00115	21
AV-A1.10.8	6.3	0.4	229	0.007	0.297	0.014	0.194	0.06	1.00	0.04	0.00115	22
AV-A1.10.9	4.3	0.8	247	0.009	0.292	0.014	0.189	0.06	1.10	0.02	0.00115	19
AV-A1.11.1	5.8	3.4	542	0.007	0.296	0.014	0.189	0.06	1.00	0.02	0.00115	21
AV-A1.11.2	7.2	0.7	349	0.026	0.305	0.014	0.18	0.06	1.00	0.04	0.00115	20
AV-A1.11.3	20.3	26.2	746	0.019	0.288	0.014	0.18	0.06	1.00	0.05	0.00115	21
AV-A1.11.4	15.1	26.4	701	0.026	0.375	0.014	0.169	0.06	1.00	0.03	0.00115	22
AV-A1.11.5	10.2	5.6	279	0.033	0.298	0.014	0.177	0.06	1.00	0.02	0.00115	17
AV-A1.11.6	3.1	24.4	190	0.012	0.282	0.014	0.178	0.06	1.04	0.02	0.00115	19
AV-A1.11.7	14.1	17.9	411	0.030	0.286	0.014	0.178	0.06	1.01	0.02	0.00115	19
AV-A1.11.8	4.9	1.9	360	0.025	0.282	0.014	0.178	0.06	1.10	0.02	0.00115	14
AV-A1.11.9	9.8	5	312	0.025	0.299	0.014	0.177	0.06	1.34	0.02	0.00115	16
AV-A1.12.1	19.5	17	573	0.096	0.380	0.014	0.169	0.06	1.00	0.07	0.00115	41
AV-A1.12.2	43.1	21.4	815	0.028	0.377	0.014	0.169	0.06	1.00	0.02	0.00115	17
AV-A1.12.3	9.3	30.9	481	0.039	0.377	0.014	0.169	0.06	1.00	0.02	0.00115	19
AV-A1.12.4	16.8	30.2	531	0.045	0.365	0.014	0.17	0.06	1.00	0.02	0.00115	21
AV-A1.12.5	3.9	2	238	0.052	0.310	0.014	0.175	0.06	1.00	0.02	0.00115	14
AV-A1.13	114.3	2.9	1312	0.019	0.290	0.014	0.186	0.06	1.35	0.03	0.00115	16
AV-A1.14	18.2	0	649	0.074	0.300	0.014	0.197	0.06	1.00	0.14	0.00115	147
AV-A1.15	35.5	0.1	684	0.056	0.300	0.014	0.197	0.06	1.00	0.14	0.00115	211
AV-A1.16	158.8	0.6	1351	0.049	0.296	0.014	0.193	0.06	1.00	0.12	0.00115	208
AV-A1.17	31.9	0.2	989	0.044	0.300	0.014	0.197	0.06	1.00	0.12	0.00115	204
AV-A1.2	31.4	16.5	722	0.040	0.348	0.014	0.175	0.06	1.06	0.15	0.00115	34
AV-A1.3	33.8	37.9	823	0.022	0.374	0.014	0.17	0.06	0.94	0.07	0.00115	25
AV-A1.4	48.2	29.7	625	0.070	0.356	0.014	0.17	0.06	1.01	0.14	0.00115	63
AV-A1.5.1	4.4	40.2	310	0.032	0.345	0.014	0.181	0.06	1.00	0.07	0.00115	22
AV-A1.5.2	61.3	34.1	1091	0.019	0.353	0.014	0.17	0.06	1.00	0.08	0.00115	27
AV-A1.6.1	4.3	26.7	252	0.089	0.283	0.014	0.168	0.06	1.00	0.14	0.00115	59
AV-A1.6.2	12.5	13.1	621	0.142	0.279	0.014	0.175	0.06	1.00	0.13	0.00115	119
AV-A1.7	27.9	17.3	856	0.134	0.344	0.014	0.171	0.06	1.00	0.12	0.00115	100
AV-A1.8	86.5	30.9	870	0.054	0.372	0.014	0.17	0.06	1.00	0.11	0.00115	77
AV-A1.9	123.5	36.1	1262	0.037	0.347	0.014	0.171	0.06	1.04	0.06	0.00115	28
AV-A1.9.1	9.2	19.3	430	0.041	0.380	0.014	0.169	0.06	1.00	0.09	0.00115	18
AV-A2.1.1	18.4	20.2	430	0.092	0.377	0.014	0.169	0.06	1.00	0.07	0.00115	39

Table A-1 Farmington North Creek Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington North Creek												
AV-A2.1.2	21.2	10.6	608	0.107	0.348	0.014	0.172	0.06	1.00	0.14	0.00115	43
AV-A2.1.3	16.5	12.1	504	0.027	0.329	0.014	0.173	0.06	1.00	0.02	0.00115	15
AV-A2.1.4	118.9	20.3	996	0.062	0.353	0.014	0.171	0.06	1.00	0.10	0.00115	71
AV-A2.1.5	9.8	4.1	344	0.027	0.281	0.014	0.177	0.06	1.00	0.02	0.00115	11
AV-A2.2	122.8	0.1	1497	0.009	0.292	0.014	0.189	0.06	1.00	0.02	0.00115	15
AV-A2.3	154.0	0	1606	0.081	0.298	0.014	0.195	0.06	1.00	0.14	0.00115	118
AV-A2.4	101.7	0	923	0.044	0.299	0.014	0.197	0.06	1.00	0.14	0.00115	71
AV-A2.5	90.3	1	1191	0.043	0.305	0.014	0.191	0.06	1.00	0.12	0.00115	57
AV-A2.6	65.8	3.4	734	0.020	0.290	0.014	0.187	0.06	1.37	0.03	0.00115	11
AV-A2.7	99.2	2.9	1102	0.017	0.290	0.014	0.187	0.06	1.20	0.07	0.00115	9
AV-A2.7.1	8.8	2.6	406	0.012	0.292	0.014	0.189	0.06	1.10	0.04	0.00115	11
AV-A2.8	69.1	0.8	969	0.043	0.295	0.014	0.189	0.06	1.00	0.12	0.00115	58
AV-A2.9	109.8	4.9	1607	0.026	0.309	0.014	0.185	0.06	1.05	0.11	0.00115	15

Table A-2 Farmington Middle Creek Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington Middle Creek												
F-A1.1	68.8	0	854	0.041	0.212	0.014	0.197	0.06	1.00	0.10	0.00115	143
F-A1.10	27.3	0	525	0.046	0.212	0.014	0.197	0.06	1.00	0.13	0.00115	137
F-A1.11	30.2	0.3	649	0.049	0.220	0.014	0.193	0.06	1.00	0.10	0.00115	135
F-A1.12	22.9	0	581	0.063	0.212	0.014	0.197	0.06	1.00	0.11	0.00115	77
F-A1.13	71.0	0.2	1132	0.061	0.212	0.014	0.197	0.06	1.00	0.13	0.00115	89
F-A1.13.1	25.7	26.6	979	0.043	0.273	0.014	0.169	0.06	1.00	0.14	0.00115	86
F-A1.14	45.2	0.2	1094	0.078	0.213	0.014	0.196	0.06	1.09	0.12	0.00115	72
F-A1.15	99.8	0.3	1443	0.062	0.213	0.014	0.196	0.06	1.07	0.10	0.00115	54
F-A1.2	28.4	0	546	0.037	0.212	0.014	0.197	0.06	1.00	0.11	0.00115	156
F-A1.3	39.3	0.1	620	0.041	0.213	0.014	0.196	0.06	1.00	0.12	0.00115	156
F-A1.4	66.1	0.7	1149	0.041	0.218	0.014	0.195	0.06	1.00	0.08	0.00115	107
F-A1.5	48.9	1.4	725	0.053	0.229	0.014	0.193	0.06	1.00	0.09	0.00115	126
F-A1.6	52.6	0.1	920	0.069	0.213	0.014	0.197	0.06	1.00	0.14	0.00115	109
F-A1.7a	47.3	9.5	815	0.063	0.239	0.014	0.185	0.06	1.00	0.13	0.00115	112
F-A1.7b	6.6	29.4	354	0.030	0.273	0.014	0.169	0.06	1.01	0.14	0.00115	112
F-A1.8.1	4.1	0	208	0.093	0.278	0.014	0.177	0.06	1.00	0.14	0.00115	176
F-A1.8.2	30.5	22.9	588	0.051	0.270	0.014	0.168	0.06	1.00	0.14	0.00115	119
F-A1.8.3	13.4	20.4	514	0.058	0.269	0.014	0.167	0.06	1.00	0.14	0.00115	93
F-A1.9	30.9	0.4	533	0.064	0.218	0.014	0.194	0.06	1.00	0.14	0.00115	86
F-A1.9.1	19.5	18.1	507	0.066	0.274	0.014	0.17	0.06	1.00	0.14	0.00115	140
F-A1.9.2	9.7	24.7	239	0.071	0.273	0.014	0.169	0.06	1.00	0.14	0.00115	99
F-A2.1	59.3	0.5	1119	0.056	0.213	0.014	0.197	0.06	1.00	0.11	0.00115	134
F-A2.2	30.6	1.8	597	0.056	0.231	0.014	0.192	0.06	1.00	0.08	0.00115	69
F-A2.3	20.3	1.1	515	0.064	0.224	0.014	0.194	0.06	1.00	0.10	0.00115	87
F-A2.4	15.7	0.3	439	0.045	0.213	0.014	0.197	0.06	1.00	0.13	0.00115	127
F-A2.5	40.3	0.2	700	0.054	0.215	0.014	0.195	0.06	1.00	0.12	0.00115	147
F-A2.6	13.8	0	377	0.068	0.212	0.014	0.197	0.06	1.00	0.12	0.00115	131
F-A2.8	65.0	1.2	1114	0.053	0.237	0.014	0.189	0.06	1.00	0.07	0.00115	53
F-A3.1	38.2	0.5	1038	0.062	0.213	0.014	0.196	0.06	1.00	0.12	0.00115	145
F-A3.10	50.6	0	872	0.080	0.215	0.014	0.195	0.06	1.00	0.09	0.00115	56
F-A3.2	26.3	1.6	478	0.062	0.228	0.014	0.192	0.06	1.00	0.11	0.00115	101
F-A3.3	50.1	0	867	0.067	0.213	0.014	0.197	0.06	1.00	0.11	0.00115	103
F-A3.4	53.5	0.8	825	0.056	0.230	0.014	0.19	0.06	1.00	0.11	0.00115	82
F-A3.5	27.8	2.4	667	0.053	0.221	0.014	0.194	0.06	1.00	0.08	0.00115	40
F-A3.6	83.4	2.7	1372	0.055	0.241	0.014	0.177	0.06	1.16	0.09	0.00115	30
F-A3.6.1	12.4	63.8	532	0.072	0.247	0.014	0.169	0.06	1.39	0.15	0.00115	34
F-A3.6.2	25.0	26	500	0.059	0.270	0.014	0.168	0.06	1.10	0.15	0.00115	86
F-A3.7	74.1	0.1	1083	0.054	0.224	0.014	0.189	0.06	1.09	0.07	0.00115	20
F-A3.8	23.3	0	603	0.069	0.223	0.014	0.19	0.06	1.00	0.14	0.00115	138
F-A3.9	8.1	0	316	0.079	0.212	0.014	0.197	0.06	1.00	0.13	0.00115	145
F-A4.1.1	2.9	0	118	0.060	0.212	0.014	0.197	0.06	1.00	0.14	0.00115	179
F-A4.1.2	16.2	0	380	0.062	0.212	0.014	0.197	0.06	1.00	0.11	0.00115	176

Table A-2 Farmington Middle Creek Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington Middle Creek												
F-A4.1.3	6.3	0	308	0.070	0.212	0.014	0.197	0.06	1.00	0.13	0.00115	144
F-A4.1.4	10.2	0	340	0.062	0.212	0.014	0.197	0.06	1.00	0.11	0.00115	156
F-A4.1.5	4.6	0	266	0.072	0.212	0.014	0.197	0.06	1.00	0.14	0.00115	154
F-A4.2	75.2	0	756	0.069	0.213	0.014	0.197	0.06	1.00	0.10	0.00115	107
F-A4.3	7.8	0	343	0.056	0.219	0.014	0.193	0.06	1.00	0.14	0.00115	142
F-A4.4	33.4	1.3	550	0.078	0.234	0.014	0.19	0.06	1.00	0.12	0.00115	81
F-A4.5	44.9	3	669	0.078	0.250	0.014	0.186	0.06	1.00	0.10	0.00115	51
F-A4.6	34.5	1.4	657	0.056	0.229	0.014	0.193	0.06	1.00	0.09	0.00115	31
F-A4.7	49.5	0	768	0.041	0.217	0.014	0.195	0.06	1.00	0.13	0.00115	54
F-A4.8	54.4	1.2	865	0.057	0.270	0.014	0.181	0.06	1.15	0.12	0.00115	26
F-A5.1	35.2	22.1	839	0.069	0.274	0.014	0.17	0.06	1.00	0.14	0.00115	90
F-A5.10	10.4	22.2	381	0.105	0.267	0.014	0.171	0.06	1.00	0.14	0.00115	44
F-A5.10.1	21.2	30.6	514	0.069	0.267	0.014	0.167	0.06	1.00	0.14	0.00115	81
F-A5.10.2a	13.4	3.6	450	0.059	0.225	0.014	0.194	0.06	1.00	0.14	0.00115	66
F-A5.10.2b	0.8	74.5	174	0.047	0.266	0.014	0.181	0.06	1.00	0.14	0.00115	82
F-A5.11	9.3	32.2	268	0.121	0.265	0.014	0.17	0.06	1.14	0.16	0.00115	54
F-A5.12	47.9	29.5	877	0.063	0.241	0.014	0.156	0.06	1.18	0.09	0.00115	14
F-A5.12.1	15.3	2.4	349	0.077	0.223	0.014	0.194	0.06	1.00	0.13	0.00115	73
F-A5.12.2	5.9	38.9	182	0.119	0.276	0.014	0.179	0.06	1.00	0.08	0.00115	37
F-A5.2.1	46.9	27.5	857	0.049	0.273	0.014	0.169	0.06	1.00	0.14	0.00115	84
F-A5.2.2	31.9	27.2	577	0.090	0.259	0.014	0.162	0.06	1.00	0.13	0.00115	70
F-A5.3	21.2	25.6	465	0.039	0.273	0.014	0.169	0.06	1.00	0.14	0.00115	105
F-A5.4	41.4	23.6	817	0.059	0.264	0.014	0.172	0.06	1.00	0.14	0.00115	83
F-A5.5	18.4	33.8	498	0.049	0.273	0.014	0.169	0.06	1.00	0.14	0.00115	64
F-A5.6	24.2	23.3	884	0.063	0.273	0.014	0.17	0.06	1.00	0.14	0.00115	73
F-A5.7	45.4	27.5	968	0.039	0.261	0.014	0.169	0.06	1.00	0.14	0.00115	98
F-A5.8	13.9	33.6	436	0.033	0.253	0.014	0.17	0.06	1.00	0.14	0.00115	83
F-A5.9	11.4	34.6	540	0.058	0.271	0.014	0.175	0.06	1.00	0.14	0.00115	82
F-A5.9.1	1.8	63.3	181	0.043	0.247	0.014	0.169	0.06	1.00	0.14	0.00115	83
F-A5.9.2	1.9	55.3	156	0.028	0.259	0.014	0.172	0.06	1.00	0.14	0.00115	78
F-A6.1	44.5	0	692	0.032	0.222	0.014	0.191	0.06	1.14	0.15	0.00115	27
F-A6.2	91.3	1.4	1129	0.021	0.222	0.014	0.193	0.06	1.00	0.14	0.00115	51
F-A6.4	374.3	2.5	2550	0.031	0.254	0.014	0.185	0.06	1.05	0.06	0.00115	8
F-A6.4.1	52.4	25.6	779	0.058	0.273	0.014	0.169	0.06	1.15	0.14	0.00115	44
F-A6.4.2	13.7	37.4	489	0.050	0.257	0.014	0.173	0.06	1.13	0.12	0.00115	13
F-A7.1	32.2	38.4	836	0.066	0.253	0.014	0.172	0.06	1.00	0.14	0.00115	86
F-A7.10	63.0	41.1	786	0.016	0.250	0.014	0.176	0.06	1.00	0.11	0.00115	3
F-A7.12	27.5	9.8	896	0.019	0.262	0.014	0.173	0.06	1.04	0.09	0.00115	4
F-A7.13a	74.6	14.1	1311	0.017	0.256	0.014	0.181	0.06	1.08	0.07	0.00115	3
F-A7.13b	4.7	2.9	318	0.022	0.219	0.014	0.195	0.06	1.22	0.10	0.00115	3
F-A7.14	19.9	3.9	612	0.062	0.269	0.014	0.177	0.06	1.13	0.13	0.00115	12
F-A7.14.1	9.8	21.5	382	0.098	0.275	0.014	0.171	0.06	1.02	0.14	0.00115	42

Table A-2 Farmington Middle Creek Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington Middle Creek												
F-A7.15	16.5	2.3	525	0.036	0.244	0.014	0.187	0.06	1.01	0.07	0.00115	3
F-A7.2	107.5	35.6	1889	0.082	0.237	0.014	0.151	0.06	1.18	0.09	0.00115	25
F-A7.2.1	36.9	32.6	1097	0.072	0.260	0.014	0.171	0.06	1.00	0.14	0.00115	65
F-A7.2.2	6.7	17.9	416	0.120	0.274	0.014	0.171	0.06	1.00	0.13	0.00115	37
F-A7.2.3	21.4	17.2	504	0.085	0.270	0.014	0.171	0.06	1.01	0.14	0.00115	65
F-A7.3	8.7	2.6	191	0.053	0.277	0.014	0.177	0.06	1.00	0.03	0.00115	3
F-A7.3.1	15.7	27.8	585	0.085	0.265	0.014	0.174	0.06	1.14	0.13	0.00115	25
F-A7.3.2	61.9	27.8	868	0.068	0.272	0.014	0.172	0.06	1.12	0.12	0.00115	25
F-A7.3.3	17.7	27.4	396	0.067	0.275	0.014	0.171	0.06	1.08	0.14	0.00115	44
F-A7.4	32.0	14	707	0.034	0.278	0.014	0.178	0.06	1.00	0.02	0.00115	3
F-A7.4.1	22.4	40.4	516	0.056	0.253	0.014	0.171	0.06	1.11	0.09	0.00115	9
F-A7.5	48.9	34.1	917	0.025	0.234	0.014	0.183	0.06	1.00	0.07	0.00115	3
F-A7.5.1	13.5	28.6	898	0.025	0.228	0.014	0.184	0.06	1.00	0.14	0.00115	6
F-A7.5.2	28.0	0.2	1193	0.013	0.214	0.014	0.195	0.06	1.00	0.03	0.00115	3
F-A7.5.3	10.6	5.9	367	0.011	0.215	0.014	0.194	0.06	1.00	0.13	0.00115	3
F-A7.5.4	3.3	41.3	358	0.021	0.282	0.014	0.178	0.06	1.00	0.08	0.00115	3
F-A7.6	37.3	4.6	755	0.036	0.279	0.014	0.178	0.06	0.96	0.06	0.00115	3
F-A7.6.1	6.6	34.3	304	0.113	0.282	0.014	0.178	0.06	1.15	0.16	0.00115	16
F-A7.7	41.0	6.3	667	0.072	0.279	0.014	0.175	0.06	0.99	0.11	0.00115	21
F-A7.8	19.9	1.2	576	0.038	0.256	0.014	0.184	0.06	1.06	0.10	0.00115	3
F-A7.9	66.8	8	1283	0.014	0.219	0.014	0.194	0.06	1.00	0.14	0.00115	12
F-A8.10.1	13.8	37.1	384	0.044	0.273	0.014	0.17	0.06	1.00	0.12	0.00115	11
F-A8.11	86.5	3	792	0.016	0.237	0.014	0.19	0.06	1.00	0.11	0.00115	6
F-A8.12	167.8	0.5	1464	0.012	0.224	0.014	0.194	0.06	1.00	0.09	0.00115	7
F-A8.12.1	4.9	32.8	281	0.029	0.247	0.014	0.169	0.06	1.00	0.14	0.00115	22
F-A8.2.1	48.7	7.1	878	0.046	0.272	0.014	0.175	0.06	1.33	0.05	0.00115	20
F-A8.2.2	21.1	2.8	575	0.058	0.279	0.014	0.177	0.06	1.17	0.10	0.00115	15
F-A8.2.3	5.7	23.4	443	0.018	0.282	0.014	0.178	0.06	1.00	0.09	0.00115	13
F-A8.3.1	20.9	6	1523	0.015	0.279	0.014	0.179	0.06	1.00	0.03	0.00115	11
F-A8.3.2	22.1	17.4	747	0.010	0.281	0.014	0.179	0.06	1.00	0.02	0.00115	9
F-A8.3.3	7.7	10.2	435	0.006	0.275	0.014	0.18	0.06	1.00	0.02	0.00115	7
F-A8.3.4	10.8	9.2	504	0.016	0.282	0.014	0.178	0.06	1.00	0.06	0.00115	9
F-A8.3.5	15.6	18.2	456	0.015	0.282	0.014	0.178	0.06	1.00	0.05	0.00115	5
F-A8.3.6	7.3	0.5	363	0.009	0.277	0.014	0.18	0.06	1.00	0.02	0.00115	4
F-A8.4a	4.9	5.3	285	0.061	0.278	0.014	0.174	0.06	1.00	0.14	0.00115	71
F-A8.4b	20.8	3.7	482	0.072	0.278	0.014	0.177	0.06	1.37	0.13	0.00115	23
F-A8.5	16.6	6.1	395	0.086	0.276	0.014	0.173	0.06	1.17	0.13	0.00115	31
F-A8.6.1	2.3	11.9	255	0.125	0.281	0.014	0.177	0.06	1.00	0.14	0.00115	29
F-A8.6.2	18.5	6	363	0.057	0.276	0.014	0.177	0.06	1.26	0.09	0.00115	11
F-A8.7	19.0	5.3	599	0.037	0.261	0.014	0.181	0.06	1.20	0.09	0.00115	4
F-A8.7.1	11.3	31.5	623	0.026	0.261	0.014	0.174	0.06	1.00	0.13	0.00115	11
F-A8.7.2	5.7	15.3	471	0.078	0.279	0.014	0.175	0.06	1.11	0.11	0.00115	10

Table A-2 Farmington Middle Creek Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington Middle Creek												
F-A8.8.1	12.7	14.9	408	0.071	0.274	0.014	0.17	0.06	1.00	0.14	0.00115	43
F-A8.8.2	1.6	31	129	0.111	0.281	0.014	0.177	0.06	1.00	0.14	0.00115	23
F-A8.9	57.7	0	1437	0.007	0.214	0.014	0.197	0.06	1.00	0.07	0.00115	4
F-A8.9.10	16.4	0	794	0.006	0.212	0.014	0.197	0.06	1.00	0.02	0.00115	7
F-A8.9.11	49.4	3	873	0.011	0.231	0.014	0.192	0.06	1.01	0.04	0.00115	3
F-A8.9.1a	26.3	0	682	0.006	0.212	0.014	0.197	0.06	1.00	0.03	0.00115	13
F-A8.9.1b	5.5	0	265	0.006	0.212	0.014	0.197	0.06	1.00	0.02	0.00115	11
F-A8.9.2	14.1	0	415	0.005	0.212	0.014	0.197	0.06	1.00	0.07	0.00115	12
F-A8.9.3	11.6	0	471	0.005	0.212	0.014	0.197	0.06	1.00	0.02	0.00115	10
F-A8.9.4	42.7	0	8724	0.006	0.212	0.014	0.197	0.06	1.00	0.03	0.00115	10
F-A8.9.5	10.3	0	487	0.007	0.212	0.014	0.197	0.06	1.00	0.05	0.00115	11
F-A8.9.6	8.3	0	305	0.007	0.212	0.014	0.197	0.06	1.00	0.06	0.00115	10
F-A8.9.7	7.8	0	1444	0.007	0.212	0.014	0.197	0.06	1.00	0.05	0.00115	10
F-A8.9.8	3.5	0.1	400	0.008	0.212	0.014	0.197	0.06	1.00	0.06	0.00115	6
F-A8.9.9	6.7	4.1	316	0.010	0.212	0.014	0.197	0.06	1.27	0.02	0.00115	3

Table A-4 Farmington Other Area Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington Other Areas												
B-A1.1	97.2	2.4	923	0.035	0.248	0.014	0.157	0.06	0.93	0.11	0.00115	12
B-A1.11	67.3	0.6	826	0.011	0.212	0.014	0.197	0.06	0.84	0.11	0.00115	3
B-A1.4b	40.4	0.1	615	0.009	0.217	0.014	0.194	0.06	0.84	0.06	0.00115	3
B-A1.8	36.9	0.9	621	0.011	0.212	0.014	0.197	0.06	0.84	0.06	0.00115	3
B-A1.9	56.4	0.3	864	0.009	0.212	0.014	0.197	0.06	0.84	0.08	0.00115	3
PW-A1.1	56.6	35.7	935	0.023	0.221	0.014	0.186	0.06	0.84	0.15	0.00115	4
PW-A1.10	14.6	39.6	419	0.020	0.268	0.014	0.169	0.06	0.84	0.15	0.00115	3
PW-A1.11	22.2	52.2	547	0.025	0.229	0.014	0.148	0.06	0.84	0.05	0.00115	3
PW-A1.11.1	16.1	26.4	473	0.031	0.274	0.014	0.17	0.06	0.84	0.12	0.00115	3
PW-A1.11.2	27.0	35.9	437	0.028	0.272	0.014	0.169	0.06	0.84	0.13	0.00115	3
PW-A1.11.3	34.6	38.8	833	0.029	0.257	0.014	0.163	0.06	0.84	0.08	0.00115	3
PW-A1.12.1	5.4	17.5	233	0.029	0.267	0.014	0.171	0.06	0.84	0.13	0.00115	3
PW-A1.12.2	33.1	34.1	690	0.035	0.273	0.014	0.17	0.06	0.84	0.11	0.00115	3
PW-A1.12.3	13.7	32.5	349	0.037	0.274	0.014	0.17	0.06	0.84	0.13	0.00115	3
PW-A1.12.4	20.7	53.3	491	0.038	0.269	0.014	0.174	0.06	0.84	0.13	0.00115	3
PW-A1.12a	39.7	34.3	621	0.039	0.276	0.014	0.173	0.06	0.84	0.10	0.00115	3
PW-A1.12b	26.4	39	834	0.035	0.276	0.014	0.174	0.06	0.84	0.04	0.00115	3
PW-A1.13	102.6	46.7	1279	0.019	0.267	0.014	0.17	0.06	0.84	0.15	0.00115	4
PW-A1.14	39.8	50.5	921	0.022	0.257	0.014	0.173	0.06	0.84	0.15	0.00115	5
PW-A1.14.1	8.6	31.6	927	0.035	0.267	0.014	0.173	0.06	0.84	0.15	0.00115	3
PW-A1.14.2	8.3	31.5	564	0.043	0.254	0.014	0.171	0.06	0.84	0.15	0.00115	3
PW-A1.14.3	11.5	45.4	699	0.035	0.266	0.014	0.174	0.06	0.84	0.15	0.00115	3
PW-A1.14.4	8.2	37.4	505	0.035	0.265	0.014	0.175	0.06	0.84	0.15	0.00115	3
PW-A1.14.5	4.4	3.9	1167	0.060	0.279	0.014	0.177	0.06	0.84	0.15	0.00115	3
PW-A1.14.6	12.3	36.6	574	0.021	0.255	0.014	0.188	0.06	0.84	0.15	0.00115	3
PW-A1.15	41.8	19	912	0.022	0.234	0.014	0.156	0.06	0.84	0.14	0.00115	8
PW-A1.15.1	14.7	40.6	442	0.016	0.271	0.014	0.174	0.06	0.84	0.15	0.00115	13
PW-A1.17.1	0.8	2.8	115	0.094	0.264	0.014	0.17	0.06	0.84	0.15	0.00115	13
PW-A1.17.2	8.9	21.1	377	0.043	0.252	0.014	0.171	0.06	0.84	0.15	0.00115	18
PW-A1.17.3	25.0	20.3	534	0.037	0.273	0.014	0.17	0.06	0.84	0.15	0.00115	15
PW-A1.3	58.7	31.5	734	0.022	0.268	0.014	0.169	0.06	0.84	0.15	0.00115	3
PW-A1.4	39.5	28.2	898	0.033	0.269	0.014	0.17	0.06	0.84	0.15	0.00115	11
PW-A1.5	20.7	21.8	622	0.050	0.271	0.014	0.177	0.06	0.60	0.09	0.00115	4
PW-A1.6.1	23.9	2.4	837	0.044	0.239	0.014	0.178	0.06	0.96	0.17	0.00115	14
PW-A1.6.2	29.0	0.5	947	0.034	0.224	0.014	0.194	0.06	1.02	0.17	0.00115	8
PW-A1.6.3	10.9	3.2	453	0.021	0.212	0.014	0.197	0.06	0.88	0.07	0.00115	3
PW-A1.7	103.0	6.5	963	0.031	0.240	0.014	0.16	0.06	0.89	0.11	0.00115	11
PW-A1.8.1	33.9	4.7	1350	0.017	0.273	0.014	0.177	0.06	0.85	0.04	0.00115	3
PW-A1.8.2	8.4	2.9	4988	0.048	0.282	0.014	0.178	0.06	0.76	0.03	0.00115	3
PW-A1.8.3	29.0	25.1	1911	0.027	0.267	0.014	0.175	0.06	0.83	0.09	0.00115	3
PW-A1.9	22.5	47.9	677	0.023	0.265	0.014	0.17	0.06	0.84	0.15	0.00115	3
VR-A1.1	101.4	2.1	834	0.017	0.228	0.014	0.193	0.06	0.86	0.12	0.00115	7

Table A-4 Farmington Other Area Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington Other Areas												
VR-A1.10	21.8	41.6	624	0.017	0.260	0.014	0.172	0.06	0.84	0.15	0.00115	17
VR-A1.11	42.8	18.5	789	0.025	0.271	0.014	0.176	0.06	0.90	0.09	0.00115	8
VR-A1.11.1	2.9	81.9	354	0.039	0.247	0.014	0.169	0.06	0.84	0.15	0.00115	24
VR-A1.11.2	3.7	91.8	469	0.040	0.247	0.014	0.169	0.06	0.84	0.15	0.00115	21
VR-A1.11.3	9.2	6	474	0.026	0.249	0.014	0.169	0.06	0.84	0.13	0.00115	9
VR-A1.11.4	5.4	17.6	609	0.032	0.250	0.014	0.17	0.06	0.84	0.15	0.00115	20
VR-A1.12a	69.6	49.8	1397	0.017	0.260	0.014	0.17	0.06	0.84	0.15	0.00115	7
VR-A1.12b	8.5	71.6	651	0.014	0.256	0.014	0.172	0.06	0.84	0.15	0.00115	10
VR-A1.12c	31.2	26.1	616	0.018	0.269	0.014	0.169	0.06	0.84	0.15	0.00115	4
VR-A1.13a	20.4	25.8	468	0.032	0.265	0.014	0.174	0.06	0.84	0.10	0.00115	13
VR-A1.13b	4.9	83.8	245	0.023	0.255	0.014	0.171	0.06	0.84	0.15	0.00115	17
VR-A1.15	7.7	73	223	0.040	0.267	0.014	0.174	0.06	0.85	0.15	0.00115	15
VR-A1.16.3	0.7	11.6	116	0.087	0.249	0.014	0.171	0.06	0.84	0.15	0.00115	9
VR-A1.16.4a	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.84	0.15	0.00115	14
VR-A1.16.4b	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	0.84	0.15	0.00115	16
VR-A1.16.5	22.4	36.7	806	0.035	0.266	0.014	0.175	0.06	0.88	0.15	0.00115	14
VR-A1.2	93.4	4	980	0.021	0.239	0.014	0.19	0.06	0.85	0.11	0.00115	6
VR-A1.2.1	46.6	4.6	873	0.027	0.216	0.014	0.195	0.06	0.93	0.16	0.00115	12
VR-A1.2.2	4.1	0	244	0.015	0.213	0.014	0.197	0.06	0.84	0.14	0.00115	6
VR-A1.2.3	15.7	30.5	448	0.029	0.252	0.014	0.184	0.06	0.84	0.12	0.00115	6
VR-A1.3.1	12.2	36.8	464	0.037	0.269	0.014	0.175	0.06	0.84	0.15	0.00115	8
VR-A1.3.2	0.5	8.6	396	0.087	0.247	0.014	0.169	0.06	0.84	0.15	0.00115	5
VR-A1.3.3	4.7	6.6	193	0.039	0.255	0.014	0.171	0.06	0.84	0.15	0.00115	10
VR-A1.3a	3.9	30	264	0.041	0.251	0.014	0.178	0.06	0.84	0.15	0.00115	7
VR-A1.3b	20.3	24.6	539	0.033	0.263	0.014	0.17	0.06	0.84	0.15	0.00115	10
VR-A1.4	48.3	41.2	912	0.025	0.247	0.014	0.169	0.06	0.84	0.15	0.00115	12
VR-A1.4.1	6.4	80.3	440	0.026	0.247	0.014	0.169	0.06	0.84	0.15	0.00115	14
VR-A1.5	43.9	25.1	616	0.030	0.268	0.014	0.176	0.06	0.84	0.10	0.00115	8
VR-A1.6	18.9	43.7	698	0.018	0.263	0.014	0.169	0.06	0.84	0.15	0.00115	15
VR-A1.7	82.2	26.7	1253	0.021	0.260	0.014	0.172	0.06	0.84	0.12	0.00115	10
VR-A1.8a	17.4	32.8	351	0.018	0.256	0.014	0.17	0.06	0.84	0.15	0.00115	8
VR-A1.8b	3.1	6.7	257	0.020	0.247	0.014	0.169	0.06	0.84	0.15	0.00115	7
VR-A1.8c	29.5	20.8	516	0.019	0.263	0.014	0.17	0.06	0.84	0.15	0.00115	8
VR-A1.9a	17.0	26.4	483	0.020	0.270	0.014	0.17	0.06	0.84	0.15	0.00115	6
VR-A1.9b	39.9	28.7	924	0.016	0.260	0.014	0.169	0.06	0.84	0.15	0.00115	3
VR-A2.1	48.2	1.1	819	0.061	0.219	0.014	0.195	0.06	0.84	0.11	0.00115	245
VR-A2.2a	33.7	2.2	549	0.054	0.220	0.014	0.192	0.06	0.84	0.10	0.00115	185
VR-A2.2b	6.4	0.2	410	0.042	0.223	0.014	0.192	0.06	0.84	0.14	0.00115	119
VR-A2.2b	6.4	0.2	410	0.042	0.223	0.014	0.192	0.06	0.84	0.14	0.00115	119

Table A-3 Farmington South Creek Hydrologic Model Inputs

Watershed	Area	Directly Connected Percent Impervious	Width	Slope	Pervious Roughness	Impervious Roughness	Pervious Depression Storage	Impervious Depression Storage	Maximum Infiltration	Minimum Infiltration	Decay Rate of Infiltration	Maximum Infiltration
(-)	(acres)	(%)	(ft)	(ft/ft)	(-)	(-)	(inches)	(inches)	(in/hr)	(in/hr)	(1/sec)	(inches)
Farmington South Creek												
L-A1.1a	34.0	0	812	0.047	0.212	0.014	0.193	0.06	0.84	0.09	0.00115	85
L-A1.1b	1.3	0	79	0.074	0.212	0.014	0.197	0.06	1.00	0.05	0.00115	87
L-A1.2	2.7	0	290	0.016	0.212	0.014	0.197	0.06	0.84	0.02	0.00115	47
L-A1.3	28.8	0	538	0.034	0.212	0.014	0.197	0.06	0.84	0.08	0.00115	43
L-A1.4	37.4	0.3	671	0.026	0.214	0.014	0.195	0.06	0.84	0.09	0.00115	29
L-A1.5	39.1	1	710	0.036	0.222	0.014	0.193	0.06	0.84	0.08	0.00115	17
L-A1.6	76.0	0.3	820	0.030	0.214	0.014	0.196	0.06	0.94	0.10	0.00115	17
L-A1.7	236.6	0.2	1620	0.014	0.216	0.014	0.195	0.06	0.87	0.13	0.00115	21
L-A1.8	169.1	0.8	1321	0.017	0.223	0.014	0.194	0.06	0.88	0.13	0.00115	16
L-A2.1a	62.3	0.2	861	0.021	0.217	0.014	0.194	0.06	0.84	0.12	0.00115	16
L-A2.1b	44.9	0.8	631	0.023	0.216	0.014	0.195	0.06	0.84	0.13	0.00115	41
L-A2.1c	45.6	0	792	0.030	0.217	0.014	0.194	0.06	0.84	0.11	0.00115	52
L-A2.2	152.8	2.9	1017	0.020	0.224	0.014	0.193	0.06	0.84	0.14	0.00115	27
L-A2.3a	107.3	0.8	1242	0.025	0.223	0.014	0.194	0.06	0.86	0.14	0.00115	21
L-A2.3b	239.1	0.4	1149	0.018	0.217	0.014	0.195	0.06	0.86	0.14	0.00115	20
L-A2.4	153.3	1.9	1152	0.026	0.228	0.014	0.192	0.06	0.96	0.13	0.00115	8

Appendix B

Hydraulic Model Inputs

Table B-1 Hydraulic Parameters for Farmington North Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington North Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FNC-988	L-FNC-988	N-218	FNC-940	Natural	1775	907.1	906.4	1325	1420	0.050	0.035	0.050						
L-215	L-215	NCreek-7	N-218	Natural	1237	915.2	907.1	865	1030	0.050	0.037	0.050						
L-446	L-446	NCreek-4	FNC-2040	Natural	1000	897.57	896.24	760	781	0.070	0.037	0.060						
L-1582	L-1582	N-445	N-1364	Natural	456.88	894.9	894.6	359	381	0.080	0.037	0.060						
L-1177	L-1177	N-1049	AV-A1.11.5	Natural	1442.4	905.2	905.2	990	1065	0.050	0.037	0.050						
L-1179	L-1179	N-1051	AV-A1.11.9	Natural	912	904.8	902	1445	1520	0.050	0.037	0.050						
L-1182	L-1182	N-1053	N-445	Natural	315.88	899.91	894.9	865	950	0.050	0.037	0.050						
L-1583	L-1583	N-1364	AV-A2.6	Natural	456.8	894.6	893.84	487	508	0.080	0.037	0.060						
L-1585	L-1585	N-1365	N-218	Natural	521.99	908.1	907.1	1762	1927	0.064	0.037	0.060						
L-1649	L-1649	N-1406	AV-A2.2	Natural	1962	905.97	904.7	1920	1995	0.050	0.037	0.050						
L-217	L-217	AV-A1.10	AV-A1.13	Natural	3018.7	906.4	898.916	780	825	0.050	0.035	0.050						
L-219	L-219	AV-A1.13	NCreek-4	Natural	639.47	898.916	897.57	737	771	0.069	0.037	0.080						
L-1180	L-1180	AV-A2.4	AV-A2.5	Natural	865.77	905.6	901.18	980	1155	0.050	0.037	0.050						
L-F1174_1	L-F1174_1	AV-A1.9	FNC2022	Trapezoidal	35	912	911											
L1174b.1	L-1174b	AV-A1.9	FNC2021	Weir	0	910.61	910.61											
L-1174a.2	L-1174a	AV-A1.9	FNC2020	Weir	0	908.35	908.35											
L-1174a.3	L-1174a	AV-A1.9	FNC2020	Weir	0	908.35	908.35											
L-1174a.1	L-1174a	AV-A1.9	FNC2020	Weir	0	908.35	908.35											
L-1176.1	L-1176	AV-A1.11.2	N-1049	Natural	56	912	912	1065	1160	0.013	0.013	0.013						
L1176_1	L-1176	AV-A1.11.2	N-1049	Natural	56	912	912	1065	1160	0.013	0.013	0.013						
L-1178.1	L-1178	AV-A1.11.5	N-1051	Natural	44	909.5	909.5	280	405	0.013	0.013	0.013						
L1178_1	L-1178	AV-A1.11.5	N-1051	Natural	44	909.5	909.5	280	405	0.013	0.013	0.013						
L-1181.1	L-1181	AV-A2.5	N-1053	Natural	40	905.5	905.5	575	795	0.013	0.013	0.013						
L1181_1	L-1181	AV-A2.5	N-1053	Natural	40	905.5	905.5	575	795	0.013	0.013	0.013						
L-1648.1	L-1648	AV-A2.1.5	N-1406	Natural	230.11	906.1	905.97	540	585	0.013	0.013	0.013						
L1648_1	L-1648	AV-A2.1.5	N-1406	Natural	230.11	906.1	905.97	540	585	0.013	0.013	0.013						
L-1649a	L-1649a	AV-A2.2	NCreek-4	Natural	400	904.7	897.57	1920	1995	0.050	0.037	0.050						
L-FNC-815	L-FNC-815	FNC-815	FNC-816	Circular	200	925.48	921.98						0	1	0.013	0.10	0.20	
L-FNC-816	L-FNC-816	FNC-816	FNC-817	Circular	183	921.67	918.03						0	1	0.013	0.10	0.20	
L-F817.1	L-FNC-817	FNC-817	FNC-818	Circular	334	917.78	915.27						0	1.75	0.013	0.10	0.20	
L-F817.2	L-FNC-817	FNC-817	FNC-818	Circular	334	917.78	915.27						0	1.75	0.013	0.10	0.20	
L-F818.1	L-FNC-818	FNC-818	FNC-819	Circular	378	915.28	914.58						0	2.75	0.013	0.10	0.20	
L-F818.2	L-FNC-818	FNC-818	FNC-819	Circular	378	915.28	914.58						0	2.75	0.013	0.10	0.20	
L-F819.1	L-FNC-819	FNC-819	FNC-820	Circular	100	914.34	914.09						0	2.75	0.013	1.00	0.20	
L-F819.2	L-FNC-819	FNC-819	FNC-820	Circular	100	914.34	914.09						0	2.75	0.013	1.00	0.20	
L-FNC-820	L-FNC-820	FNC-820	FNC-821	Circular	44	914.43	914.05						0	2.75	0.013	0.10	0.20	
L-F820a.1	L-F820a	FNC-820	AV-A1.2	Weir	0	918.68	918.68											
L-F821.1	L-FNC-821	FNC-821	AV-A1.2	Circular	40	913.88	913.78						0	2.75	0.013	1.00	0.20	
L-F821.2	L-FNC-821	FNC-821	AV-A1.2	Circular	40	913.88	913.78						0	2.75	0.013	1.00	0.20	
Link5105	Link5105	AV-A1.2	NCL-70	Trapezoidal	55	916.5	916.5											
L-F822a.2	L-F822a	AV-A1.2	FNC2017	Weir	0	918.11	918.11											
L-F822a.3	L-F822a	AV-A1.2	FNC2017	Weir	0	918.11	918.11											
L-F822a.1	L-F822a	AV-A1.2	FNC2017	Weir	0	918.11	918.11											
L-FNC-823	L-FNC-823	FNC-824	FNC-825	Circular	72	913.95	913.88						0	1.25	0.013	1.00	0.20	
L-FNC-824	L-FNC-824	FNC-825	FNC-826	Circular	274	913.88	913.61						0	1.25	0.013	1.00	0.20	
L-FNC-825	L-FNC-825	FNC-826	FNC-827	Circular	140	913.61	913.22						0	1.25	0.013	0.10	0.20	
L-F826.1	L-FNC-826	FNC-827	FNC-828	Circular	32	913.22	913.12						0	1.25	0.013	0.10	0.20	
L-F826.2	L-FNC-826	FNC-827	FNC-828	Circular	32	913.22	913.12						0	1.25	0.013	0.10	0.20	
L-F827.1	L-FNC-827	FNC-828	FNC-829	Circular	114	913.12	912.88						0	1.5	0.013	1.00	0.20	
L-F827.2	L-FNC-827	FNC-828	FNC-829	Circular	114	913.12	912.88						0	1.5	0.013	1.00	0.20	
L-F828.1	L-FNC-828	FNC-829	FNC-830	Circular	87.52	912.88	912.73						0	1.5	0.013	1.00	0.20	
L-F828.2	L-FNC-828	FNC-829	FNC-830	Circular	87.52	912.88	912.73						0	1.5	0.013	1.00	0.20	
L-F829.1	L-FNC-829	FNC-830	FNC-831	Circular	113.5	912.73	912.36						0	1.5	0.013	0.10	0.20	
L-F829.2	L-FNC-829	FNC-830	FNC-831	Circular	113.5	912.73	912.36						0	1.5	0.013	0.10	0.20	
L-F830.1	L-FNC-830	FNC-831	FNC-832	Circular	33	912.36	912.33						0	1.75	0.013	0.10	0.20	
L-F830.2	L-FNC-830	FNC-831	FNC-832	Circular	33	912.36	912.33						0	1.75	0.013	0.10	0.20	
L-F831.1	L-FNC-831	FNC-832	FNC-833	Circular	113.5	912.33	912.04						0	1.75	0.013	0.10	0.20	
L-F831.2	L-FNC-831	FNC-832	FNC-833	Circular	113.5	912.33	912.04						0	1.75	0.013	0.10	0.20	
L-F832.1	L-FNC-832	FNC-833	FNC-834	Circular	111.75	912.04	911.81						0	1.75	0.013	0.10	0.20	
L-F832.2	L-FNC-832	FNC-833	FNC-834	Circular	111.75	912.04	911.81						0	1.75	0.013	0.10	0.20	

Table B-1 Hydraulic Parameters for Farmington North Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington North Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-F833.1	L-FNC-833	FNC-834	FNC-835	Circular	36.5	911.81	911.68						0	2	0.013	0.10	0.20	
L-F833.2	L-FNC-833	FNC-834	FNC-835	Circular	36.5	911.81	911.68						0	2	0.013	0.10	0.20	
L-F834.1	L-FNC-834	FNC-835	AV-A1.3	Circular	135	911.68	911.41						0	2	0.013	1.00	0.20	
L-F834.2	L-FNC-834	FNC-835	AV-A1.3	Circular	135	911.68	911.41						0	2	0.013	1.00	0.20	
L-FNC-839	L-FNC-839	AV-A1.6.1	AV-A1.6.2	Circular	126	927.23	926.43						0	1	0.013	1.00	1.00	45 deg Beveled Ring (Circ, Conc)
L-FNC-841	L-FNC-841	AV-A1.7	FNC-850	Circular	14	918	916.71						0	3	0.013	0.10	1.00	Groove End with Projecting (Circ, Conc)
L-FNC-842	L-FNC-842	FNC-850	FNC-851	Circular	28	916.71	916.61						0	3	0.013	0.10	0.20	
L-FNC-843	L-FNC-843	FNC-851	FNC-852	Circular	45	916.61	916.51						0	3	0.013	0.10	0.20	
L-FNC-844	L-FNC-844	FNC-852	FNC-853	Circular	16	916.51	916.41						0	3	0.013	0.10	0.20	
L-FNC-845	L-FNC-845	FNC-853	FNC-854	Circular	36	916.41	916.31						0	3	0.013	0.10	0.20	
L-FNC-846	L-FNC-846	FNC-854	FNC-855	Circular	18	916.31	916.21						0	3	0.013	0.50	0.20	
L-FNC-847	L-FNC-847	FNC-855	FNC-856	Circular	52.2	916.21	909.64						0	3	0.013	0.50	0.20	
L-FNC-848	L-FNC-848	FNC-856	FNC-857	Circular	177.2	909.64	908.56						0	3	0.013	1.00	0.20	
L-FNC-849	L-FNC-849	FNC-857	FNC-858	Circular	38	908.56	908.56						0	3.5	0.013	1.00	0.20	
L-FNC-850	L-FNC-850	FNC-858	AV-A1.8	Circular	158	908.56	907.92						0	3.5	0.013	1.00	0.20	
L-FNC-852	L-FNC-852	FNC-861	FNC-862	Circular	8	907.64	906.49						0	2.5	0.013	1.00	0.20	
L-FNC-853	L-FNC-853	FNC-862	AV-A1.9	Circular	35	906.07	905.46						0	3	0.013	1.00	0.40	
L-FNC-851	L-FNC-851	AV-A1.8	FNC-861	Arch	75	908.87	908.37						0	3	0.013	1.00	1.00	
L-FNC-854	L-FNC-854	AV-A1.8	FNC-865	Arch	32	908.84	908.51						0	2.5	0.013	0.10	1.00	
L-FNC-856	L-FNC-856	AV-A1.8	FNC-867	Circular	75	909.11	908.02						0	3	0.013	1.00	1.00	
L-F856a	L-F856a	AV-A1.8	AV-A1.9	Trapezoidal	33	912	912											
L-FNC-855	L-FNC-855	FNC-865	FNC-862	Arch	42	908.51	908.32						0	2.5	0.013	1.00	0.20	
L-FNC-857	L-FNC-857	FNC-867	AV-A1.9	Circular	35	906.26	906.21						0	3	0.013	1.00	0.20	
L-858a.2	L-858a	AV-A2.1.2	FNC2018	Weir	0	912.86	912.86											
L-858a.3	L-858a	AV-A2.1.2	FNC2018	Weir	0	912.86	912.86											
L-858a.1	L-858a	AV-A2.1.2	FNC2018	Weir	0	912.86	912.86											
L-FNC-859	L-FNC-859	FNC-870	FNC-871	Circular	40	906.82	906.59						0	1.5	0.013	0.20	0.20	
L-FNC-860	L-FNC-860	FNC-871	AV-A2.1.4	Circular	221	906.59	905.45						0	1.5	0.013	1.00	0.20	
L-FNC-861	L-FNC-861	AV-A1.9.1	FNC-874	Circular	150	910.2	909.9						0	1.25	0.013	0.10	1.00	45 deg Beveled Ring (Circ, Conc)
Link5103	Link5103	AV-A1.9.1	FNC-876	Trapezoidal	740	913	911.92											
L-FNC-862	L-FNC-862	FNC-874	FNC-875	Circular	30	909.9	909.7						0	1.25	0.013	0.10	0.20	
L-FNC-863	L-FNC-863	FNC-875	FNC-876	Circular	163.26	909.66	909.22						0	1.5	0.013	0.10	0.20	
L-FNC-864	L-FNC-864	FNC-876	FNC-877	Circular	175	908.95	908.58						0	2	0.01	0.10	0.20	
L-FNC-865	L-FNC-865	FNC-877	FNC-878	Circular	35	908.58	908.45						0	2.25	0.013	0.10	0.20	
L-FNC-866	L-FNC-866	FNC-878	FNC-879	Circular	40	908.45	908.3						0	2.25	0.013	0.10	0.20	
L-FNC-867	L-FNC-867	FNC-879	AV-A1.9	Circular	24	906	905.85						0	2.25	0.013	1.00	0.20	
L-FNC-868	L-FNC-868	AV-A1.12.1	FNC-882	Arch	65	907.4	907						0	3	0.013	0.50	1.00	45 deg Beveled Ring (Circ, Conc)
L-FNC-869	L-FNC-869	FNC-882	FNC-883	Circular	195	906.5	905.8						0	3	0.013	0.50	0.20	
L-FNC-870	L-FNC-870	FNC-883	AV-A1.12.2	Circular	220	905.8	905						0	3	0.013	1.00	0.20	
L-F871a.2	L-F871a	AV-A1.12.2	FNC2014	Weir	0	907	907											
L-871a.3	L-F871a	AV-A1.12.2	FNC2014	Weir	0	907	907											
L-F871a.1	L-F871a	AV-A1.12.2	FNC2014	Weir	0	907	907											
L-FNC-872	L-FNC-872	FNC-886	FNC-887	Circular	319	904.94	904.4						0	2	0.013	0.50	0.20	
L-FNC-873	L-FNC-873	FNC-887	FNC-888	Circular	114	904.4	904.2						0	2	0.013	0.20	0.20	
L-FNC-874	L-FNC-874	FNC-888	FNC-889	Circular	109	904.2	904.06						0	2	0.01	0.10	0.20	
L-FNC-875	L-FNC-875	FNC-889	AV-A1.12.4	Circular	33	904.06	904						0	2	0.013	1.00	0.20	
L-F877a.2	L-F877a	AV-A1.12.3	FNC2015	Weir	0	907.2	907.2											
L-F877a.3	L-F877a	AV-A1.12.3	FNC2015	Weir	0	907.2	907.2											
L-F877a.1	L-F877a	AV-A1.12.3	FNC2015	Weir	0	907.2	907.2											
L-FNC-877	L-FNC-877	FNC-892	FNC-893	Circular	81	904.45	904.3						0	2	0.013	0.50	0.20	
L-FNC-878	L-FNC-878	FNC-893	AV-A1.12.4	Circular	146	904.3	904						0	2	0.013	1.00	0.20	
L-F879a.2	L-F879a	AV-A1.12.4	FNC2016	Weir	0	907	907											
L-879a.3	L-F879a	AV-A1.12.4	FNC2016	Weir	0	907	907											
L-F879a.1	L-F879a	AV-A1.12.4	FNC2016	Weir	0	907	907											
L-F879_1a	L-F879_1	AV-A1.12.4	AV-A1.12.5	Trapezoidal	33	907.5	907.5											
L-F880.1	L-FNC-880	AV-A1.12.5	FNC-898	Circular	195	904	904						0	2	0.013	0.50	1.00	
L-F880.2	L-FNC-880	AV-A1.12.5	FNC-898	Circular	195	904	904						0	2	0.013	0.50	1.00	
L-F881.1	L-FNC-881	FNC-898	FNC-899	Circular	308	904	903						0	2	0.013	0.10	0.20	
L-F881.2	L-FNC-881	FNC-898	FNC-899	Circular	308	904	903						0	2	0.013	0.10	0.20	
L-F882.1	L-FNC-882	FNC-899	FNC-900	Circular	400	903	902						0	2	0.013	0.20	0.20	

Table B-1 Hydraulic Parameters for Farmington North Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington North Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-F882.2	L-FNC-882	FNC-899	FNC-900	Circular	400	903	902						0	2	0.013	0.20	0.20	
L-FNC-883	L-FNC-883	FNC-900	FNC-901	Circular	400	902	901						0	2	0.013	0.20	0.20	
L-F883a.1	L-F883a	FNC-900	FNC-902	Trapezoidal	260	906	905.5											
L-FNC-884	L-FNC-884	FNC-901	FNC-902	Circular	100	901	900.5						0	2	0.013	1.00	0.20	
L-FNC-987	L-FNC-987	FNC-902	AV-A1.13	Natural	166	900.5	898.9	70	115	0.080	0.040	0.080						
LFNC904.1	L-F904c	AV-A2.1.1	FNC-904	Circular	25	904.96	904.91						0	2	0.013	0.50	0.50	Groove End with Projecting (Circ, Conc)
L-904c.1	L-F904c	AV-A2.1.1	FNC-904	Circular	25	904.96	904.91						0	2	0.013	0.50	0.50	Groove End with Projecting (Circ, Conc)
L-904c.2	L-F904c	AV-A2.1.1	FNC-904	Circular	25	904.96	904.91						0	2	0.013	0.50	0.50	Groove End with Projecting (Circ, Conc)
L-FNC-886	L-FNC-886	FNC-904	FNC-905	Circular	104	907.01	906.73						0	2	0.013	0.50	0.20	
L-FNC-887	L-FNC-887	FNC-905	AV-A2.1.5	Circular	188	906.73	906.21						0	2	0.013	1.00	0.20	
L-F888a.2	L-F888a	AV-A1.10.1	FNC2019	Weir	0	913.76	913.76											
L-F888a.3	L-F888a	AV-A1.10.1	FNC2019	Weir	0	913.76	913.76											
L-F888a.1	L-F888a	AV-A1.10.1	FNC2019	Weir	0	913.76	913.76											
L-FNC-889	L-FNC-889	FNC-908	FNC-909	Circular	149	911.97	911.58						0	1.5	0.013	0.50	0.20	
L-FNC-890	L-FNC-890	FNC-909	FNC-907	Circular	33	911.58	911.48						0	1.5	0.013	0.50	0.20	
L-FNC-891	L-FNC-891	FNC-907	AV-A1.10.2	Circular	161	911.48	910.8						0	1.5	0.013	1.00	0.20	
L-F892.1b	L-F-892.1	AV-A1.10.2	FNC-1028	Weir	0	912.74	912.74											
L-F892.1c	L-F-892.1	AV-A1.10.2	FNC-1028	Weir	0	912.74	912.74											
L-F892.1a	L-F-892.1	AV-A1.10.2	FNC-1028	Weir	0	912.74	912.74											
L-F893.1b	L-F893.1	AV-A1.10.3	FNC2002	Weir	0	914.34	914.34											
L-F893.1c	L-F893.1	AV-A1.10.3	FNC2002	Weir	0	914.34	914.34											
L-F893.1a	L-F893.1	AV-A1.10.3	FNC2002	Weir	0	914.34	914.34											
L-FNC-894	L-FNC-894	FNC-915	FNC-916	Circular	125	911.47	911.31						0	2	0.013	0.50	0.20	
L-FNC-895	L-FNC-895	FNC-916	FNC-917	Circular	80	911.25	911.14						0	2.25	0.013	0.50	0.20	
L-FNC-896	L-FNC-896	FNC-917	FNC-918	Circular	194	911.14	910.86						0	2.25	0.013	0.10	0.20	
L-FNC-897	L-FNC-897	FNC-918	FNC-919	Circular	91	910.86	910.5						0	2.25	0.013	0.50	0.20	
L-FNC-898	L-FNC-898	FNC-919	AV-A1.10.4	Circular	167	910.5	910.19						0	2.25	0.013	1.00	0.20	
L-F899.1b	L-F899.1	AV-A1.10.4	FNC2003	Weir	0	912.16	912.16											
L-F899.1c	L-F899.1	AV-A1.10.4	FNC2003	Weir	0	912.16	912.16											
L-F899.1a	L-F899.1	AV-A1.10.4	FNC2003	Weir	0	912.16	912.16											
L-F900.1b	L-F900.1	AV-A1.10.6	FNC2005	Weir	0	912.3	912.3											
L-F900.1c	L-F900.1	AV-A1.10.6	FNC2005	Weir	0	912.3	912.3											
L-F900.1a	L-F900.1	AV-A1.10.6	FNC2005	Weir	0	912.3	912.3											
L-F900a.2	Link4798	AV-A1.10.6	Node3178	Weir	0	913.6	913.6											
L-F901_1	L-F901_1	AV-A1.11.1	FNC-926	Trapezoidal	134	911.2	910.1											
L-F901.1b	L-FNC901.1	AV-A1.11.1	FNC2009	Weir	0	910.42	910.42											
L-F901.1c	L-FNC901.1	AV-A1.11.1	FNC2009	Weir	0	910.42	910.42											
L-F901.1a	L-FNC901.1	AV-A1.11.1	FNC2009	Weir	0	910.42	910.42											
L-FNC-902	L-FNC-902	FNC-926	AV-A1.11.2	Circular	140	906.6	906.07						0	1.5	0.013	1.00	0.20	
L-F903-1b	L-F903.1	AV-A1.10.5	FNC2004	Weir	0	913.18	913.18											
L-F903.1c	L-F903.1	AV-A1.10.5	FNC2004	Weir	0	913.18	913.18											
L-F903.1a	L-F903.1	AV-A1.10.5	FNC2004	Weir	0	913.18	913.18											
L-FNC-904	L-FNC-904	FNC-929	FNC-930	Circular	364	910.89	910.2						0	1.5	0.013	0.50	0.20	
L-FNC-905	L-FNC-905	FNC-930	AV-A1.10.6	Circular	14	910.2	909.87						0	1.5	0.013	1.00	0.20	
L-F906a.2	L-F906a	AV-A1.11.3	FNC2010	Weir	0	909.14	909.14											
L-F906a.3	L-F906a	AV-A1.11.3	FNC2010	Weir	0	909.14	909.14											
L-F906a.1	L-F906a	AV-A1.11.3	FNC2010	Weir	0	909.14	909.14											
L-FNC-907	L-FNC-907	FNC-933	AV-A1.11.5	Circular	367	906.29	905.59						0	2	0.013	1.00	0.20	
L-F908.1b	L-F908.1	AV-A1.10.8	FNC2007	Weir	0	910.4	910.4											
L-F908.1c	L-F908.1	AV-A1.10.8	FNC2007	Weir	0	910.4	910.4											
L-F908.1a	L-F908.1	AV-A1.10.8	FNC2007	Weir	0	910.4	910.4											
L-F909.1b	L-F909.1	AV-A1.10.7	FNC2006	Weir	0	911.24	911.24											
L-F909.1c	L-F909.1	AV-A1.10.7	FNC2006	Weir	0	911.24	911.24											
L-F909.1a	L-F909.1	AV-A1.10.7	FNC2006	Weir	0	911.24	911.24											
L-F910.1b	L-F910.1	AV-A1.10.9	FNC2008	Weir	0	910.53	910.53											
L-F910.1c	L-F910.1	AV-A1.10.9	FNC2008	Weir	0	910.53	910.53											
L-F910.1a	L-F910.1	AV-A1.10.9	FNC2008	Weir	0	910.53	910.53											
L-F910_1a	L-F910_1	AV-A1.10.9	AV-A1.10	Natural	350	910.6	910	1555	1605	0.050	0.050	0.050						
L-FNC-989	L-FNC-989	FNC-940	AV-A1.10	Natural	314	906.4	906.4	1015	1065	0.050	0.035	0.050						
L-F911a.2	L-F911a	AV-A1.11.6	FNC2012	Weir	0	908.38	908.38											

Table B-1 Hydraulic Parameters for Farmington North Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington North Creek Conduits and Reaches																		
								Natural Channels					Pipes & Culverts					
L-F911a.3	L-F911a	AV-A1.11.6	FNC2012	Weir	0	908.38	908.38											
L-F911a.1	L-F911a	AV-A1.11.6	FNC2012	Weir	0	908.38	908.38											
L-FNC-912	L-FNC-912	FNC-942	AV-A1.11.7	Circular	181	906.17	905.45						0	2.5	0.013	1.00	0.20	
L-F913_1	L-F913_1	AV-A1.11.7	AV-A1.11.8	Trapezoidal	40	908	908											
L-F913b.1	L-F913b	AV-A1.11.7	FNC2013a	Weir	0	908.26	908.26											
L-F913b.2	L-F913b	AV-A1.11.7	FNC2013a	Weir	0	908.26	908.26											
L-F913a.1	L-F913a	AV-A1.11.7	FNC2013	Orifice	0	903.26	903.26						0	0	0	0.00	0.00	
L-FNC-914	L-FNC-914	AV-A1.11.8	AV-A1.11.9	Natural	106	905	905	410	455	0.050	0.035	0.050						
L-FNC-986	L-FNC-986	AV-A1.11.9	FNC-902	Natural	1792	905	900.5	675	765	0.050	0.035	0.050						
L-F918.1	L-FNC-918	AV-A2.7.1	FNC-2021	Circular	68	898.5	898.5						0	1.5	0.013	0.15	1.00	Square Edge with Headwall (Circ, Conc)
L-F918.2	L-FNC-918	AV-A2.7.1	FNC-2021	Circular	68	898.5	898.5						0	1.5	0.013	0.15	1.00	Square Edge with Headwall (Circ, Conc)
L-FNC-919	L-FNC-919	AV-A1.3	FNC-950	Circular	119	911.35	910.8						0	1	0.013	0.10	1.00	Square Edge with Headwall (Circ, Conc)
L-FNC-920	L-FNC-920	FNC-950	FNC-951	Circular	32	910.8	910.73						0	1.5	0.013	0.10	0.20	
L-FNC-921	L-FNC-921	FNC-951	FNC-952	Circular	227	910.73	910.3						0	1.5	0.013	0.30	0.20	
L-FNC-922	L-FNC-922	FNC-952	FNC-953	Circular	42.6	910.3	910.05						0	1.75	0.013	0.30	0.20	
L-FNC-923	L-FNC-923	FNC-953	FNC-954	Circular	121.46	910.05	909.81						0	1.75	0.013	0.10	0.20	
L-FNC-924	L-FNC-924	FNC-954	FNC-955	Circular	101.5	909.81	909.53						0	2	0.013	0.10	0.20	
L-FNC-925	L-FNC-925	FNC-955	FNC-956	Circular	153	909.53	909.2						0	2	0.013	1.00	0.20	
L-FNC-926	L-FNC-926	FNC-956	FNC-957	Circular	33	909.2	909.21						0	2	0.013	0.50	0.20	
L-F926a.1	L-F926a	FNC-956	AV-A1.5.2	Trapezoidal	33	916	915.07											
L-FNC-927	L-FNC-927	FNC-957	FNC-958	Circular	16.5	909.21	909.08						0	2	0.013	0.50	0.20	
L-FNC-928	L-FNC-928	FNC-958	FNC-959	Circular	91	909.03	908.87						0	3	0.013	1.00	0.40	
L-F928a.1	L-F928a	FNC-958	AV-A1.5.2	Trapezoidal	150	915.16	915											
L-FNC-929	L-FNC-929	FNC-959	AV-A1.5.2	Circular	14	908.87	908.11						0	3	0.013	1.00	0.20	
L-F930.1	L-FNC-930	AV-A1.5.2	FNC-961	Circular	586.7	908.11	907.9						0	5.5	0.013	0.20	0.40	
L-F930.2	L-FNC-930	AV-A1.5.2	FNC-961	Circular	586.7	908.11	907.9						0	5.5	0.013	0.20	0.40	
L-FNC-931	L-FNC-931	FNC-961	FNC-962	Circular	110	907.9	907.9						0	5.5	0.013	0.20	0.20	
L-FNC-932	L-FNC-932	FNC-962	FNC-963	Circular	378	907.9	908.55						0	5.5	0.013	0.40	0.20	
L-FNC-933	L-FNC-933	FNC-963	FNC-964	Circular	136	908.24	908.36						0	6	0.013	0.10	0.40	
L-FNC-934	L-FNC-934	FNC-964	FNC-965	Circular	287	908.36	907.38						0	5	0.013	0.10	0.20	
L-FNC-935	L-FNC-935	FNC-965	FNC-966	Circular	148	907.38	907.25						0	5	0.013	0.10	0.20	
L-FNC-936	L-FNC-936	FNC-966	FNC-967	Circular	160	907.25	907.56						0	5	0.013	0.10	0.20	
5606.1	L-FNC-937	FNC-967	AV-A1.9	Circular	92	907.56	905.85						0	5	0.013	1.00	0.20	
5606.2	L-FNC-937	FNC-967	AV-A1.9	Circular	92	907.56	905.85						0	5	0.013	1.00	0.20	
L-FNC-938	L-FNC-938	AV-A2.1.4	AV-A2.1.5	Circular	30	906.1	906						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FNC-939	L-FNC-939	AV-A2.1.3	AV-A2.1.5	Natural	123	906.1	906.1	50	205	0.080	0.040	0.080						
L-FNC-940	L-FNC-940	AV-A1.4	FNC-974	Circular	57	914.1	912.52						0	2.5	0.013	0.50	0.50	
L-FNC-941	L-FNC-941	FNC-974	FNC-975	Circular	534	910.52	909.2						0	2.5	0.013	0.10	0.20	
L-FNC-942	L-FNC-942	FNC-975	FNC-976	Circular	180	909.2	908.92						0	4.5	0.013	0.10	0.20	
L-FNC-943	L-FNC-943	FNC-976	AV-A1.5.2	Circular	148.5	908.92	908.11						0	4.5	0.013	0.40	0.20	
L-F943a.1	L-F943	FNC-976	FNC-956	Trapezoidal	100	914.65	914.23											
L-FNC-944	L-FNC-944	AV-A1.6.2	FNC-978	Circular	81	926.5	919.75						0	1	0.013	0.10	1.00	45 deg Beveled Ring (Circ, Conc)
L-FNC-945	L-FNC-945	FNC-978	FNC-979	Circular	40	918.75	918.63						0	2	0.013	0.10	0.20	
L-FNC-946	L-FNC-946	FNC-979	FNC-980	Circular	40	918.63	918.45						0	2	0.013	0.10	0.20	
L-FNC-947	L-FNC-947	FNC-980	FNC-981	Circular	12	918.45	918.35						0	2	0.013	0.10	0.20	
L-FNC-948	L-FNC-948	FNC-981	FNC-982	Circular	35	918.35	918.25						0	2	0.013	0.10	0.20	
L-FNC-949	L-FNC-949	FNC-982	FNC-983	Circular	13	918.25	918.15						0	2	0.013	0.10	0.20	
L-FNC-950	L-FNC-950	FNC-983	FNC-984	Circular	23	918.15	916.8						0	2	0.013	0.10	0.20	
L-FNC-951	L-FNC-951	FNC-984	FNC-985	Circular	234	916.8	916.7						0	2	0.013	0.10	0.20	
L-FNC-952	L-FNC-952	FNC-985	FNC-986	Circular	72	916.7	912.16						0	2	0.013	1.00	0.20	
L-FNC-953	L-FNC-953	FNC-986	FNC-987	Circular	147.5	912.16	911.89						0	3	0.013	0.50	0.20	
L-FNC-954	L-FNC-954	FNC-987	FNC-988	Circular	167	911.89	911.35						0	3	0.013	0.20	0.20	
L-FNC-955	L-FNC-955	FNC-988	FNC-989	Circular	101.2	911.35	911.03						0	3	0.013	0.20	0.20	
L-FNC-956	L-FNC-956	FNC-989	FNC-990	Circular	265.8	911.03	910.02						0	3	0.013	0.20	0.20	
L-FNC-957	L-FNC-957	FNC-990	FNC-991	Circular	67.2	910.02	909.76						0	3	0.013	0.20	0.20	
L-FNC-958	L-FNC-958	FNC-991	FNC-992	Circular	13	909.76	909.67						0	3	0.013	0.10	0.20	
L-FNC-959	L-FNC-959	FNC-992	FNC-993	Circular	142	909.67	909.39						0	3	0.013	0.20	0.20	
L-FNC-960	L-FNC-960	FNC-993	FNC-963	Circular	42	909.39	909.31						0	3	0.013	1.00	0.20	
L-FNC-961	L-FNC-961	AV-A1.5.1	FNC-995	Circular	125	913.62	913.29						0	1	0.013	1.00	1.00	Square Edge with Headwall (Circ, Conc)
L-F_L-01	Link5106	AV-A1.5.1	NCL-71	Weir	0	914.4	914.4											

Table B-1 Hydraulic Parameters for Farmington North Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington North Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FNC-962	L-FNC-962	FNC-995	FNC-996	Circular	28	913.29	913.23						0	1	0.013	1.00	1.00	
L-FNC-963	L-FNC-963	FNC-996	FNC-997	Circular	31	913.23	913.17						0	1.5	0.013	1.00	0.20	
L-FNC-964	L-FNC-964	FNC-997	FNC-998	Circular	114.5	913.17	912.94						0	1.5	0.013	0.10	0.20	
L-FNC-965	L-FNC-965	FNC-998	FNC-999	Circular	114.5	912.94	912.61						0	1.5	0.013	0.10	0.20	
L-FNC-966	L-FNC-966	FNC-999	FNC-1000	Circular	31	912.61	912.41						0	1.5	0.013	1.00	0.20	
L-FNC-967	L-FNC-967	FNC-1000	FNC-1001	Circular	145	912.41	912.16						0	1.5	0.013	0.20	0.20	
L-FNC-968	L-FNC-968	FNC-1001	FNC-1002	Circular	80	912.16	911.96						0	1.5	0.013	1.00	0.20	
L-FNC-969	L-FNC-969	FNC-1002	FNC-1003	Circular	134.05	911.79	911.6						0	1.5	0.013	1.00	0.20	
L-FNC-970	L-FNC-970	FNC-1003	FNC-1004	Circular	31	911.6	911.58						0	2	0.013	0.10	0.20	
L-FNC-971	L-FNC-971	FNC-1004	FNC-1005	Circular	114.5	911.58	911.41						0	2	0.013	0.10	0.20	
L-F972.1	L-FNC-972	FNC-1005	FNC-1006	Circular	113.75	911.28	911.03						0	2	0.013	0.10	0.20	
L-F972.2	L-FNC-972	FNC-1005	FNC-1006	Circular	113.75	911.28	911.03						0	2	0.013	0.10	0.20	
L-F973.1	L-FNC-973	FNC-1006	FNC-1007	Circular	32.75	911.03	910.78						0	2	0.013	0.10	0.20	
L-F973.2	L-FNC-973	FNC-1006	FNC-1007	Circular	32.75	911.03	910.78						0	2	0.013	0.10	0.20	
L-F974.1	L-FNC-974	FNC-1007	FNC-1008	Circular	113.5	910.78	910.37						0	2.5	0.013	0.10	0.20	
L-F974.2	L-FNC-974	FNC-1007	FNC-1008	Circular	113.5	910.78	910.37						0	2.5	0.013	0.10	0.20	
L-F975.1	L-FNC-975	FNC-1008	FNC-1009	Circular	112.35	910.37	910.08						0	2.5	0.013	0.10	0.20	
L-F975.2	L-FNC-975	FNC-1008	FNC-1009	Circular	112.35	910.37	910.08						0	2.5	0.013	0.10	0.20	
L-F976.1	L-FNC-976	FNC-1009	FNC-1010	Circular	35.3	910.08	909.92						0	3	0.013	0.10	0.20	
L-F976.2	L-FNC-976	FNC-1009	FNC-1010	Circular	35.3	910.08	909.92						0	3	0.013	0.10	0.20	
L-F977.1	L-FNC-977	FNC-1010	FNC-1011	Circular	112.35	909.92	910.28						0	3	0.013	1.00	0.20	
L-F977.2	L-FNC-977	FNC-1010	FNC-1011	Circular	112.35	909.92	910.28						0	3	0.013	1.00	0.20	
L-F978.1	L-FNC-978	FNC-1011	FNC-1012	Circular	326.35	910.28	909.82						0	3	0.013	0.10	0.20	
L-F978.2	L-FNC-978	FNC-1011	FNC-1012	Circular	326.35	910.28	909.82						0	3	0.013	0.10	0.20	
L-F979.1	L-FNC-979	FNC-1012	FNC-1013	Circular	35.3	909.82	909.76						0	3	0.013	0.10	0.20	
L-F979.2	L-FNC-979	FNC-1012	FNC-1013	Circular	35.3	909.82	909.76						0	3	0.013	0.10	0.20	
L-F980.1	L-FNC-980	FNC-1013	FNC-1014	Circular	380.35	909.76	909.34						0	3	0.013	0.10	0.20	
L-F980.2	L-FNC-980	FNC-1013	FNC-1014	Circular	380.35	909.76	909.34						0	3	0.013	0.10	0.20	
L-F981.1	L-FNC-981	FNC-1014	FNC-958	Circular	248	909.34	909.12						0	3	0.013	1.00	0.20	
L-F981.2	L-FNC-981	FNC-1014	FNC-958	Circular	248	909.34	909.12						0	3	0.013	1.00	0.20	
L-FNC-990	L-FNC-990	AV-A2.3	AV-A2.4	Natural	2494	908.2	905.6	140	150	0.080	0.040	0.080						
L-FNC-992	L-FNC-992	AV-A1.16	FNC-1018	Natural	1179	943.5	933.9	290	335	0.080	0.040	0.080						
L-FNC-995	L-FNC-995	FNC-1018	FNC-1021	Natural	982	933.9	928	260	290	0.080	0.040	0.080						
L-FNC-993	L-FNC-993	AV-A1.15	FNC-1018	Natural	1500	963.3	933.9	225	260	0.080	0.040	0.080						
L-FNC-994	L-FNC-994	AV-A1.14	FNC-1021	Natural	856	945.3	928	25	230	0.050	0.035	0.050						
L-FNC-996	L-FNC-996	FNC-1021	NCreek-7	Natural	1320	928	916.6	70	150	0.050	0.037	0.050						
L-1000a.2	L-FNC1000a	AV-A1.1	FNC-1027	Weir	0	929.3	929.3											
L-1000a.3	L-FNC1000a	AV-A1.1	FNC-1027	Weir	0	929.3	929.3											
L-1000a.1	L-FNC1000a	AV-A1.1	FNC-1027	Weir	0	929.3	929.3											
L-FNC-1001	L-FNC-1001	FNC-1026	FNC-815	Circular	142	926.07	925.48						0	1	0.013	1.00	0.20	
L-F1002a.2	L-F1002a	AV-A1.11.4	FNC2011	Weir	0	907.53	907.53											
L-F1002a.3	L-F1002a	AV-A1.11.4	FNC2011	Weir	0	907.53	907.53											
L-F1002a.1	L-F1002a	AV-A1.11.4	FNC2011	Weir	0	907.53	907.53											
L-FNC-1000	L-FNC-1000	FNC-1027	FNC-1026	Circular	182	926.3	926.07						0	1	0.013	1.00	1.00	
L-FNC-892	L-FNC-892	FNC-1028	AV-A1.10.6	Circular	57	910.48	909.92						0	1.25	0.013	1.00	1.00	
L-FNC-893	L-FNC-893	FNC2002	FNC-915	Circular	157	912.24	911.47						0	2	0.013	1.00	1.00	
L-FNC-899	L-FNC-899	FNC2003	AV-A1.10.6	Circular	47	910.22	910.08						0	1.5	0.013	1.00	1.00	
L-FNC-903	L-FNC-903	FNC2004	FNC-929	Circular	38	910.98	910.89						0	1.5	0.013	0.50	1.00	
L-FNC-900	L-FNC-900	FNC2005	AV-A1.10.7	Circular	95	910.25	909.91						0	1.25	0.013	1.00	1.00	
L-FNC-909	L-FNC-909	FNC2006	AV-A1.10.9	Circular	31	908.91	908.2						0	1.5	0.013	1.00	1.00	
L-FNC-908	L-FNC-908	FNC2007	AV-A1.10.7	Circular	23	909.08	908.98						0	1	0.013	1.00	1.00	
L-FNC-910	L-FNC-910	FNC2008	FNC-940	Circular	90	908.08	907.84						0	1.5	0.013	1.00	1.00	
L-FNC-901	L-FNC-901	FNC2009	FNC-926	Circular	134	908.39	906.7						0	1.25	0.013	0.10	1.00	
L-FNC-906	L-FNC-906	FNC2010	FNC-933	Circular	20	906.44	906.34						0	0.83	0.01	0.10	1.00	
L-FNC-1002	L-FNC-1002	FNC2011	AV-A1.11.5	Circular	39	905.13	905.27						0	1.25	0.013	1.00	1.00	
L-FNC-911	L-FNC-911	FNC2012	FNC-942	Circular	153	906.85	906.17						0	1	0.01	1.00	1.00	
L-FNC-913	L-FNC-913	FNC2013a	AV-A1.11.8	Circular	41	905.76	905.1						0	1	0.013	1.00	1.00	
L-F913c.2	L-F913c	FNC2013	FNC2013a	Weir	0	907.7	907.7											
L-F913c.1	L-F913c	FNC2013	FNC2013a	Weir	0	907.7	907.7											
L-FNC-871	L-FNC-871	FNC2014	FNC-886	Circular	49	905	904.94						0	2	0.01	0.50	1.00	

Table B-1 Hydraulic Parameters for Farmington North Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington North Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FNC-876	L-FNC-876	FNC2015	FNC-892	Circular	126	904.65	904.45						0	2	0.01	0.50	1.00	
L-FNC-879	L-FNC-879	FNC2016	AV-A1.12.5	Circular	33	904	903.9						0	2.5	0.013	1.00	1.00	
L-FNC-822	L-FNC-822	FNC2017	FNC-824	Circular	86	914.09	913.95						0	1.25	0.013	0.50	1.00	
L-FNC-858	L-FNC-858	FNC2018	FNC-870	Circular	172	908.1	906.82						0	1.5	0.013	0.20	1.00	
L-FNC-888	L-FNC-888	FNC2019	FNC-908	Circular	23	912.22	912.22						0	1.25	0.013	0.50	1.00	
L-1174c	L-1174c	FNC2020	FNC2021	Circular	13	905.85	905.7						0	1.5	0.013	0.20	1.00	
L-1174d	L-1174d	FNC2021	FNC2022	Circular	33	905.7	905.39						0	3.5	0.013	0.50	0.10	
L-1175	L-1175	FNC2022	AV-A1.11.2	Natural	625	905.85	905.5	1090	1145	0.050	0.037	0.050						
L-FNC900a	L-FNC900a	Node3178	FNC-940	Natural	1250	910.5	906.4	1940	2220	0.050	0.050	0.050						
L-1598	L-1598	N-1372	NCL-84	Natural	270.68	910.9	910.11	1179	1337	0.075	0.037	0.060						
5748.1	LNCRK-268	NCL-70	56AA006	Arch	132	915.39	915.39						0	1.833	0.013	1.00	0.50	Square Edge with Headwall (Circ, Conc)
5748_1	LNCRK-268	NCL-70	56AA006	Arch	132	915.39	915.39						0	1.833	0.013	1.00	0.50	Square Edge with Headwall (Circ, Conc)
LNCRK-271	LNCRK-271	NCL-71	N-857	Natural	114.7	911.8	911.91	825	1030	0.080	0.040	0.080						
L-1584	L-1584	NCL-84	N-1365	Natural	563.3	910.11	908.1	1130	1174	0.071	0.037	0.060						
L-FNC-918a	L-FNC-918a	FNC-2021	AV-A2.6	Natural	306	898.5	898	100	160	0.050	0.035	0.050						
L-F2040	L-F2040	FNC-2040	FNC-2040.1	Natural	60	896.24	895.3	463	487	0.070	0.037	0.060						
L-446.1	L-446.1	FNC-2040.1	N-445	Natural	550	896.24	894.9	760	781	0.070	0.037	0.060						

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-204	L-204	N-206	N-207	Natural	1975.7	888.5	884	1142	1162	0.080	0.037	0.080						
L-F918.1	L-FNC-918	AV-A2.7.1	FNC-2021	Circular	68	898.5	898.5						0	1.5	0.013	0.15	1.00	Square Edge with Headwall (Circ, Conc)
L-F918.2	L-FNC-918	AV-A2.7.1	FNC-2021	Circular	68	898.5	898.5						0	1.5	0.013	0.15	1.00	Square Edge with Headwall (Circ, Conc)
L-FNC-918a	L-FNC-918a	FNC-2021	AV-A2.6	Natural	306	898.5	898	100	160	0.050	0.035	0.050						
L1195_1	L-1195	F-A1.15	N-1061	Rectangular	140	916.46	916.02						8	8	0.013	1.00	0.70	0 deg Wingwall Flares (Rect, Conc)
L1195_2	L-1195	F-A1.15	N-1061	Rectangular	140	916.46	916.02						8	8	0.013	1.00	0.70	0 deg Wingwall Flares (Rect, Conc)
L1195.1	L-1195	F-A1.15	N-1061	Rectangular	140	916.46	916.02						8	8	0.013	1.00	0.70	0 deg Wingwall Flares (Rect, Conc)
L-194	L-194	F-A3.7	N-197	Natural	2412.5	908.91	908.632	519	540	0.060	0.037	0.060						
L-454	L-454	N-197	N-451	Natural	377.23	908.632	907.688	1985	2005	0.060	0.037	0.060						
L-195	L-195	F-A4.8	N-197	Natural	1046.5	909.25	908.632	940	985	0.050	0.037	0.050						
L-1193.1	L-1193	F-A6.4	N-1060	Natural	60.823	912.5	912.5	655	4150	0.013	0.013	0.013						
L1193_1	L-1193	F-A6.4	N-1060	Natural	60.823	912.5	912.5	655	4150	0.013	0.013	0.013						
L1193_2	L-1193	F-A6.4	N-1060	Natural	60.823	912.5	912.5	655	4150	0.013	0.013	0.013						
L1193_3	L-1193	F-A6.4	N-1060	Natural	60.823	912.5	912.5	655	4150	0.013	0.013	0.013						
L1193_4	L-1193	F-A6.4	N-1060	Natural	60.823	912.5	912.5	655	4150	0.013	0.013	0.013						
L-198	L-198	F-A7.13a	N-FF294	Natural	262.28	896.78	896	865	905	0.050	0.037	0.050						
L-FMC004	L-FMC004	N-202	N-FF039	Natural	296	894.18	894	280	300	0.072	0.037	0.060						
L-201	L-201	F-A8.11	N-204	Natural	1194	890.93	888.69	3910	4035	0.050	0.037	0.050						
L-1187	L-1187	N-204	F-A8.12	Natural	577.93	888.69	888.5	1422	1442	0.080	0.037	0.080						
L-202	L-202	F-A8.9	N-204	Natural	2667.6	895.5	888.69	1510	1565	0.050	0.037	0.050						
L-FMC307	L-FMC307	N-449	F-A7.6	Natural	304	898.912	900.09	280	300	0.076	0.037	0.100						
L-1645.1	L-1645	F-A5.12	N-1404	Natural	40	913	913	795	1085	0.013	0.013	0.013						
L1645_1	L-1645	F-A5.12	N-1404	Natural	40	913	913	795	1085	0.013	0.013	0.013						
L-FMC013	L-FMC013	N-451	N-FF190	Natural	538	907.688	906.9	1630	1670	0.060	0.037	0.060						
L-1188.1	L-1188	F-A8.12	N-206	Natural	32	888.5	888.5	1422	1442	0.080	0.037	0.080						
L-1190.1	L-1190	F-A7.15	N-1058	Natural	88.586	903.5	903.5	470	2375	0.013	0.013	0.013						
L1190_1	L-1190	F-A7.15	N-1058	Natural	88.586	903.5	903.5	470	2375	0.013	0.013	0.013						
L1190_2	L-1190	F-A7.15	N-1058	Natural	88.586	903.5	903.5	470	2375	0.013	0.013	0.013						
L-1191	L-1191	N-1058	N-202	Natural	632.86	894.82	894.18	690	710	0.080	0.037	0.080						
L-1192.1	L-1192	N-1059	N-449	Natural	51.772	903.73	903.73	105	505	0.013	0.013	0.013						
L1192_1	L-1192	N-1059	N-449	Natural	51.772	903.73	903.73	105	505	0.013	0.013	0.013						
L1192_2	L-1192	N-1059	N-449	Natural	51.772	903.73	903.73	105	505	0.013	0.013	0.013						
L-FMC011	L-FMC011	N-1060	F-A7.4	Natural	1124	903.4	901.61	1037	1204	0.060	0.037	0.060						
L-FMC016	L-FMC016	N-1061	N-FF224	Natural	796	916.02	915.44	170	220	0.060	0.037	0.060						
L-1199	L-1199	N-1063	F-A1.15	Natural	1584.8	923.7	916.46	665	710	0.050	0.037	0.050						
L-FMC020	L-FMC020	N-1065	F-A2.2	Natural	1386	943.9	934.6	540	580	0.050	0.037	0.050						
L-1314.1	L-1314	F-A1.4	N-1157	Natural	48.614	958.365	958.365	1275	1395	0.013	0.013	0.013						
L1314_1	L-1314	F-A1.4	N-1157	Natural	48.614	958.365	958.365	1275	1395	0.013	0.013	0.013						
L-FMC213	L-FMC213	N-1157	N-FF239	Natural	446	950.4	950.4	140	180	0.050	0.037	0.050						
L-1578	L-1578	N-1362	F-A8.11	Natural	398.16	893.446	893.129	2777	2815	0.080	0.037	0.080						
L-FMC430	L-FMC430	F-A1.1	N-FF315	Natural	337	958.55	956.8	1295	1335	0.050	0.037	0.050						
L-1613.1	L-1613	F-A7.3	N-1379	Natural	35	910	910	340	405	0.013	0.013	0.013						Mitered to Slope (Circ, Corr Metal)
L1613_1	L-1613	F-A7.3	N-1379	Natural	35	910	910	340	405	0.013	0.013	0.013						Mitered to Slope (Circ, Corr Metal)
L1613_2	L-1613	F-A7.3	N-1379	Natural	35	910	910	340	405	0.013	0.013	0.013						Mitered to Slope (Circ, Corr Metal)
L-1616	L-1616	N-1379	N-1380	Natural	770.64	903.5	899.97	670	840	0.050	0.037	0.050						
L-1615	L-1615	N-1380	N-1059	Natural	779.35	899.97	899.463	274	319	0.060	0.037	0.060						
L-FMC305	L-FMC305	N-1404	N-FF237	Natural	777	908.4	907.95	90	120	0.060	0.037	0.060						
L-FMC303	L-FMC303	N-1407	N-FF002	Natural	1189	899	897.59	4740	4800	0.050	0.037	0.050						
L-1651.1	L-1651	F-A8.9.11	N-1409	Natural	28	900	900	1160	1225	0.013	0.013	0.013						
L1651_1	L-1651	F-A8.9.11	N-1409	Natural	28	900	900	1160	1225	0.013	0.013	0.013						
L-1652	L-1652	N-1409	F-A8.9	Natural	781.19	896.71	895.5	4415	4755	0.050	0.037	0.050						
L-FMC247	L-FMC247	N-1459	F-A3.5	Natural	1197	926.83	913.88	260	300	0.060	0.037	0.060						
L-1712.1	L-1712	F-A3.4	N-1459	Natural	93	937.368	937.368	625	890	0.013	0.013	0.013						
L1712_1	L-1712	F-A3.4	N-1459	Natural	93	937.368	937.368	625	890	0.013	0.013	0.013						
L-FMC192	L-FMC192	F-A1.10	N-FF275	Natural	52	961.2	961.05	160	310	0.050	0.030	0.050						
L-FMC193	L-FMC193	F-A1.11	N-FF275	Natural	65	961.86	961.05	150	230	0.050	0.030	0.050						
L-FMC431.1	L-FMC431	F-A1.11	F-A1.10	Weir	0	962.2	962.2											
L-FMC190	L-FMC190	F-A1.12	N-FF228	Natural	272	937.8	937.1	220	250	0.050	0.037	0.050						
L-FMC186	L-FMC186	F-A1.13	F-A1.14	Natural	1210	928.22	923	630	660	0.050	0.037	0.050						
L-FMC372	L-FMC372	F-A1.13.1	N-FF229	Trapezoidal	33	954.5	954.5											

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC339.1	L-FMC338	F-A1.13.1	N-FF301	Orifice	0	948.8	948.8											
L-FMC185	L-FMC185	F-A1.14	F-A1.15	Natural	1597	923	916.46	700	790	0.050	0.037	0.050						
L-FMC228	L-FMC228	F-A1.2	N-FF238	Natural	80	969.01	967	200	420	0.050	0.035	0.050						
L-FMC229	L-FMC229	F-A1.3	N-FF238	Natural	77	968.97	967	300	610	0.050	0.035	0.050						
L-FMC211	L-FMC211	F-A1.5	F-A1.6	Natural	1567	948.01	944.1	280	310	0.050	0.037	0.050						
L-FMC210	L-FMC210	F-A1.6	N-FF308	Natural	409	944.1	943.17	40	70	0.050	0.037	0.050						
L-FMC209	L-FMC209	F-A1.7a	N-FF233	Natural	1198	942.13	939.53	280	320	0.050	0.037	0.050						
L-FMC223_1	L-FMC223	F-A1.7b	N-FF273	Circular	127	957.88	957.46						0	1.75	0.013	0.50	0.20	
L-FMC223.1	L-FMC223	F-A1.7b	N-FF273	Circular	127	957.88	957.46						0	1.75	0.013	0.50	0.20	
L-FMC208	L-FMC208	F-A1.8.1	N-FF271	Circular	148	995.08	986.45						0	1	0.013	1.00	0.50	
L-FMC373	L-FMC373	F-A1.8.1	N-FF270	Trapezoidal	500	998.2	989.48											
L-FMC198	L-FMC198	F-A1.8.2	F-A1.8.3	Trapezoidal	60	954.3	954.3											
L-FMC374	L-FMC374	F-A1.8.3	N-FF260	Trapezoidal	50	955.1	953.6											
L-FMC334o1	L-FMC334	F-A1.8.3	N-FF300	Orifice	0	949.63	949.63											
L-FMC336w1	L-FMC336	F-A1.8.3	N-FF261	Weir	0	954.5	954.5											
L-FMC194	L-FMC194	F-A1.9	F-A1.12	Natural	694	938.17	937.8	280	320	0.050	0.037	0.050						
L-FMC376	L-FMC376	F-A1.9.1	N-FF308	Trapezoidal	595	967.9	945											
L-FMC367w1	L-FMC367	F-A1.9.1	N-FF259	Weir	0	967.23	967.23											
L-FMC367w2	L-FMC367	F-A1.9.1	N-FF259	Weir	0	967.23	967.23											
L-FMC367o1	L-FMC367	F-A1.9.1	N-FF259	Weir	0	967.23	967.23											
L-FMC377	L-FMC377	F-A1.9.2	F-A1.7a	Trapezoidal	100	949.5	946.3											
L-FMC339w1	L-FMC339	F-A1.9.2	N-FF255	Weir	0	949.19	949.19											
L-FMC339w2	L-FMC339	F-A1.9.2	N-FF255	Weir	0	949.19	949.19											
L-FMC339o1	L-FMC339	F-A1.9.2	N-FF255	Weir	0	949.19	949.19											
L-FMC019	L-FMC019	F-A2.2	N-FF244	Natural	998	934.6	928.33	250	310	0.050	0.037	0.050						
L-FMC280	L-FMC280	F-A2.3	F-A2.2	Natural	106	937.95	937	400	600	0.050	0.035	0.050						
L-FMC258_1	L-FMC258	F-A2.4	N-FF249	Circular	44	966.52	965.93						0	1.42	0.024	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC258.1	L-FMC258	F-A2.4	N-FF249	Circular	44	966.52	965.93						0	1.42	0.024	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC260_1	L-FMC260	F-A2.5	N-FF251	Circular	57	960.7	959.19						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC260.1	L-FMC260	F-A2.5	N-FF251	Circular	57	960.7	959.19						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC261	L-FMC261	F-A2.6	N-FF253	Circular	69	964.93	964.62						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC379	L-FMC379	F-A2.6	N-1063	Trapezoidal	1535	967	930											
L-FMC251_1	L-FMC251	F-A3.1	N-FF221	Circular	66	973.64	972.88						0	2	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC251.1	L-FMC251	F-A3.1	N-FF221	Circular	66	973.64	972.88						0	2	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC282	L-FMC282	F-A3.10	F-A3.7	Natural	83	911.1	908.91	200	340	0.050	0.030	0.050						
L-FMC249	L-FMC249	F-A3.2	N-FF218	Natural	131	940.66	940.43	250	280	0.060	0.037	0.060						
L-FMC252	L-FMC252	F-A3.3	F-A3.2	Natural	25	940.51	940.66	270	330	0.060	0.037	0.060						
L-FMC246	L-FMC246	F-A3.5	F-A3.6	Natural	64	913.88	912.98	260	300	0.060	0.037	0.060						
L-FMC014	L-FMC014	F-A3.6	F-A3.7	Natural	2314	912.98	908.91	470	520	0.060	0.037	0.060						
L-FMC380	L-FMC380	F-A3.6.1	N-FF224	Trapezoidal	50	924.4	923											
L-FMC349o1	L-FMC349	F-A3.6.1	N-FF304	Orifice	0	920.3	920.3											
L-FMC350w1	L-FMC350	F-A3.6.1	N-FF225	Weir	0	922.5	922.5											
L-FMC350w2	L-FMC350	F-A3.6.1	N-FF225	Weir	0	922.5	922.5											
L-FMC382	L-FMC382	F-A3.6.2	N-FF309	Trapezoidal	100	942	941											
L-FMC366o1	L-FMC366	F-A3.6.2	N-FF278	Orifice	0	934.83	934.83											
L-FMC287	L-FMC287	F-A3.8	N-FF280	Circular	39	968.3	966.87						0	2	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC285	L-FMC285	F-A3.9	N-FF187	Circular	48	973.38	971.88						0	1.5	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC383	L-FMC383	F-A3.9	F-A3.8	Trapezoidal	360	976.2	975											
L-FMC265	L-FMC265	F-A4.1.1	F-A4.1.3	Circular	120	981.73	981.05						0	1.5	0.013	0.10	1.00	
L-FMC411	L-FMC411	F-A4.1.1	L-A1.1b	Trapezoidal	950	985.9	961											
L-FMC360w1	L-FMC360	F-A4.1.2	N-FF208	Weir	0	991	991											
L-FMC361w1	L-FMC361	F-A4.1.2	N-FF306	Weir	0	990.3	990.3											
L-FMC298	L-FMC298	F-A4.1.3	N-FF292	Circular	10	980.26	980.17						0	1.75	0.013	0.10	0.20	
L-FMC384	L-FMC384	F-A4.1.4	F-A4.1.5	Trapezoidal	360	991.7	987.2											
L-FMC362w1	L-FMC362	F-A4.1.4	N-FF203	Weir	0	990.4	990.4											
L-FMC295	L-FMC295	F-A4.1.5	N-FF290	Circular	75	972.34	972.02						0	3.5	0.013	0.50	0.20	
L-FMC420w1	L-FMC420	F-A4.2	N-FF200	Weir	0	947.92	947.92											
L-FMC420w2	L-FMC420	F-A4.2	N-FF200	Weir	0	947.92	947.92											
L-FMC420o1	L-FMC420	F-A4.2	N-FF200	Weir	0	947.92	947.92											
L-FMC421w1	L-FMC421	F-A4.2	N-FF093	Weir	0	955.93	955.93											

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC421w2	L-FMC421	F-A4.2	N-FF093	Weir	0	955.93	955.93											
L-FMC241	L-FMC241	F-A4.3	N-FF096	Circular	72	981.66	980.8						0	1.5	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC417	L-FMC417	F-A4.3	F-A3.9	Trapezoidal	250	984.2	980											
L-FMC236	L-FMC236	F-A4.4	F-A4.6	Natural	1087	917.2	910.08	440	490	0.050	0.037	0.050						
L-FMC237	L-FMC237	F-A4.5	F-A4.4	Natural	100	917.92	917.2	360	390	0.050	0.037	0.050						
L-FMC235	L-FMC235	F-A4.6	N-197	Natural	211	910.08	908.632	440	490	0.050	0.037	0.050						
L-FMC234	L-FMC234	F-A4.7	F-A4.8	Natural	1860	923.96	909.25	330	430	0.050	0.037	0.050						
L-FMC180	L-FMC180	F-A5.1	N-FF188	Circular	75	934.19	930.32						0	1.5	0.013	0.10	1.00	
L-FMC351w1	L-FMC351	F-A5.10	N-FF119	Weir	0	925.58	925.58											
L-FMC351w2	L-FMC351	F-A5.10	N-FF119	Weir	0	925.58	925.58											
L-FMC351o1	L-FMC351	F-A5.10	N-FF119	Weir	0	925.58	925.58											
L-FMC358w1	L-FMC358	F-A5.10	N-FF118	Weir	0	931.43	931.43											
L-FMC358w2	L-FMC358	F-A5.10	N-FF118	Weir	0	931.43	931.43											
L-FMC279_1	L-FMC279	F-A5.10.1	F-A5.10	Circular	24	925	922						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC279.1	L-FMC279	F-A5.10.1	F-A5.10	Circular	24	925	922						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC410	L-FMC410	F-A5.10.2a	F-A5.10	Trapezoidal	50	928.6	928.6											
L-FMC352w1	L-FMC352	F-A5.10.2a	N-FF121	Weir	0	930.39	930.39											
L-FMC352w2	L-FMC352	F-A5.10.2a	N-FF121	Weir	0	930.39	930.39											
L-FMC352o1	L-FMC352	F-A5.10.2a	N-FF121	Weir	0	930.39	930.39											
L-FMC122	L-FMC122	F-A5.10.2b	N-FF130	Circular	15	950.45	949.81						0	1	0.013	0.50	0.20	
L-FMC267	L-FMC267	F-A5.11	F-A5.12	Circular	109	915.87	915						0	2.5	0.013	1.00	1.00	
L-FMC386	L-FMC386	F-A5.12.1	F-A5.12	Trapezoidal	50	914.3	914											
L-FMC347w1	L-FMC347	F-A5.12.1	N-FF111	Weir	0	913.38	913.38											
L-FMC347.1	L-FMC347	F-A5.12.1	N-FF111	Weir	0	913.38	913.38											
L-FMC347o1	L-FMC347	F-A5.12.1	N-FF111	Weir	0	913.38	913.38											
L-FMC387	L-FMC387	F-A5.12.2	F-A5.12	Trapezoidal	50	913	913											
L-FMC346w1	L-FMC346	F-A5.12.2	N-FF110	Weir	0	912.19	912.19											
L-FMC346w2	L-FMC346	F-A5.12.2	N-FF110	Weir	0	912.19	912.19											
L-FMC346o1	L-FMC346	F-A5.12.2	N-FF110	Weir	0	912.19	912.19											
L-FMC363w1	L-FMC363	F-A5.2.1	N-FF178	Weir	0	945.78	945.78											
L-FMC167	L-FMC167	F-A5.2.2	N-FF174	Circular	195	929.3	928.71						0	2	0.013	0.10	1.00	Groove End with Projecting (Circ, Conc)
L-FMC178	L-FMC178	F-A5.3	N-FF185	Circular	19	956.89	956.7						0	1.75	0.013	0.10	0.20	
L-FMC388	L-FMC388	F-A5.3	F-A5.7	Trapezoidal	330	964	961.6											
L-FMC389	L-FMC389	F-A5.4	F-A5.5	Trapezoidal	50	932	932											
L-FMC364w1	L-FMC364	F-A5.4	N-FF162	Weir	0	929.84	929.84											
L-FMC151	L-FMC151	F-A5.5	F-A5.10	Circular	92	923	922.5						0	4	0.013	1.00	0.20	Groove End with Projecting (Circ, Conc)
L-FMC162p1	L-FMC162	F-A5.6	N-FF169	Circular	75	927.32	926.77						0	1	0.013	0.10	1.00	Groove End with Projecting (Circ, Conc)
L-FMC162w1	L-FMC162	F-A5.6	N-FF169	Circular	75	927.32	926.77						0	1	0.013	0.10	1.00	Groove End with Projecting (Circ, Conc)
L-FMC162w2	L-FMC162	F-A5.6	N-FF169	Circular	75	927.32	926.77						0	1	0.013	0.10	1.00	Groove End with Projecting (Circ, Conc)
L-FMC150	L-FMC150	F-A5.7	N-FF157	Circular	307	952	948.1						0	1	0.013	0.50	1.00	Groove End with Projecting (Circ, Conc)
L-FMC143	L-FMC143	F-A5.8	N-FF150	Circular	76	950.7	950						0	1.75	0.013	1.00	0.50	
L-FMC390	L-FMC390	F-A5.8	N-FF313	Trapezoidal	120	954.5	954.5											
L-FMC423w1	L-FMC423	F-A5.9	N-FF133	Weir	0	954.44	954.44											
L-FMC423w2	L-FMC423	F-A5.9	N-FF133	Weir	0	954.44	954.44											
L-FMC426o1	L-FMC426	F-A5.9	N-FF312	Orifice	0	949.61	949.61											
L-FMC131	L-FMC131	F-A5.9.1	F-A5.9	Circular	100	954.8	954						0	1.25	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC140	L-FMC140	F-A5.9.2	N-FF147	Circular	50	951	949.6						0	1.75	0.013	0.10	1.00	
L-FMC233	L-FMC233	F-A6.1	N-FF106	Circular	91	915.37	915.2						0	3.5	0.013	0.10	1.00	Groove End with Projecting (Circ, Conc)
L-FMC391	L-FMC391	F-A6.1	F-A7.9	Trapezoidal	2000	918.6	910											
L-FMC392	L-FMC392	F-A6.4.1	N-FF190	Trapezoidal	50	911	911											
L-FMC344o1	L-FMC344	F-A6.4.1	N-FF303	Orifice	0	906	906											
L-FMC345.1	L-FMC345	F-A6.4.1	N-FF192	Weir	0	909.78	909.78											
L-FMC345w2	L-FMC345	F-A6.4.1	N-FF192	Weir	0	909.78	909.78											
L-FMC393	L-FMC393	F-A6.4.2	N-FF237	Trapezoidal	50	910.2	910.2											
L-FMC342w1	L-FMC342	F-A6.4.2	N-FF108	Weir	0	910.54	910.54											
L-FMC342w2	L-FMC342	F-A6.4.2	N-FF108	Weir	0	910.54	910.54											
L-FMC341o1	L-FMC341	F-A6.4.2	N-FF302	Orifice	0	906.24	906.24											
L-FMC331w1	L-FMC331	F-A7.1	N-FF088	Weir	0	951.15	951.15											
L-FMC331w2	L-FMC331	F-A7.1	N-FF088	Weir	0	951.15	951.15											
L-FMC331o1	L-FMC331	F-A7.1	N-FF088	Weir	0	951.15	951.15											

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC060	L-FMC060	F-A7.10	F-A7.13a	Natural	2143	900.77	896.78	550	600	0.050	0.037	0.050						
L-FMC058	L-FMC058	F-A7.14	F-A7.15	Natural	188	903.18	902.5	220	240	0.050	0.030	0.050						
L-FMC394	L-FMC394	F-A7.14.1	F-A7.14	Trapezoidal	50	907.8	907											
L-FMC314o1	L-FMC314	F-A7.14.1	N-FF299	Orifice	0	904.5	904.5											
L-FMC312w1	L-FMC312	F-A7.14.1	N-FF059	Weir	0	908.8	908.8											
L-FMC312w2	L-FMC312	F-A7.14.1	N-FF059	Weir	0	908.8	908.8											
L-FMC418w1	L-FMC418	F-A7.2	N-FF068	Weir	0	910.41	910.41											
L-FMC418w2	L-FMC418	F-A7.2	N-FF068	Weir	0	910.41	910.41											
L-FMC418o1	L-FMC418	F-A7.2	N-FF068	Weir	0	910.41	910.41											
L-FMC330w1	L-FMC330	F-A7.2.1	N-FF311	Weir	0	920.3	920.3											
L-FMC330w2	L-FMC330	F-A7.2.1	N-FF311	Weir	0	920.3	920.3											
L-FMC330o1	L-FMC330	F-A7.2.1	N-FF311	Weir	0	920.3	920.3											
L-FMC332w1	L-FMC332	F-A7.2.2	N-FF071	Weir	0	915.9	915.9											
L-FMC332w2	L-FMC332	F-A7.2.2	N-FF071	Weir	0	915.9	915.9											
L-FMC332o1	L-FMC332	F-A7.2.2	N-FF071	Weir	0	915.9	915.9											
L-FMC333w1	L-FMC333	F-A7.2.3	N-FF076	Weir	0	919.37	919.37											
L-FMC333w2	L-FMC333	F-A7.2.3	N-FF076	Weir	0	919.37	919.37											
L-FMC333o1	L-FMC333	F-A7.2.3	N-FF076	Weir	0	919.37	919.37											
L-FMC395	L-FMC395	F-A7.3.1	N-FF063	Trapezoidal	33	910.2	909.5											
L-FMC355w1	L-FMC355	F-A7.3.1	N-FF064	Weir	0	908.9	908.9											
L-FMC355w2	L-FMC355	F-A7.3.1	N-FF064	Weir	0	908.9	908.9											
L-FMC355o1	L-FMC355	F-A7.3.1	N-FF064	Weir	0	908.9	908.9											
L-FMC422w1	L-FMC422	F-A7.3.2	N-FF062	Weir	0	908.73	908.73											
L-FMC422w2	L-FMC422	F-A7.3.2	N-FF062	Weir	0	908.73	908.73											
L-FMC422o1	L-FMC422	F-A7.3.2	N-FF062	Weir	0	908.73	908.73											
L-FMC419w1	L-FMC419	F-A7.3.3	N-FF066	Weir	0	908.75	908.75											
L-FMC419w2	L-FMC419	F-A7.3.3	N-FF066	Weir	0	908.75	908.75											
L-FMC419o1	L-FMC419	F-A7.3.3	N-FF066	Weir	0	908.75	908.75											
L-FMC010	L-FMC010	F-A7.4	N-1380	Natural	952	901.61	899.97	1037	1204	0.060	0.037	0.060						
L-FMC424w1	L-FMC424	F-A7.4.1	N-FF104	Weir	0	909.35	909.35											
L-FMC424w2	L-FMC424	F-A7.4.1	N-FF104	Weir	0	909.35	909.35											
L-FMC424o1	L-FMC424	F-A7.4.1	N-FF104	Weir	0	909.35	909.35											
L-FMC220	L-FMC220	F-A7.5	N-1059	Circular	50	903.07	902.76						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC396	L-FMC396	F-A7.5	N-1380	Trapezoidal	50	906.2	906.2											
L-FMC230	L-FMC230	F-A7.5.1	F-A7.5.2	Natural	217	909.2	908.3	10	40	0.050	0.035	0.050						
L-FMC369w1	L-FMC369	F-A7.5.2	N-FF101	Weir	0	909.09	909.09											
L-FMC369w2	L-FMC369	F-A7.5.2	N-FF101	Weir	0	909.09	909.09											
L-FMC369o1	L-FMC369	F-A7.5.2	N-FF101	Weir	0	909.09	909.09											
L-FMC368w1	L-FMC368	F-A7.5.3	N-FF099	Weir	0	909.23	909.23											
L-FMC368w2	L-FMC368	F-A7.5.3	N-FF099	Weir	0	909.23	909.23											
L-FMC368o1	L-FMC368	F-A7.5.3	N-FF099	Weir	0	909.23	909.23											
L-FMC397	L-FMC397	F-A7.5.4	F-A7.5	Trapezoidal	50	909	907											
L-FMC357w1	L-FMC357	F-A7.5.4	N-FF092	Weir	0	907	907											
L-FMC357w2	L-FMC357	F-A7.5.4	N-FF092	Weir	0	907	907											
L-FMC008	L-FMC008	F-A7.6	N-FF057	Natural	872	900.09	898.96	230	250	0.076	0.037	0.100						
L-FMC398	L-FMC398	F-A7.6.1	N-1059	Trapezoidal	50	908.7	908.7											
L-FMC356w1	L-FMC356	F-A7.6.1	N-FF061	0	0	0	0						0	0	0	0.00	0.00	
L-FMC356w2	L-FMC356	F-A7.6.1	N-FF061	0	0	0	0						0	0	0	0.00	0.00	
L-FMC356w3	L-FMC356	F-A7.6.1	N-FF061	0	0	0	0						0	0	0	0.00	0.00	
L-FMC073	L-FMC073	F-A7.7	F-A7.8	Natural	191	904.93	897.71	190	220	0.050	0.037	0.050						
L-FMC006	L-FMC006	F-A7.8	N-FF294	Natural	777	897.71	896	200	220	0.076	0.037	0.100						
L-FMC072	L-FMC072	F-A7.9	N-FF054	Circular	68	908.03	907.35						0	2	0.013	0.10	1.00	Groove End with Projecting (Circ, Conc)
L-FMC399	L-FMC399	F-A7.9	N-FF052	Trapezoidal	175	913.5	913.45											
L-FMC278_1	L-FMC278	F-A8.10.1	N-FF039	Circular	24	896	895.9						0	1.25	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC278.1	L-FMC278	F-A8.10.1	N-FF039	Circular	24	896	895.9						0	1.25	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC400	L-FMC400	F-A8.12.1	N-FF310	Trapezoidal	20	899.8	899.8											
L-FMC310w1	L-FMC310	F-A8.12.1	N-FF298	Weir	0	900.09	900.09											
L-FMC310w2	L-FMC310	F-A8.12.1	N-FF298	Weir	0	900.09	900.09											
L-FMC310o1	L-FMC310	F-A8.12.1	N-FF298	Weir	0	900.09	900.09											
L-FMC327w1	L-FMC327	F-A8.2.1	N-FF014	Weir	0	905.2	905.2											

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC327w2	L-FMC327	F-A8.2.1	N-FF014	Weir	0	905.2	905.2											
L-FMC327o1	L-FMC327	F-A8.2.1	N-FF014	Weir	0	905.2	905.2											
L-FMC326w1	L-FMC326	F-A8.2.2	N-FF012	Weir	0	904.9	904.9											
L-FMC326w2	L-FMC326	F-A8.2.2	N-FF012	Weir	0	904.9	904.9											
L-FMC354o1	L-FMC354	F-A8.2.2	N-FF305	Orifice	0	902	902											
L-FMC401	L-FMC401	F-A8.2.3	F-A8.2.1	Trapezoidal	50	907.2	907.2											
L-FMC324w1	L-FMC324	F-A8.2.3	N-FF015	Weir	0	906.25	906.25											
L-FMC324w2	L-FMC324	F-A8.2.3	N-FF015	Weir	0	906.25	906.25											
L-FMC324o1	L-FMC324	F-A8.2.3	N-FF015	Weir	0	906.25	906.25											
L-FMC325w1	L-FMC325	F-A8.3.1	N-FF019	Weir	0	903.24	903.24											
L-FMC325w2	L-FMC325	F-A8.3.1	N-FF019	Weir	0	903.24	903.24											
L-FMC325o1	L-FMC325	F-A8.3.1	N-FF019	Weir	0	903.24	903.24											
L-FMC323w1	L-FMC323	F-A8.3.2	N-FF017	Weir	0	902.44	902.44											
L-FMC323w2	L-FMC323	F-A8.3.2	N-FF017	Weir	0	902.44	902.44											
L-FMC323o1	L-FMC323	F-A8.3.2	N-FF017	Weir	0	902.44	902.44											
L-FMC321w1	L-FMC321	F-A8.3.3	N-FF020	Weir	0	902.27	902.27											
L-FMC321w2	L-FMC321	F-A8.3.3	N-FF020	Weir	0	902.27	902.27											
L-FMC321o1	L-FMC321	F-A8.3.3	N-FF020	Weir	0	902.27	902.27											
L-FMC322w1	L-FMC322	F-A8.3.4	N-FF011	Weir	0	903.7	903.7											
L-FMC322w2	L-FMC322	F-A8.3.4	N-FF011	Weir	0	903.7	903.7											
L-FMC322o1	L-FMC322	F-A8.3.4	N-FF011	Weir	0	903.7	903.7											
L-FMC402	L-FMC402	F-A8.3.5	F-A8.3.6	Trapezoidal	50	902.6	902.6											
L-FMC328w1	L-FMC328	F-A8.3.5	N-FF010	Weir	0	902.4	902.4											
L-FMC328w2	L-FMC328	F-A8.3.5	N-FF010	Weir	0	902.4	902.4											
L-FMC328o1	L-FMC328	F-A8.3.5	N-FF010	Weir	0	902.4	902.4											
L-FMC026_1	L-FMC026	F-A8.3.6	N-FF008	Circular	40	899.5	899						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC026.1	L-FMC026	F-A8.3.6	N-FF008	Circular	40	899.5	899						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC085	L-FMC085	F-A8.4a	F-A7.2	Natural	817	937.8	913.3	40	70	0.050	0.035	0.050						Groove End with Projecting (Circ, Conc)
L-FMC024	L-FMC024	F-A8.4b	N-FF006	Natural	467	898.55	898.39	240	280	0.050	0.037	0.050						
L-FMC009	L-FMC009	F-A8.5	N-FF297	Natural	39	898.8	898.8	200	230	0.050	0.037	0.050						
L-FMC311w1	L-FMC311	F-A8.6.1	N-FF005	Weir	0	906	906											
L-FMC311w2	L-FMC311	F-A8.6.1	N-FF005	Weir	0	906	906											
L-FMC311o1	L-FMC311	F-A8.6.1	N-FF005	Weir	0	906	906											
L-FMC435.1	L-FMC435	F-A8.6.1	F-A8.6.2	Weir	0	907.5	907.5											
L-FMC304	L-FMC304	F-A8.6.2	N-FF297	Natural	45	898.8	898.8	380	410	0.050	0.037	0.050						
L-FMC022	L-FMC022	F-A8.7	F-A8.6.2	Natural	968	901.5	898.8	380	410	0.050	0.037	0.050						
L-FMC057	L-FMC057	F-A8.7.1	F-A8.7.2	Trapezoidal	26	901	901											
L-FMC056_1	L-FMC056	F-A8.7.2	N-FF295	Circular	82	900.8	900.55						0	2	0.013	0.50	0.50	Groove End with Projecting (Circ, Conc)
L-FMC056.1	L-FMC056	F-A8.7.2	N-FF295	Circular	82	900.8	900.55						0	2	0.013	0.50	0.50	Groove End with Projecting (Circ, Conc)
L-FMC403	L-FMC403	F-A8.8.1	F-A8.7	Trapezoidal	50	914.8	914.8											
L-FMC329w1	L-FMC329	F-A8.8.1	N-FF036	Weir	0	913.5	913.5											
L-FMC329w2	L-FMC329	F-A8.8.1	N-FF036	Weir	0	913.5	913.5											
L-FMC329o1	L-FMC329	F-A8.8.1	N-FF036	Weir	0	913.5	913.5											
L-FMC052	L-FMC052	F-A8.8.2	F-A8.7	Arch	17	906.86	906.32						0	2.333	0.024	1.00	0.20	
L-FMC370w1	L-FMC370	F-A8.9.10	N-FF021	Weir	0	900.9	900.9											
L-FMC370w2	L-FMC370	F-A8.9.10	N-FF021	Weir	0	900.9	900.9											
L-FMC370o1	L-FMC370	F-A8.9.10	N-FF021	Weir	0	900.9	900.9											
L-FMC320w1	L-FMC320	F-A8.9.1a	N-FF031	Weir	0	902.7	902.7											
L-FMC320w2	L-FMC320	F-A8.9.1a	N-FF031	Weir	0	902.7	902.7											
L-FMC320o1	L-FMC320	F-A8.9.1a	N-FF031	Weir	0	902.7	902.7											
L-FMC050	L-FMC050	F-A8.9.1b	F-A8.9.1a	Natural	563	901.3	898.3	70	120	0.050	0.030	0.050						
L-FMC318w1	L-FMC318	F-A8.9.2	N-FF030	Weir	0	902.4	902.4											
L-FMC318w2	L-FMC318	F-A8.9.2	N-FF030	Weir	0	902.4	902.4											
L-FMC318o1	L-FMC318	F-A8.9.2	N-FF030	Weir	0	902.4	902.4											
L-FMC319w1	L-FMC319	F-A8.9.3	N-FF029	Weir	0	903.1	903.1											
L-FMC319w2	L-FMC319	F-A8.9.3	N-FF029	Weir	0	903.1	903.1											
L-FMC319o1	L-FMC319	F-A8.9.3	N-FF029	Weir	0	903.1	903.1											
L-FMC315w1	L-FMC315	F-A8.9.4	N-FF023	Weir	0	901.3	901.3											
L-FMC315w2	L-FMC315	F-A8.9.4	N-FF023	Weir	0	901.3	901.3											
L-FMC315o1	L-FMC315	F-A8.9.4	N-FF023	Weir	0	901.3	901.3											

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC404	L-FMC404	F-A8.9.5	F-A8.9.7	Trapezoidal	50	902.3	902.3											
L-FMC317w1	L-FMC317	F-A8.9.5	N-FF028	Weir	0	902.2	902.2											
L-FMC317w2	L-FMC317	F-A8.9.5	N-FF028	Weir	0	902.2	902.2											
L-FMC317o1	L-FMC317	F-A8.9.5	N-FF028	Weir	0	902.2	902.2											
L-FMC405	L-FMC405	F-A8.9.6	F-A8.9.7	Trapezoidal	50	902.4	902.4											
L-FMC316w1	L-FMC316	F-A8.9.6	N-FF027	Weir	0	902.7	902.7											
L-FMC316w2	L-FMC316	F-A8.9.6	N-FF027	Weir	0	902.7	902.7											
L-FMC316o1	L-FMC316	F-A8.9.6	N-FF027	Weir	0	902.7	902.7											
L-FMC371w1	L-FMC371	F-A8.9.7	N-FF026	Weir	0	901.7	901.7											
L-FMC371w2	L-FMC371	F-A8.9.7	N-FF026	Weir	0	901.7	901.7											
L-FMC371o1	L-FMC371	F-A8.9.7	N-FF026	Weir	0	901.7	901.7											
L-FMC041	L-FMC041	F-A8.9.8	F-A8.9.9	Arch	18	899.6	899.5						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC406	L-FMC406	F-A8.9.8	N-204	Trapezoidal	870	900.2	895.3											
L-FMC040	L-FMC040	F-A8.9.9	F-A8.9.10	Arch	51	899.5	899.4						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC283	L-FMC283	N-FF002	F-A8.9.11	Natural	222	898.2	897.6	430	460	0.050	0.037	0.050						
L-FMC023	L-FMC023	N-FF006	F-A8.5	Natural	240	898.39	898.06	200	230	0.050	0.037	0.050						
L-FMC025	L-FMC025	N-FF008	N-1407	Natural	141	899	899	4740	4800	0.050	0.037	0.050						
L-FMC033	L-FMC033	N-FF016	F-A5.10	Circular	15	922.67	922.3						0	2	0.013	1.00	0.10	
L-FMC036	L-FMC036	N-FF018	F-A8.3.2	Circular	174	901.75	901						0	1	0.013	1.00	0.20	
L-FMC042	L-FMC042	N-FF025	F-A8.9.8	Arch	46	899.76	899.6						0	1.5	0.013	1.00	0.20	
L-FMC053	L-FMC053	N-FF034	F-A8.8.2	Circular	80	907.94	907						0	2.75	0.013	1.00	0.20	
L-FMC054	L-FMC054	N-FF035	N-FF034	Circular	730	908.89	907.94						0	2.75	0.013	0.10	0.20	
L-FMC003	L-FMC003	N-FF039	N-1362	Natural	1990	894	893.446	290	310	0.072	0.037	0.060						
L-FMC061	L-FMC061	N-FF044	F-A7.10	Natural	767	902.1	900.77	210	230	0.050	0.037	0.050						
L-FMC062	L-FMC062	N-FF045	N-FF044	Circular	290	902.62	902.1						0	4	0.013	0.10	0.20	
L-FMC063	L-FMC063	N-FF046	N-FF045	Circular	40	902.7	902.62						0	3.5	0.013	1.00	0.20	
L-FMC064	L-FMC064	N-FF047	N-FF046	Circular	24	902.75	902.7						0	3.5	0.013	1.00	0.20	
L-FMC414	L-FMC414	N-FF047	N-FF044	Trapezoidal	325	908.6	907.5											
L-FMC065_1	L-FMC065	N-FF048	N-FF283	Arch	130	903.36	903.1						0	2.25	0.013	0.10	0.20	
L-FMC065.1	L-FMC065	N-FF048	N-FF283	Arch	130	903.36	903.1						0	2.25	0.013	0.10	0.20	
L-FMC066_1	L-FMC066	N-FF049	N-FF048	Circular	37	903.48	903.37						0	3	0.013	0.40	0.20	
L-FMC066.1	L-FMC066	N-FF049	N-FF048	Circular	37	903.48	903.37						0	3	0.013	0.40	0.20	
L-FMC067_1	L-FMC067	N-FF050	N-FF049	Circular	253	904.24	903.48						0	3	0.013	0.10	0.20	
L-FMC067.1	L-FMC067	N-FF050	N-FF049	Circular	253	904.24	903.48						0	3	0.013	0.10	0.20	
L-FMC068_1	L-FMC068	N-FF051	N-FF050	Circular	48	904.71	904.24						0	3	0.013	1.00	0.40	
L-FMC068.1	L-FMC068	N-FF051	N-FF050	Circular	48	904.71	904.24						0	3	0.013	1.00	0.40	
L-FMC069	L-FMC069	N-FF052	N-FF051	Circular	335	904.98	904.71						0	3	0.013	0.40	0.20	
L-FMC070	L-FMC070	N-FF053	N-FF052	Circular	189	906.87	904.98						0	3	0.013	0.10	0.20	
L-FMC071	L-FMC071	N-FF054	N-FF053	Circular	48	907.35	906.87						0	2	0.013	0.40	0.20	
L-FMC007	L-FMC007	N-FF057	F-A7.8	Natural	458	898.96	897.71	190	210	0.076	0.037	0.100						
L-FMC300	L-FMC300	N-FF063	F-A7.3	Natural	856	904.47	903	200	220	0.050	0.037	0.050						
L-FMC076	L-FMC076	N-FF065	N-FF063	Natural	371	904.2	904.47	200	220	0.050	0.037	0.050						
L-FMC077	L-FMC077	N-FF067	N-FF065	Natural	613	906.53	904.2	420	460	0.050	0.037	0.050						
L-FMC080	L-FMC080	N-FF070	F-A7.2	Circular	82	908.85	908.58						0	1.75	0.013	1.00	0.20	
L-FMC082	L-FMC082	N-FF072	N-FF070	Circular	159	911.68	909.24						0	1.25	0.013	0.10	0.20	
L-FMC083	L-FMC083	N-FF073	N-FF072	Circular	135	913.61	911.68						0	1.25	0.013	1.00	0.20	
L-FMC086	L-FMC086	N-FF075	F-A7.2	Circular	129	909.09	908.39						0	1.75	0.013	1.00	0.40	
L-FMC088	L-FMC088	N-FF077	N-FF075	Circular	97	918.12	915.22						0	1.25	0.013	1.00	0.20	
L-FMC089	L-FMC089	N-FF078	N-FF077	Circular	181	923.42	918.12						0	1.25	0.013	1.00	0.20	
L-FMC090	L-FMC090	N-FF079	N-FF078	Circular	76	925.78	923.42						0	1.25	0.013	1.00	0.20	
L-FMC091	L-FMC091	N-FF080	N-FF079	Circular	179	930.87	925.78						0	1.25	0.013	1.00	0.20	
L-FMC092	L-FMC092	N-FF081	N-FF080	Circular	150	934.06	930.87						0	1.25	0.013	1.00	0.20	
L-FMC093	L-FMC093	N-FF082	N-FF081	Circular	111	936.36	934.06						0	1.25	0.013	0.50	0.20	
L-FMC094	L-FMC094	N-FF083	N-FF082	Circular	37	937.07	936.36						0	1.25	0.013	0.10	0.20	
L-FMC095	L-FMC095	N-FF084	N-FF083	Circular	74	938	937.08						0	1.25	0.013	0.10	0.20	
L-FMC096	L-FMC096	N-FF085	N-FF084	Circular	42	938.82	938.25						0	1	0.013	0.50	0.20	
L-FMC097	L-FMC097	N-FF086	N-FF085	Circular	206	941.96	938.82						0	1	0.013	0.50	0.20	
L-FMC098	L-FMC098	N-FF087	N-FF086	Circular	374	948.44	941.96						0	1	0.013	0.50	0.20	
L-FMC412	L-FMC412	N-FF087	F-A7.2.3	Trapezoidal	1037	956.19	917											
L-FMC299_1	L-FMC239	N-FF093	N-FF199	Circular	152	946.43	939.33						0	2	0.013	0.50	1.00	

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC299.1	L-FMC239	N-FF093	N-FF199	Circular	152	946.43	939.33						0	2	0.013	0.50	1.00	
L-FMC268	L-FMC268	N-FF094	F-A7.5	Circular	62	902.61	902.51						0	3	0.013	1.00	0.20	
L-FMC408	L-FMC408	N-FF095	F-A7.5	Trapezoidal	450	909	907.5											
L-FMC270_1	L-FMC270	N-FF095	N-FF094	Circular	458	903.29	902.61						0	3	0.013	0.50	0.20	
L-FMC271	L-FMC271	N-FF096	N-FF196	Circular	49	974.1	974.09						0	1.5	0.013	1.00	0.20	
L-FMC272	L-FMC272	N-FF097	N-FF095	Circular	32	903.36	903.29						0	2.5	0.013	0.40	0.20	
L-FMC273	L-FMC273	N-FF098	N-FF097	Circular	375	906.38	905.37						0	1.25	0.013	1.00	0.20	
L-FMC275	L-FMC275	N-FF100	N-FF097	Circular	414	906.11	904.89						0	1.75	0.013	1.00	0.20	
L-FMC231	L-FMC231	N-FF105	F-A6.4	Natural	3588	915.15	906.2	390	440	0.060	0.037	0.060						
L-FMC232	L-FMC232	N-FF106	N-FF105	Circular	69	915.2	915.15						0	3.5	0.013	0.50	0.20	
L-FMC105	L-FMC105	N-FF112	F-A5.12	Circular	40	909.04	908.59						0	3	0.013	1.00	0.20	
L-FMC106	L-FMC106	N-FF113	N-FF112	Circular	190	910.85	909.04						0	3	0.013	0.50	0.20	
L-FMC107	L-FMC107	N-FF114	N-FF113	Circular	295	915.65	911.54						0	1.5	0.013	0.50	0.20	
L-FMC108	L-FMC108	N-FF115	N-FF114	Circular	260	917.76	915.65						0	1.5	0.013	1.00	0.20	
L-FMC109	L-FMC109	N-FF116	N-FF115	Circular	445	919.5	917.76						0	1.5	0.013	0.10	0.20	
L-FMC110	L-FMC110	N-FF117	N-FF116	Circular	176	920.04	919.5						0	1.5	0.013	0.10	0.20	
L-FMC111	L-FMC111	N-FF118	N-FF117	Circular	182	921.01	920.04						0	1.5	0.013	0.10	0.20	
L-FMC115	L-FMC115	N-FF124	F-A5.10.2a	Circular	42	929.45	928.33						0	3	0.013	1.00	0.20	
L-FMC116	L-FMC116	N-FF125	N-FF124	Circular	38	934.29	933.8						0	2.5	0.013	1.00	0.20	
L-FMC117	L-FMC117	N-FF126	N-FF125	Circular	233	937.94	934.79						0	2	0.013	1.00	0.40	
L-FMC118	L-FMC118	N-FF127	N-FF126	Circular	123	938.4	937.94						0	2	0.013	0.40	0.40	
L-FMC119	L-FMC119	N-FF128	N-FF127	Circular	123	943.55	943.2						0	2	0.013	1.00	0.20	
L-FMC120	L-FMC120	N-FF129	N-FF128	Circular	122	948.06	945.8						0	2	0.013	1.00	0.20	
L-FMC121	L-FMC121	N-FF130	N-FF129	Circular	72	948.81	948.06						0	2	0.013	0.50	0.20	
L-FMC123	L-FMC123	N-FF132	F-A5.10.2b	Circular	139	950	949.31						0	1	0.013	0.50	0.20	
L-FMC132_1	L-FMC132	N-FF140	F-A5.10	Circular	40	923.68	921.68						0	3	0.013	1.00	0.20	
L-FMC132w1	L-FMC132	N-FF140	F-A5.10	Circular	40	923.68	921.68						0	3	0.013	1.00	0.20	
L-FMC133	L-FMC133	N-FF141	N-FF140	Circular	70	927.18	923.68						0	3	0.013	0.50	0.20	
L-FMC134	L-FMC134	N-FF142	N-FF141	Circular	414	935.46	927.18						0	3	0.013	1.00	0.20	
L-FMC135	L-FMC135	N-FF143	N-FF142	Circular	428	943.2	935.46						0	3	0.013	0.10	0.20	
L-FMC136	L-FMC136	N-FF144	N-FF143	Circular	80	949	948.7						0	1.75	0.013	1.00	0.20	
L-FMC137	L-FMC137	N-FF145	N-FF144	Circular	16	949.2	949						0	1.75	0.013	0.50	0.20	
L-FMC138	L-FMC138	N-FF146	N-FF145	Circular	13	949.4	949.2						0	1.75	0.013	0.10	0.20	
L-FMC139	L-FMC139	N-FF147	N-FF146	Circular	16	949.6	949.4						0	1.75	0.013	0.10	0.20	
L-FMC141	L-FMC141	N-FF149	N-FF143	Circular	100	944	943.2						0	3	0.013	1.00	0.40	
L-FMC142	L-FMC142	N-FF150	N-FF149	Circular	61	944.2	944						0	1.75	0.013	0.50	0.20	
L-FMC144	L-FMC144	N-FF152	N-FF149	Circular	143	944.72	944						0	2.5	0.013	0.40	0.20	
L-FMC145	L-FMC145	N-FF153	N-FF152	Circular	306	946.25	944.72						0	2	0.013	0.10	0.20	
L-FMC146	L-FMC146	N-FF154	N-FF153	Circular	300	947.75	946.25						0	1.75	0.013	0.10	0.20	
L-FMC147	L-FMC147	N-FF155	N-FF154	Circular	24	947.87	947.75						0	1.5	0.013	1.00	0.20	
L-FMC148	L-FMC148	N-FF156	N-FF155	Circular	16	947.95	947.87						0	1.5	0.013	0.10	0.20	
L-FMC149	L-FMC149	N-FF157	N-FF156	Circular	30	948.1	947.95						0	1.5	0.013	0.10	0.20	
L-FMC152	L-FMC152	N-FF160	F-A5.5	Circular	189	924.5	923						0	2.5	0.013	1.00	0.20	
L-FMC153	L-FMC153	N-FF161	N-FF160	Circular	94	924.21	924.5						0	2.5	0.013	0.10	0.20	
L-FMC155	L-FMC155	N-FF163	F-A5.5	Circular	22	923.35	923.22						0	3	0.013	1.00	0.40	
L-FMC156	L-FMC156	N-FF164	N-FF163	Circular	236	924.9	923.35						0	3	0.013	0.40	0.20	
L-FMC157	L-FMC157	N-FF165	N-FF164	Circular	325	925.84	924.9						0	1.5	0.013	1.00	0.20	
L-FMC158	L-FMC158	N-FF166	N-FF165	Circular	157	926.18	925.84						0	2	0.013	0.10	0.20	
L-FMC159	L-FMC159	N-FF167	N-FF166	Circular	32	926.34	926.18						0	2	0.013	0.10	0.20	
L-FMC160	L-FMC160	N-FF168	N-FF167	Circular	110	926.69	926.34						0	2	0.013	1.00	0.20	
L-FMC161	L-FMC161	N-FF169	N-FF168	Circular	150	926.77	926.69						0	2	0.013	1.00	0.20	
L-FMC163_1	L-FMC163	N-FF171	F-A5.6	Circular	91	927.54	927.32						0	1	0.013	1.00	0.20	
L-FMC163.1	L-FMC163	N-FF171	F-A5.6	Circular	91	927.54	927.32						0	1	0.013	1.00	0.20	
L-FMC164	L-FMC164	N-FF172	N-FF171	Circular	160	928.37	927.54						0	1	0.013	0.50	0.20	
L-FMC165	L-FMC165	N-FF173	N-FF172	Circular	61	928.69	928.37						0	2	0.013	1.00	0.20	
L-FMC166	L-FMC166	N-FF174	N-FF173	Circular	32	928.71	928.69						0	2	0.013	1.00	0.20	
L-FMC168_1	L-FMC168	N-FF176	F-A5.2.2	Circular	15	929.28	929.26						0	3.5	0.013	1.00	0.20	
L-FMC168.1	L-FMC168	N-FF176	F-A5.2.2	Circular	15	929.28	929.26						0	3.5	0.013	1.00	0.20	
L-FMC169	L-FMC169	N-FF177	N-FF176	Circular	45	937.26	929.28						0	2.5	0.013	0.10	0.20	
L-FMC171	L-FMC171	N-FF179	F-A5.2.2	Circular	305	949.67	929.38						0	1.75	0.013	1.00	0.20	

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC172	L-FMC172	N-FF180	N-FF179	Circular	33	951.76	949.67						0	1.75	0.013	0.10	0.20	
L-FMC173	L-FMC173	N-FF181	N-FF180	Circular	259	954.37	951.9						0	1.75	0.013	0.10	0.20	
L-FMC174	L-FMC174	N-FF182	N-FF181	Circular	40	954.77	954.37						0	1.75	0.013	0.50	0.20	
L-FMC175	L-FMC175	N-FF183	N-FF182	Circular	136	956.12	954.77						0	2	0.013	0.50	0.20	
L-FMC176	L-FMC176	N-FF184	N-FF183	Circular	32	956.44	956.12						0	2	0.013	0.10	0.20	
L-FMC177	L-FMC177	N-FF185	N-FF184	Circular	26	956.7	956.44						0	1.75	0.013	0.10	0.20	
L-FMC243	L-FMC243	N-FF187	N-FF212	Circular	57	962.2	961.88						0	1.5	0.013	1.00	0.20	
L-FMC179	L-FMC179	N-FF188	F-A5.2.2	Circular	120	929.31	927.5						0	1.5	0.013	1.00	0.20	
L-FMC012	L-FMC012	N-FF190	F-A6.4	Natural	2177	906.9	903	1630	1670	0.060	0.037	0.060						
L-FMC240	L-FMC240	N-FF196	F-A4.4	Natural	2091	973.92	917.2	290	310	0.050	0.037	0.050						
L-FMC238	L-FMC238	N-FF199	F-A4.5	Natural	1739	939.33	917.92	360	390	0.050	0.037	0.050						
L-FMC262	L-FMC262	N-FF202	N-FF291	Circular	160	984.27	982.72						0	2	0.013	0.10	0.20	
L-FMC296	L-FMC296	N-FF204	F-A4.1.5	Circular	291	975.24	973.76						0	3	0.013	0.00	0.00	
L-FMC264	L-FMC264	N-FF205	N-FF204	Circular	391	977.16	975.24						0	3	0.013	0.10	0.20	
L-FMC242	L-FMC242	N-FF212	F-A3.10	Natural	1814	961.88	911.1	200	340	0.050	0.030	0.050						
L-FMC244	L-FMC244	N-FF214	F-A3.10	Natural	1436	941.42	911.1	140	270	0.050	0.030	0.050						
L-FMC248	L-FMC248	N-FF218	F-A3.4	Natural	875	940.43	928.63	360	440	0.060	0.037	0.060						
L-FMC250	L-FMC250	N-FF221	F-A3.2	Natural	1204	972.88	945	280	310	0.060	0.037	0.060						
L-FMC015	L-FMC015	N-FF224	F-A3.6	Natural	729	915.44	912.98	310	340	0.060	0.037	0.060						
L-FMC187	L-FMC187	N-FF228	F-A1.13	Natural	1292	937.1	928.22	230	270	0.050	0.037	0.050						
L-FMC188	L-FMC188	N-FF229	N-FF228	Natural	215	949.4	942.5	220	260	0.050	0.037	0.050						
L-FMC195	L-FMC195	N-FF233	F-A1.9	Natural	85	939.53	938.17	280	320	0.050	0.037	0.050						
L-FMC212	L-FMC212	N-FF239	F-A1.5	Natural	612	950.4	948.01	230	270	0.050	0.037	0.050						
L-FMC306	L-FMC306	N-FF237	F-A6.4	Natural	1509	907.95	906.35	90	120	0.060	0.037	0.060						
L-FMC227	L-FMC227	N-FF238	F-A1.4	Natural	1500	967	953.9	300	520	0.050	0.030	0.050						
L-FMC018	L-FMC018	N-FF244	N-193	Natural	237	928.33	927	370	440	0.050	0.037	0.050						
L-FMC256	L-FMC256	N-FF248	N-FF244	Natural	614	943.97	937.8	150	170	0.050	0.037	0.050						
L-FMC257	L-FMC257	N-FF249	N-FF248	Natural	818	966.2	943.97	80	280	0.050	0.037	0.050						
L-FMC259	L-FMC259	N-FF251	N-FF248	Natural	644	959.19	943.97	170	210	0.050	0.037	0.050						
L-FMC378	L-FMC378	N-FF253	N-FF251	Trapezoidal	140	964.62	962											
L-FMC215_1	L-FMC215	N-FF256	F-A1.9.2	Circular	16.92	945.67	945.57						0	2.5	0.013	1.00	0.20	
L-FMC215.1	L-FMC215	N-FF256	F-A1.9.2	Circular	16.92	945.67	945.57						0	2.5	0.013	1.00	0.20	
L-FMC216	L-FMC216	N-FF257	N-FF256	Circular	154.48	955.85	948.39						0	2.5	0.013	1.00	0.20	
L-FMC217	L-FMC217	N-FF258	N-FF257	Circular	42.3	961.9	959.01						0	2.5	0.013	1.00	0.20	
L-FMC196	L-FMC196	N-FF260	N-FF233	Natural	478	950.01	939.53	110	160	0.050	0.035	0.050						
L-FMC199	L-FMC199	N-FF263	F-A1.8.2	Circular	170	955.66	954.57						0	2	0.013	1.00	0.20	
L-FMC200	L-FMC200	N-FF264	N-FF263	Circular	122.5	964.5	961.79						0	1.75	0.013	1.00	0.20	
L-FMC201	L-FMC201	N-FF265	N-FF264	Circular	238	967.55	965.25						0	1.75	0.013	1.00	0.20	
L-FMC202	L-FMC202	N-FF266	N-FF265	Circular	46	968.37	967.55						0	1.75	0.013	1.00	0.20	
L-FMC203	L-FMC203	N-FF267	N-FF266	Circular	86.5	969.35	968.37						0	1.75	0.013	1.00	0.20	
L-FMC204	L-FMC204	N-FF268	N-FF267	Circular	106	972.05	969.6						0	1.5	0.013	1.00	0.20	
L-FMC205	L-FMC205	N-FF269	N-FF268	Circular	131	973.38	971.19						0	1.5	0.013	0.10	0.20	
L-FMC206	L-FMC206	N-FF270	N-FF269	Circular	92	984.94	980.25						0	1.25	0.013	1.00	0.20	
L-FMC207_1	L-FMC207	N-FF271	N-FF270	Circular	69	986.45	984.94						0	1.25	0.013	1.00	0.20	
L-FMC207.1	L-FMC207	N-FF271	N-FF270	Circular	69	986.45	984.94						0	1.25	0.013	1.00	0.20	
L-FMC221	L-FMC221	N-FF273	F-A1.6	Natural	456	957.46	946.79	40	320	0.050	0.030	0.050						
L-FMC191	L-FMC191	N-FF275	F-A1.12	Natural	1216	961.05	941.5	210	240	0.050	0.030	0.050						
L-FMC286	L-FMC286	N-FF280	N-FF281	Circular	103	960.82	956.89						0	2	0.013	1.00	0.20	
L-FMC245_1	L-FMC245	N-FF281	N-FF214	Circular	308	949.72	941.42						0	2	0.013	1.00	0.20	
L-FMC245.1	L-FMC245	N-FF281	N-FF214	Circular	308	949.72	941.42						0	2	0.013	1.00	0.20	
L-FMC184	L-FMC184	N-FF282	N-FF309	Circular	24	934	933.7						0	1.5	0.013	1.00	0.20	
L-FMC284_1	L-FMC284	N-FF283	N-FF047	Circular	176	903.1	902.75						0	3.5	0.013	0.10	0.20	
L-FMC284.1	L-FMC284	N-FF283	N-FF047	Circular	176	903.1	902.75						0	3.5	0.013	0.10	0.20	
L-FMC288	L-FMC288	N-FF284	F-A4.2	Circular	59	951.24	951						0	5.5	0.013	1.00	0.20	
L-FMC289	L-FMC289	N-FF285	N-FF284	Circular	74	953.3	953.1						0	5.5	0.013	1.00	0.20	
L-FMC290	L-FMC290	N-FF286	N-FF285	Circular	214	959.1	958.6						0	5	0.013	1.00	0.20	
L-FMC292	L-FMC292	N-FF287	N-FF293	Circular	57	966.89	966.59						0	4	0.013	0.10	0.20	
L-FMC293	L-FMC293	N-FF288	N-FF287	Circular	156	968.81	968.03						0	3.5	0.013	0.10	0.20	
L-FMC308	L-FMC308	N-FF289	N-FF288	Circular	68	970.59	970.22						0	3.5	0.013	0.20	0.20	
L-FMC294	L-FMC294	N-FF290	N-FF289	Circular	86	971.76	971.16						0	3.5	0.013	0.10	0.20	

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC299	L-FMC299	N-FF291	F-A4.1.5	Circular	110	980.12	979.05						0	2	0.013	1.00	0.20	
L-FMC297	L-FMC297	N-FF292	N-FF205	Circular	186	979.28	978.72						0	2.5	0.013	0.10	0.20	
L-FMC416	L-FMC416	N-FF292	F-A4.1.5	Trapezoidal	675	986.8	984.1											
L-FMC291	L-FMC291	N-FF293	N-FF286	Circular	254	965.98	965.22						0	4	0.013	0.10	0.20	
L-FMC005	L-FMC005	N-FF294	F-A7.15	Natural	374	896	895	280	300	0.071	0.037	0.080						
L-FMC302	L-FMC302	N-FF295	N-FF296	Natural	315	900.55	897.9	20	50	0.050	0.037	0.050						
L-FMC021	L-FMC021	N-FF297	N-FF002	Natural	743	898.8	897.59	430	460	0.050	0.037	0.050						
L-FVR379	L-FVR379	VR-A1.11.3	N-1362	Trapezoidal	812	898.7	898.4											
L-FMC301	L-FMC301	N-FF296	F-A8.7	Circular	90	897.9	897.6						0	1.5	0.013	0.50	0.50	
L-FMC002	L-FMC002	N-FF001	N-FF310	Circular	32	898.16	898.08						0	1.5	0.013	0.50	1.00	
L-FMC309o1	L-FMC309	N-FF298	N-FF001	Orifice	0	898.5	898.5											
L-FMC051	L-FMC051	N-FF005	F-A8.6.2	Circular	38.5	904.09	903.29						0	1	0.013	1.00	1.00	
L-FMC059	L-FMC059	N-FF059	F-A7.14	Circular	35	906.15	905.78						0	1	0.013	1.00	1.00	
L-FMC313w1	L-FMC313	N-FF299	N-FF059	Weir	0	908	908											
L-FMC313o1	L-FMC313	N-FF299	N-FF059	Weir	0	908	908											
L-FMC046	L-FMC046	N-FF023	F-A8.9.9	Circular	152	900	899.5						0	1.25	0.013	1.00	1.00	
L-FMC044	L-FMC044	N-FF027	F-A8.9.7	Circular	30	900.6	900.5						0	1.5	0.013	1.00	1.00	
L-FMC045	L-FMC045	N-FF028	F-A8.9.7	Circular	24	900.6	900.5						0	1.5	0.013	1.00	1.00	
L-FMC048	L-FMC048	N-FF030	F-A8.9.4	Circular	900.1	900.1	900						0	1.5	0.013	1.00	1.00	
L-FMC047	L-FMC047	N-FF029	F-A8.9.4	Circular	360	900.5	900						0	2	0.013	1.00	1.00	
L-FMC049	L-FMC049	N-FF031	F-A8.9.2	Circular	111	900.5	900.1						0	1.25	0.013	1.00	1.00	
L-FMC038	L-FMC038	N-FF020	F-A8.3.2	Circular	99	901.5	901						0	1	0.013	1.00	1.00	
L-FMC028	L-FMC028	N-FF011	F-A8.3.5	Circular	99	900.5	900						0	1	0.013	1.00	1.00	
L-FMC035	L-FMC035	N-FF017	F-A8.3.4	Circular	96	901	900.5						0	1	0.013	0.00	0.00	
L-FMC032	L-FMC032	N-FF015	F-A8.2.1	Circular	31	905.1	905						0	1.25	0.013	1.00	1.00	
L-FMC037	L-FMC037	N-FF019	N-FF018	Circular	177	902.5	901.75						0	1	0.013	0.10	1.00	
L-FMC029	L-FMC029	N-FF012	F-A8.3.4	Circular	47	901	900.5						0	1	0.013	1.00	1.00	
L-FMC031	L-FMC031	N-FF014	F-A8.2.2	Circular	61	905	904.7						0	1	0.013	0.00	0.00	
L-FMC027	L-FMC027	N-FF010	F-A8.3.6	Circular	34	900	899.5						0	1	0.013	1.00	1.00	
L-FMC055	L-FMC055	N-FF036	N-FF035	Circular	11	910	908.89						0	2.75	0.013	1.00	1.00	
L-FMC084	L-FMC084	N-FF074	N-FF073	Circular	44	914.37	913.61						0	1.25	0.013	1.00	1.00	
L-FMC099	L-FMC099	N-FF088	N-FF087	Circular	54	949.05	948.84						0	1	0.013	0.10	1.00	
L-FMC081	L-FMC081	N-FF071	N-FF070	Circular	64	914.35	913.32						0	1	0.013	1.00	1.00	
L-FMC087	L-FMC087	N-FF076	N-FF075	Circular	77	915.97	915.22						0	1.25	0.013	0.40	1.00	
L-FMC197	L-FMC197	N-FF261	N-FF260	Arch	38	950.09	950.01						0	2.5	0.013	0.50	1.00	
L-FMC335w1	L-FMC335	N-FF300	N-FF261	Weir	0	952	952											
L-FMC189	L-FMC189	N-FF230	N-FF229	Circular	38	950.5	950						0	1.5	0.013	1.00	1.00	
L-FMC337.1	L-FMC337	N-FF301	N-FF230	Weir	0	950.5	950.5											
L-FMC337w2	L-FMC337	N-FF301	N-FF230	Weir	0	950.5	950.5											
L-FMC214	L-FMC214	N-FF255	F-A1.7a	Circular	125.7	945.19	942.22						0	2.25	0.013	0.50	1.00	
L-FMC101	L-FMC101	N-FF108	N-FF237	Circular	80	908.24	907.95						0	1	0.013	0.50	1.00	
L-FMC340w1	L-FMC340	N-FF302	N-FF108	Weir	0	910	910											
L-FMC340o1	L-FMC340	N-FF302	N-FF108	Weir	0	910	910											
L-FMC182	L-FMC182	N-FF192	N-FF190	Circular	29	908.04	907.8						0	1.25	0.013	1.00	1.00	
L-FMC343w1	L-FMC343	N-FF303	N-FF192	Weir	0	909.28	909.28											
L-FMC343o1	L-FMC343	N-FF303	N-FF192	Weir	0	909.28	909.28											
L-FMC103	L-FMC103	N-FF110	F-A5.12	Circular	45	910.73	910.05						0	1	0.013	1.00	1.00	
L-FMC104	L-FMC104	N-FF111	F-A5.12	Circular	24	910.33	909.97						0	2	0.013	1.00	1.00	
L-FMC183	L-FMC183	N-FF225	N-FF224	Circular	188	916	915.44						0	1.25	0.013	1.00	1.00	
L-FMC348w1	L-FMC348	N-FF304	N-FF225	Weir	0	920.3	920.3											
L-FMC348o1	L-FMC348	N-FF304	N-FF225	Weir	0	920.3	920.3											
L-FMC112	L-FMC112	N-FF119	N-FF118	Circular	79	922.11	921.46						0	1	0.013	0.50	1.00	
L-FMC113	L-FMC113	N-FF121	N-FF016	Circular	20	926.24	926.07						0	2	0.013	1.00	1.00	
L-FMC353w1	L-FMC353	N-FF305	N-FF012	Weir	0	904	904											
L-FMC075	L-FMC075	N-FF064	N-FF063	Circular	36	906.14	905.99						0	1	0.013	1.00	1.00	
L-FMC281	L-FMC281	N-FF061	N-1059	Circular	32	906.23	906.13						0	1.25	0.013	1.00	1.00	
L-FMC222	L-FMC222	N-FF092	F-A7.5	Trapezoidal	50	907	905											
L-FMC359	L-FMC359	N-FF208	N-FF306	Circular	11	985.5	985.33						0	1.75	0.013	1.00	1.00	
L-FMC415	L-FMC415	N-FF208	F-A4.1.3	Trapezoidal	367	992	988											
L-FMC266	L-FMC266	N-FF306	N-FF205	Circular	416	984.19	980.7						0	2.75	0.013	0.50	1.00	

Table B-2 Hydraulic Parameters for Farmington Middle Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Middle Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FMC263	L-FMC263	N-FF203	N-FF202	Circular	160	985.29	984.51						0	2	0.013	0.20	1.00	
L-FMC170	L-FMC170	N-FF178	N-FF177	Circular	285	940.88	937.26						0	2.5	0.013	0.10	1.00	
L-FMC365	L-FMC365	N-FF162	N-FF307	Circular	5	925.42	924.33						0	2.5	0.014	0.10	1.00	
L-FMC154	L-FMC154	N-FF307	N-FF161	Circular	40	924.33	924.31						0	2.5	0.013	0.50	0.20	
L-FMC102	L-FMC102	N-FF278	N-FF282	Circular	20	936.83	936.8						0	1	0.013	1.00	1.00	
L-FMC219	L-FMC219	N-FF259	N-FF258	Circular	144	963.23	962						0	2.5	0.013	0.10	1.00	
L-FMC274	L-FMC274	N-FF099	N-FF098	Circular	100	906.94	906.38						0	1.25	0.013	0.10	1.00	
L-FMC276	L-FMC276	N-FF101	N-FF100	Circular	80	906.79	906.11						0	1.75	0.013	1.00	1.00	
L-FMC039	L-FMC039	N-FF021	N-1407	Circular	193	899.4	899						0	1.5	0.013	0.50	1.00	
L-FMC043	L-FMC043	N-FF026	N-FF025	Arch	205	900.5	899.76						0	1.5	0.013	0.10	1.00	
L-FMC375	L-FMC375	N-FF308	F-A1.7a	Natural	460	943.17	942.13	40	70	0.050	0.037	0.050						
L-FMC381	L-FMC381	N-FF309	F-A3.6	Trapezoidal	1430	933.7	916											
L-FMC001	L-FMC001	N-FF310	F-A8.12	Natural	1665	897.3	890.7	120	140	0.050	0.035	0.050						
L-FMC407	L-FMC407	N-FF311	N-FF074	Circular	39	917.39	916.89						0	1.25	0.013	0.00	0.00	
L-FMC079_1	L-FMC079	N-FF068	N-FF067	Circular	209	908.07	906.67						0	1	0.013	0.50	1.00	
L-FMC079.1	L-FMC079	N-FF068	N-FF067	Circular	209	908.07	906.67						0	1	0.013	0.50	1.00	
L-FMC078_1	L-FMC078	N-FF066	N-FF065	Circular	24	906.36	905.87						0	1	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC078.1	L-FMC078	N-FF066	N-FF065	Circular	24	906.36	905.87						0	1	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC269	L-FMC269	N-FF200	N-FF093	Circular	43	946.72	946						0	1.25	0.013	0.00	0.00	
L-FMC074_1	L-FMC074	N-FF062	F-A7.3	Circular	38	904.88	904.4						0	1	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC074.1	L-FMC074	N-FF062	F-A7.3	Circular	38	904.88	904.4						0	1	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC124	L-FMC124	N-FF133	N-FF132	Circular	34	951.07	950						0	1	0.013	0.10	1.00	Groove End with Projecting (Circ, Conc)
L-FMC100_1	L-FMC100	N-FF104	F-A7.4	Circular	39	906.24	904						0	1	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC100.1	L-FMC100	N-FF104	F-A7.4	Circular	39	906.24	904						0	1	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FMC425w1	L-FMC425	N-FF312	N-FF133	Weir	0	951.67	951.67											
L-FMC427	L-FMC427	N-FF313	N-FF164	Trapezoidal	850	950	939.16											
L-FMC429	L-FMC429	N-FF315	N-FF314	Natural	817	956.8	956.2	1295	1335	0.050	0.037	0.050						
L-FMC428	L-FMC428	N-FF314	F-A1.4	Natural	1090	956.2	950.5	1295	1335	0.050	0.037	0.050						
L-LMC-091	L-LMC-091	FO-019	F-A4.1.2	Natural	2098.6	1013.36	984.19	400	550	0.050	0.035	0.050						
L-FMC224	L-FMC224	N-FF241	N-FF239	Natural	402	964	954	200	400	0.050	0.035	0.050						

Table B-3 Hydraulic Parameters for Farmington South Creek Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington South Creek Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FSC005	L-FSC005	N-155	L-A1.8	Natural	2124	916.4	912.04	210	240	0.050	0.037	0.050						
L-1348	L-1348	L-A1.5	L-A1.6	Natural	2415.3	922.532	916.9	595	640	0.050	0.037	0.050						
L-1340.1	L-1340	L-A1.7	N-1178	Natural	25	927.52	927.52	445	1115	0.013	0.013	0.013						
L1340_1	L-1340	L-A1.7	N-1178	Natural	25	927.52	927.52	445	1115	0.013	0.013	0.013						
L-1341	L-1341	N-1178	N-155	Natural	618.52	918.9	916.4	200	240	0.050	0.037	0.050						
L-1349.1	L-1349	L-A1.6	N-1186	Natural	49	925	925	290	325	0.013	0.013	0.013						
L1349_1	L-1349	L-A1.6	N-1186	Natural	49	925	925	290	325	0.013	0.013	0.013						
L1349_2	L-1349	L-A1.6	N-1186	Natural	49	925	925	290	325	0.013	0.013	0.013						
L1349_3	L-1349	L-A1.6	N-1186	Natural	49	925	925	290	325	0.013	0.013	0.013						
L-1350	L-1350	N-1186	N-155	Natural	753.17	916.7	916.4	665	705	0.050	0.037	0.050						
L-1353	L-1353	N-1188	L-A1.5	Natural	1337	926	922.532	325	370	0.050	0.037	0.050						
L-FSC029	L-FSC029	L-A1.1a	L-A1.2	Trapezoidal	20	949.3	949.3											
L-FSC028w1	L-FSC028	L-A1.1a	N-FL016	Weir	0	949.73	949.73											
L-FSC028w2	L-FSC028	L-A1.1a	N-FL016	Weir	0	949.73	949.73											
L-FSC028o1	L-FSC028	L-A1.1a	N-FL016	Weir	0	949.73	949.73											
L-FSC018	L-FSC018	L-A1.1b	N-FL023	Circular	14	960.1	958.5						0	1.5	0.013	1.00	1.00	
L-FSC033	L-FSC033	L-A1.1b	L-A1.1a	Trapezoidal	50	957.9	957.9											
L-FSC032	L-FSC032	L-A1.2	N-FL014	Trapezoidal	33	953.5	953.5											
L-FSC030w1	L-FSC030	L-A1.2	N-FL015	Weir	0	949.06	949.06											
L-FSC030w2	L-FSC030	L-A1.2	N-FL015	Weir	0	949.06	949.06											
L-FSC029o1	L-FSC030	L-A1.2	N-FL015	Weir	0	949.06	949.06											
L-FSC031w1	L-FSC031	L-A1.2	N-FL020	Weir	0	950.41	950.41											
L-FSC031w2	L-FSC031	L-A1.2	N-FL020	Weir	0	950.41	950.41											
L-FSC027	L-FSC027	L-A1.3	L-A1.4	Natural	1000	930.68	927.2	390	600	0.050	0.035	0.050						
L-FSC034.1	L-FSC034	L-A1.3	L-A2.1c	Weir	0	933	933											
L-FSC004	L-FSC004	L-A1.8	L-A2.3a	Natural	1420	912.04	909.91	320	370	0.050	0.037	0.050						
L-FSC011_1	L-FSC011	L-A2.1a	N-FL009	Circular	65	922.75	922.38						0	4	0.013	0.50	1.00	Groove End with Projecting (Circ, Conc)
L-FSC011.1	L-FSC011	L-A2.1a	N-FL009	Circular	65	922.75	922.38						0	4	0.013	0.50	1.00	Groove End with Projecting (Circ, Conc)
L-FSC011_2	L-FSC011	L-A2.1a	N-FL009	Circular	65	922.75	922.38						0	4	0.013	0.50	1.00	Groove End with Projecting (Circ, Conc)
L-FSC013	L-FSC013	L-A2.1b	N-FL011	Circular	137	928.82	928.29						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FSC035.1	L-FSC035	L-A2.1b	L-A1.4	Weir	0	932.9	932.9											
L-FSC014	L-FSC014	L-A2.1c	L-A2.1b	Natural	1663	932.15	928.82	310	420	0.050	0.037	0.050						
L-FSC006	L-FSC006	L-A2.2	L-A1.8	Natural	55	912.15	912.04	260	300	0.050	0.037	0.050						
L-FSC003_1	L-FSC003	L-A2.3a	N-FL003	Circular	31.2	911.5	911.2						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FSC003.1	L-FSC003	L-A2.3a	N-FL003	Circular	31.2	911.5	911.2						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FSC001	L-FSC001	L-A2.3b	L-A2.4	Natural	3766	907.85	901.26	1275	1325	0.050	0.037	0.050						
L-FSC002	L-FSC002	N-FL003	L-A2.3b	Natural	1270	910.73	907.85	1275	1325	0.050	0.037	0.050						
L-FSC007	L-FSC007	N-FL007	L-A2.2	Natural	2418	923.69	912.15	260	300	0.050	0.037	0.050						
L-FSC008	L-FSC008	N-FL008	N-FL007	Natural	1456	928.7	923.69	60	130	0.050	0.030	0.050						
L-FSC010	L-FSC010	N-FL009	N-FL007	Natural	651	922.33	923.69	120	150	0.050	0.037	0.050						
L-FSC012	L-FSC012	N-FL011	L-A2.1a	Natural	858	928.29	923	80	150	0.050	0.070	0.050						
L-FSC015	L-FSC015	N-FL014	L-A1.3	Natural	1433	942.17	930.68	390	600	0.050	0.035	0.050						
L-FSC019	L-FSC019	N-FL020	N-FL014	Circular	43	945.05	944.6						0	1.5	0.014	1.00	0.20	
L-FSC020	L-FSC020	N-FL021	N-FL014	Circular	524	945.81	943.44						0	2.5	0.013	1.00	0.20	
L-FSC021	L-FSC021	N-FL022	N-FL021	Circular	405	947.83	945.81						0	2.5	0.013	0.10	0.20	
L-FSC022	L-FSC022	N-FL023	N-FL022	Circular	332	949.5	947.84						0	5	0.013	0.50	0.20	
L-FSC017	L-FSC017	N-FL016	L-A1.2	Circular	21	948.06	947.1						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FSC016	L-FSC016	N-FL015	N-FL020	Circular	27	948.1	947.5						0	0.667	0.013	0.50	1.00	

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-225	L-225	VR-30	VR-29	Natural	1639.5	878.4	878	1180	1270	0.050	0.042	0.050						
L-1302	L-1302	VR-29	N-1146	Natural	2461.1	878	875.4	560	610	0.050	0.042	0.050						
L-1301	L-1301	N-228	N-239	Natural	6820.3	873.727	866.56	1255	1305	0.050	0.042	0.050						
L-233.1	L-233	N-235	N-236	Natural	15.12	885.297	885.297	1180	1260	0.013	0.013	0.013						
L233_1	L-233	N-235	N-236	Natural	15.12	885.297	885.297	1180	1260	0.013	0.013	0.013						
L-234	L-234	N-236	TribJ-1	Natural	2632.6	880.916	876.139	695	730	0.050	0.042	0.050						
L-235.1	L-235	TribJ-1	N-238	Natural	43.92	881.803	881.803	110	180	0.013	0.013	0.013						
L235_1	L-235	TribJ-1	N-238	Natural	43.92	881.803	881.803	110	180	0.013	0.013	0.013						
L-236	L-236	N-238	N-228	Natural	359.63	875.641	873.727	1660	1800	0.050	0.042	0.050						
L-238	L-238	VRTribI-28	N-239	Natural	8900.2	875.9	866.56	2855	2990	0.050	0.042	0.050						
L-1303	L-1303	N-1146	N-1147	Natural	21	875.4	875.4	1471	1577	0.060	0.043	0.080						
L-1304	L-1304	N-1147	N-228	Natural	3093	875.4	873.727	1145	1205	0.050	0.042	0.050						
L1412_1	L-1412	VR-34	N-1241	Rectangular	64	901.98	901.75						12	7	0.012	1.00	0.20	0 deg Wingwall Flares (Rect, Conc)
L1412_2	L-1412	VR-34	N-1241	Rectangular	64	901.98	901.75						12	7	0.012	1.00	0.20	0 deg Wingwall Flares (Rect, Conc)
L1412_3	L-1412	VR-34	N-1241	Rectangular	64	901.98	901.75						12	7	0.012	1.00	0.20	0 deg Wingwall Flares (Rect, Conc)
L-1412.1	L-1412	VR-34	N-1241	Rectangular	64	901.98	901.75						12	7	0.012	1.00	0.20	0 deg Wingwall Flares (Rect, Conc)
L-FVR298	L-FVR298	N-1241	VR-A1.1	Natural	2177	901.75	901.34	330	370	0.050	0.037	0.050						
L-204	L-204	N-206	N-207	Natural	1975.7	888.5	884	1142	1162	0.080	0.037	0.080						
L-1673	L-1673	N-207	AV-A2.9	Natural	70.65	884	882.6	685	740	0.050	0.037	0.050						
L-222	L-222	N-225	NCreek-1b	Natural	1908.7	891.33	886.267	410	435	0.067	0.037	0.060						
L-1186	L-1186	N-1055	N-181	Natural	1843	884.73	880.9	589	626	0.050	0.042	0.050						
L-1666	L-1666	N-1422	VR-29	Natural	665.06	883.16	881.778	880	935	0.050	0.042	0.050						
L-1672	L-1672	N-1426	N-207	Natural	35	886	884	1170	1215	0.050	0.037	0.050						
L-1686	L-1686	NCreek-1b	N-1440	Natural	10	886.267	886.267	1090	1234	0.055	0.037	0.055						
L-1679.1	L-1679	N-1433	N-1434	Natural	26	883	883	340	425	0.035	0.040	0.035						
L1679_1	L-1679	N-1433	N-1434	Natural	26	883	883	340	425	0.035	0.040	0.035						
L-1680	L-1680	N-1434	N-1435	Natural	2547.3	877.998	872.427	130	160	0.035	0.034	0.035						
L-1687	L-1687	N-1440	N-1441	Natural	33.4	886.267	886.1	1180	1215	0.055	0.037	0.055						
L-1671.1	L-1671	N-1441	N-1426	Natural	32.8	892.872	892.872	1100	1215	0.014	0.014	0.014						
L1671_1	L-1671	N-1441	N-1426	Natural	32.8	892.872	892.872	1100	1215	0.014	0.014	0.014						
L1671_2	L-1671	N-1441	N-1426	Natural	32.8	892.872	892.872	1100	1215	0.014	0.014	0.014						
L-1414	L-1414	N-1444	VR-34	Natural	280	903.15	901.68	970	1015	0.050	0.037	0.050						
L-1185.1	L-1185	AV-A2.9	N-1055	Natural	49.2	895.861	895.861	2225	2310	0.013	0.013	0.013						
L1185_1	L-1185	AV-A2.9	N-1055	Natural	49.2	895.861	895.861	2225	2310	0.013	0.013	0.013						
L1185_2	L-1185	AV-A2.9	N-1055	Natural	49.2	895.861	895.861	2225	2310	0.013	0.013	0.013						
L-FNC-997	L-FNC-997	AV-A2.8	N-225	Natural	1045	900	893	300	535	0.045	0.035	0.045						
L-1329	L-1329	N-132	N-1169	Natural	2914.9	900.64	897.2	470	495	0.050	0.037	0.050						
L-1317	L-1317	VR-A1.13a	N-FVR014	Natural	152	887.15	887.09	2150	2220	0.050	0.042	0.050						
L-179	L-179	VR-31	N-181	Natural	317.58	881.217	880.9	495	535	0.050	0.042	0.050						
L-FVR187	L-FVR187	N-181	N-FVR001	Natural	842	880.9	880	860	910	0.050	0.042	0.050						
L-FVR305	L-FVR305	TribJ-3	N-FVR117	Rectangular	150	921.7	920.5						16	5	0.013	1.00	0.50	
L-230.1	L-230	N-232	N-233	Natural	34.9	919.387	919.387	80	1080	0.013	0.013	0.013						
L230_1	L-230	N-232	N-233	Natural	34.9	919.387	919.387	80	1080	0.013	0.013	0.013						
L-231	L-231	N-233	N-FVR138	Natural	3115.3	912.856	891.4	320	355	0.050	0.042	0.050						
L-FVR316_1	L-FVR316	TribJ-2	N-FVR138	Circular	62	892	891.5						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR316.1	L-FVR316	TribJ-2	N-FVR138	Circular	62	892	891.5						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L1282_1	L-1282	N-1130	N-1131	Arch	24	884.243	883.485						0	1.25	0.024	1.00	0.70	Mitered to Embankment (Arch, Corr Metal)
L-1282.1	L-1282	N-1130	N-1131	Arch	24	884.243	883.485						0	1.25	0.024	1.00	0.70	Mitered to Embankment (Arch, Corr Metal)
L-1283	L-1283	N-1131	N-1132	Natural	198.51	883.485	883.809	1415	1460	0.050	0.042	0.050						
L1284_1	L-1284	N-1132	N-1133	Circular	24	883.809	883.113						0	3.5	0.013	1.00	0.20	Groove End with Projecting (Circ, Conc)
L-1284.1	L-1284	N-1132	N-1133	Circular	24	883.809	883.113						0	3.5	0.013	1.00	0.20	Groove End with Projecting (Circ, Conc)
L-1285	L-1285	N-1133	B-A1.3	Natural	489.31	883.113	880.05	1760	1790	0.050	0.042	0.050						
L1286_1	L-1286	B-A1.3	N-1135	Circular	24	880.05	880.936						0	3.5	0.024	1.00	0.90	Projecting (Circ, Corr Metal)
L-1286.1	L-1286	B-A1.3	N-1135	Circular	24	880.05	880.936						0	3.5	0.024	1.00	0.90	Projecting (Circ, Corr Metal)
L-FVR002	L-FVR002	N-1135	N-FB001	Natural	5500	880.936	877.84	530	570	0.050	0.042	0.050						
L-1318	L-1318	N-1158	N-1159	Natural	638.36	886.66	885.89	970	1005	0.050	0.042	0.050						
L-1319	L-1319	N-1159	N-1160	Natural	12	885.89	885.76	961	1002	0.080	0.043	0.050						
L-1320	L-1320	N-1160	VR-A1.14	Natural	1836.4	885.76	883.8	720	775	0.050	0.042	0.050						

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-1322	L-1322	N-1162	VR-31	Natural	2663.8	883.7	881.217	685	720	0.050	0.042	0.050						
L-1323	L-1323	VR-A1.5	N-1164	Natural	66.33	892.5	892.5	1149	1281	0.100	0.042	0.045						
L-1324	L-1324	N-1164	N-1165	Natural	46.614	892.5	894.06	700	755	0.050	0.042	0.050						
L-1325	L-1325	N-1165	N-1166	Natural	7	894.06	894.13	967	1008	0.045	0.043	0.060						
L-FVR264	L-FVR264	N-1166	VR-A1.7	Natural	1181	894.13	893.48	805	850	0.050	0.042	0.050						
L-1327	L-1327	VR-A1.11	N-1168	Natural	16.5	890.31	890.07	1120	1232	0.100	0.043	0.100						
L-FVR202	L-FVR202	N-1168	N-FVR016	Natural	487	890.07	888.19	1590	1640	0.050	0.042	0.050						
L-1330	L-1330	N-1169	N-1170	Natural	42.67	897.2	897.2	995	1203	0.080	0.038	0.050						
L-FVR292	L-FVR292	N-1170	N-FVR105	Natural	692	897.2	895.5	885	960	0.050	0.037	0.050						
L-1332	L-1332	VR-A1.2	N-1172	Natural	62.25	895.5	895.49	1073	1244	0.100	0.046	0.100						
L-1333	L-1333	N-1172	N-1173	Natural	430.64	895.49	895.18	1120	1165	0.050	0.042	0.050						
L-1334	L-1334	N-1173	N-1174	Natural	7	895.18	895.15	1093	1186	0.060	0.043	0.060						
L-1335	L-1335	N-1174	VR-A1.5	Natural	1942.6	895.15	892.5	1180	1250	0.050	0.042	0.050						
L-1546.1	L-1546	B-A1.2b	N-1341	Natural	52.5	892.536	892.536	3765	3960	0.013	0.013	0.013						
L1546_1	L-1546	B-A1.2b	N-1341	Natural	52.5	892.536	892.536	3765	3960	0.013	0.013	0.013						
L-1547	L-1547	N-1341	N-1130	Natural	1100	887.627	884.243	515	555	0.050	0.042	0.050						
L-1328	L-1328	N-1392	VR-A1.13a	Natural	390.01	887.54	887.15	1270	1335	0.050	0.042	0.050						
L-1631	L-1631	N-1393	N-1392	Natural	7	887.8	887.54	1793	1855	0.100	0.043	0.100						
L-1653.1	L-1653	PW-A1.12a	N-1410	Natural	30	892.52	892.52	105	1460	0.013	0.013	0.013						
L1653_1	L-1653	PW-A1.12a	N-1410	Natural	30	892.52	892.52	105	1460	0.013	0.013	0.013						
L-FVR460.1	L-FVR460	PW-A1.12a	N-FB020	Weir	0	893.3	893.3											
L-1654	L-1654	N-1410	PW-A1.14.6	Natural	485.08	888.34	887.74	425	500	0.050	0.042	0.050						
L-1655.1	L-1655	PW-A1.14.6	PW-A1.14.5	Natural	50	895.71	895.71	60	935	0.013	0.013	0.013						
L1655_1	L-1655	PW-A1.14.6	PW-A1.14.5	Natural	50	895.71	895.71	60	935	0.013	0.013	0.013						
L-FVR462.1	L-FVR462	PW-A1.14.6	N-FB025	Weir	0	894	894											
L-1659.1	L-1659	PW-A1.14	N-1416	Natural	67	896.91	896.91	185	655	0.013	0.013	0.013						
L1659_1	L-1659	PW-A1.14	N-1416	Natural	67	896.91	896.91	185	655	0.013	0.013	0.013						
L-1660	L-1660	N-1416	PW-A1.15	Natural	1809.6	886.4	886	75	95	0.050	0.042	0.050						
L-1661.1	L-1661	PW-A1.15	N-1418	Natural	56.9	893.54	893.54	710	1675	0.013	0.013	0.013						
L1661_1	L-1661	PW-A1.15	N-1418	Natural	56.9	893.54	893.54	710	1675	0.013	0.013	0.013						
L-FVR464.1	L-FVR464	PW-A1.15	N-FB026	Weir	0	891.7	891.7											
L-1662	L-1662	N-1418	PW-A1.16	Natural	1113.4	885.86	884.7	90	105	0.050	0.042	0.050						
L-1663.1	L-1663	PW-A1.16	N-1420	Natural	85	892.82	892.82	95	105	0.013	0.013	0.013						
L1663_1	L-1663	PW-A1.16	N-1420	Natural	85	892.82	892.82	95	105	0.013	0.013	0.013						
L-1664	L-1664	N-1420	PW-A1.18	Natural	1157.1	884.54	883.3	105	140	0.050	0.042	0.050						
L-1665.1	L-1665	PW-A1.18	N-1422	Natural	50	890.35	890.35	560	580	0.013	0.013	0.013						
L1665_1	L-1665	PW-A1.18	N-1422	Natural	50	890.35	890.35	560	580	0.013	0.013	0.013						
L-1674.1	L-1674	B-A1.9	N-1429	Natural	30	887.4	887.4	420	485	0.035	0.040	0.035						
L1674_1	L-1674	B-A1.9	N-1429	Natural	30	887.4	887.4	420	485	0.035	0.040	0.035						
L-1675	L-1675	N-1429	N-1430	Natural	1239.4	883.668	882.71	687	709	0.035	0.034	0.035						
L-1676	L-1676	N-1430	B-A1.10	Natural	753.34	882.71	882.31	340	385	0.035	0.034	0.035						
L-1677.1	L-1677	B-A1.10	N-1432	Natural	48	888	888	545	610	0.035	0.040	0.035						
L1677_1	L-1677	B-A1.10	N-1432	Natural	48	888	888	545	610	0.035	0.040	0.035						
L-FVR012	L-FVR012	N-1432	N-FB011	Natural	883	881.65	881.4	190	220	0.050	0.034	0.050						
L-FVR006_1	L-FVR006	B-A1.1	N-FB005	Circular	63	890.5	890						0	2	0.013	0.50	0.50	
L-FVR006.1	L-FVR006	B-A1.1	N-FB005	Circular	63	890.5	890						0	2	0.013	0.50	0.50	
L-FVR019	L-FVR019	B-A1.11	N-FB014	Circular	70	885.42	885.4						0	2	0.013	0.50	1.00	Groove End with Projecting (Circ, Conc)
L-FVR365	L-FVR365	B-A1.11	B-A1.10	Trapezoidal	536	888.3	886.1											
L-FVR017_1	L-FVR017	B-A1.12	N-FB012	Circular	74	885.6	885.2						0	2	0.013	0.50	1.00	
L-FVR017.1	L-FVR017	B-A1.12	N-FB012	Circular	74	885.6	885.2						0	2	0.013	0.50	1.00	
L-FVR025	L-FVR025	B-A1.15	B-A1.16	Natural	1639	888.31	884.8	190	580	0.050	0.030	0.050						
L-FVR024_1	L-FVR024	B-A1.16	N-FB023	Circular	52	884.9	884.6						0	2	0.013	0.50	1.00	
L-FVR024.1	L-FVR024	B-A1.16	N-FB023	Circular	52	884.9	884.6						0	2	0.013	0.50	1.00	
L-FVR020	L-FVR020	B-A1.17	N-FB019	Circular	90	880.9	880.1						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FVR010	L-FVR010	B-A1.4a	B-A1.5	Natural	2803	888.96	883.16	170	240	0.050	0.042	0.050						
L-FVR015	L-FVR015	B-A1.4b	N-FB017	Natural	546	890.92	888.89	320	340	0.035	0.034	0.035						
L-FVR009	L-FVR009	B-A1.5	B-A1.7	Natural	1309	883.16	881.55	230	270	0.050	0.042	0.050						
L-FVR003	L-FVR003	B-A1.6	B-A1.3	Natural	503	883.37	881	230	270	0.050	0.042	0.050						

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FVR008	L-FVR008	B-A1.7	N-FB007	Circular	74	881.55	881						0	2	0.024	0.50	0.50	
L-FVR013	L-FVR013	B-A1.8	B-A1.9	Natural	1350	887.93	883.719	480	500	0.035	0.034	0.035						
L-FVR261	L-FVR261	F-A7.12	N-FVR076	Circular	378	900.3	899.48						0	1	0.013	0.10	0.50	
L-FVR262	L-FVR262	F-A7.13b	F-A7.12	Circular	90	898.15	897.95						0	2	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FMC400	L-FMC400	F-A8.12.1	N-FF310	Trapezoidal	20	899.8	899.8											
L-FMC310w1	L-FMC310	F-A8.12.1	N-FF298	Weir	0	900.09	900.09											
L-FMC310w2	L-FMC310	F-A8.12.1	N-FF298	Weir	0	900.09	900.09											
L-FMC310o1	L-FMC310	F-A8.12.1	N-FF298	Weir	0	900.09	900.09											
L-FSC001	L-FSC001	L-A2.3b	L-A2.4	Natural	3766	907.85	901.26	1275	1325	0.050	0.037	0.050						
L-FVR296	L-FVR296	L-A2.4	N-132	Natural	107	901.26	900.64	1275	1325	0.050	0.037	0.050						
L-FVR004	L-FVR004	N-FB003	B-A1.2b	Natural	2720	898.1	888.9	450	480	0.050	0.042	0.050						
L-FVR005	L-FVR005	N-FB005	B-A1.2b	Natural	107	890	890	10	30	0.050	0.042	0.050						
L-FVR007	L-FVR007	N-FB007	N-FB001	Natural	3389	881	877.84	100	140	0.050	0.042	0.050						
L-FVR011	L-FVR011	N-FB011	N-1433	Natural	2500	881.4	879.2	720	760	0.050	0.037	0.050						
L-FVR016	L-FVR016	N-FB012	N-FB011	Natural	1637	885.2	881.4	50	70	0.050	0.034	0.050						
L-FVR018	L-FVR018	N-FB014	B-A1.12	Natural	862	885.4	884.59	630	680	0.050	0.034	0.050						
L-FVR014	L-FVR014	N-FB017	B-A1.8	Natural	535	888.89	887.93	30	80	0.035	0.034	0.035						
L-FVR330	L-FVR330	N-FB019	N-239	Natural	1054	880.1	876.8	380	410	0.050	0.039	0.050						
L-FVR021	L-FVR021	N-FB021	B-A1.17	Natural	148	882.2	881.3	30	50	0.050	0.035	0.050						
L-FVR022	L-FVR022	N-FB022	N-FB021	Circular	42	882.5	882.2						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FVR023	L-FVR023	N-FB023	N-FB022	Natural	2843	884.6	881.8	120	430	0.050	0.030	0.050						
L-FVR027	L-FVR027	N-FPW002	PW-A1.17.3	Circular	184	885.73	885.16						0	2.25	0.013	1.00	0.20	
L-FVR028	L-FVR028	N-FPW003	N-FPW002	Circular	29	885.83	885.73						0	2.25	0.013	0.10	0.20	
L-FVR029	L-FVR029	N-FPW004	N-FPW003	Circular	140	886.28	885.83						0	2.25	0.013	0.10	0.20	
L-FVR030	L-FVR030	N-FPW005	N-FPW004	Circular	203	886.58	886.28						0	2.25	0.013	0.50	0.20	
L-FVR031	L-FVR031	N-FPW006	N-FPW005	Circular	29	886.71	886.58						0	2.25	0.013	0.10	0.20	
L-FVR032	L-FVR032	N-FPW007	N-FPW006	Circular	145	887.17	886.71						0	2.25	0.013	0.10	0.20	
L-FVR035	L-FVR035	N-FPW010	N-1416	Circular	384	887.46	886.41						0	2.25	0.013	0.50	0.20	
L-FVR036	L-FVR036	N-FPW011	N-FPW010	Circular	523	888.96	887.46						0	2.25	0.013	0.10	0.20	
L-FVR037	L-FVR037	N-FPW012	N-FPW011	Circular	219	889.51	888.96						0	2.25	0.013	1.00	0.20	
L-FVR038	L-FVR038	N-FPW013	N-FPW012	Circular	170	890.04	889.51						0	2.25	0.013	1.00	0.20	
L-FVR066	L-FVR066	N-FPW015	PW-A1.14	Circular	68	886.49	886.17						0	4.5	0.013	1.00	0.20	
L-FVR067	L-FVR067	N-FPW016	N-FPW015	Circular	436	886.84	886.49						0	4.5	0.013	0.50	0.20	
L-FVR410	L-FVR410	N-FPW016	PW-A1.14.2	Trapezoidal	10	894	894											
L-FVR449	L-FVR449	N-FPW016	PW-A1.14	Trapezoidal	255	895.2	895.2											
L-FVR069	L-FVR069	N-FPW018	N-FPW016	Circular	398	887.14	886.84						0	4.5	0.013	0.40	0.40	
L-FVR406	L-FVR406	N-FPW019	PW-A1.14.2	Trapezoidal	364	893	890.3											
L-FVR070_1	L-FVR070	N-FPW019	N-FPW018	Circular	10	888.2	888.19						0	1.75	0.013	1.00	0.20	
L-FVR070.1	L-FVR070	N-FPW019	N-FPW018	Circular	10	888.2	888.19						0	1.75	0.013	1.00	0.20	
L-FVR071_1	L-FVR071	N-FPW020	N-FPW019	Circular	88	888.29	888.2						0	1.75	0.013	1.00	0.20	
L-FVR071.1	L-FVR071	N-FPW020	N-FPW019	Circular	88	888.29	888.2						0	1.75	0.013	1.00	0.20	
L-FVR072	L-FVR072	N-FPW021	N-FPW020	Circular	96	888.4	888.29						0	1.75	0.013	1.00	0.20	
L-FVR040	L-FVR040	N-FPW024	PW-A1.14	Circular	40	886.35	886						0	2.5	0.013	1.00	0.20	
L-FVR041	L-FVR041	N-FPW025	N-FPW024	Circular	230	886.88	886.35						0	2.5	0.013	0.50	0.20	
L-FVR042	L-FVR042	N-FPW026	N-FPW025	Circular	89	886.98	886.88						0	2.5	0.013	0.10	0.20	
L-FVR045	L-FVR045	N-FPW029	PW-A1.14.4	Circular	63	887.34	887.23						0	2.25	0.013	1.00	0.20	
L-FVR046	L-FVR046	N-FPW030	N-FPW029	Circular	102	887.56	887.34						0	2.25	0.013	0.50	0.20	
L-FVR047	L-FVR047	N-FPW031	N-FPW030	Circular	70	887.72	887.56						0	2.25	0.013	1.00	0.20	
L-FVR048	L-FVR048	N-FPW032	N-FPW031	Circular	70	887.88	887.72						0	2.25	0.013	0.10	0.20	
L-FVR049	L-FVR049	N-FPW033	N-FPW032	Circular	24	887.91	887.88						0	2.25	0.013	1.00	0.20	
L-FVR407	L-FVR407	N-FPW033	PW-A1.14.3	Trapezoidal	100	894.3	894											
L-FVR050	L-FVR050	N-FPW034	N-FPW033	Circular	67	887.99	887.91						0	2.25	0.013	1.00	0.20	
L-FVR051	L-FVR051	N-FPW035	N-FPW034	Circular	102	888.09	887.99						0	2	0.013	1.00	0.20	
L-FVR056	L-FVR056	N-FPW040	PW-A1.14.3	Circular	48	888.79	888.17						0	1.5	0.013	1.00	0.20	
L-FVR057	L-FVR057	N-FPW041	N-FPW040	Circular	30	889.14	888.79						0	1.5	0.013	0.10	0.20	
L-FVR058	L-FVR058	N-FPW042	N-FPW041	Circular	218	890.86	889.14						0	1.25	0.013	1.00	0.20	
L-FVR059	L-FVR059	N-FPW043	N-FPW042	Circular	110	891.39	890.89						0	1.25	0.013	0.10	0.20	
L-FVR060	L-FVR060	N-FPW044	N-FPW043	Circular	30	891.67	891.39						0	1	0.013	1.00	0.20	

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					Pipes & Culverts					
L-FVR061	L-FVR061	N-FPW045	N-FPW044	Circular	112	892.13	891.67						0	1	0.013	1.00	0.20	
L-FVR176	L-FVR176	N-FPW047	PW-A1.12a	Circular	40	891.06	891						0	3.5	0.013	1.00	0.20	
L-FVR177	L-FVR177	N-FPW048	N-FPW047	Circular	47	891.14	891.06						0	3.5	0.013	0.10	0.20	
L-FVR178	L-FVR178	N-FPW049	N-FPW048	Circular	207	891.58	891.14						0	3	0.013	0.10	0.20	
L-FVR179	L-FVR179	N-FPW050	N-FPW049	Circular	138	891.8	891.58						0	3	0.013	0.10	0.20	
L-FVR180	L-FVR180	N-FPW051	N-FPW050	Circular	64	891.91	891.8						0	3	0.013	0.10	0.20	
L-FVR181	L-FVR181	N-FPW052	N-FPW051	Circular	92	892.07	891.91						0	3	0.013	0.10	0.20	
L-FVR182	L-FVR182	N-FPW053	N-FPW052	Circular	272	892.54	892.07						0	3	0.013	0.10	0.20	
L-FVR183	L-FVR183	N-FPW054	N-FPW053	Circular	53	892.63	892.54						0	3	0.013	0.10	0.40	
L-FVR184	L-FVR184	N-FPW055	N-FPW155	Circular	60	893.07	892.96						0	2.25	0.013	1.00	0.50	
L-FVR185	L-FVR185	N-FPW056	N-FPW165	Circular	119	893.08	892.91						0	2.25	0.013	0.50	0.20	
L-FVR164_1	L-FVR164	N-FPW058	N-FPW168	Arch	20	893.54	893.44						0	1.5	0.013	0.50	0.20	
L-FVR164.1	L-FVR164	N-FPW058	N-FPW168	Arch	20	893.54	893.44						0	1.5	0.013	0.50	0.20	
L-FVR165	L-FVR165	N-FPW059	N-FPW058	Arch	30	893.58	893.54						0	1.5	0.013	0.10	0.20	
L-FVR167_1	L-FVR167	N-FPW061	N-FPW169	Circular	15	893.5	893.45						0	2	0.013	0.50	0.20	
L-FVR167.1	L-FVR167	N-FPW061	N-FPW169	Circular	15	893.5	893.45						0	2	0.013	0.50	0.20	
L-FVR168	L-FVR168	N-FPW062	N-FPW061	Circular	50	893.67	893.5						0	2	0.013	0.40	0.50	
L-FVR169	L-FVR169	N-FPW063	N-FPW170	Circular	75	893.66	893.68						0	2	0.013	0.50	0.20	
L-FVR170	L-FVR170	N-FPW064	N-FPW063	Circular	78	893.98	893.86						0	2	0.013	0.10	0.20	
L-FVR171	L-FVR171	N-FPW065	N-FPW064	Arch	35	894.13	893.98						0	1.125	0.013	1.00	0.20	
L-FVR172	L-FVR172	N-FPW066	N-FPW065	Arch	30	894.36	894.13						0	1.125	0.013	1.00	0.20	
L-FVR413	L-FVR413	N-FPW066	N-FPW170	Trapezoidal	66	898.4	898.4											
L-FVR173_1	L-FVR173	N-FPW067	N-FPW066	Circular	108	894.78	894.36						0	1.25	0.013	1.00	0.20	
L-FVR173.1	L-FVR173	N-FPW067	N-FPW066	Circular	108	894.78	894.36						0	1.25	0.013	1.00	0.20	
L-FVR174_1	L-FVR174	N-FPW068	N-FPW067	Circular	64	895.45	894.78						0	1.25	0.013	0.10	0.20	
L-FVR174.1	L-FVR174	N-FPW068	N-FPW067	Circular	64	895.45	894.78						0	1.25	0.013	0.10	0.20	
L-FVR156	L-FVR156	N-FPW073	N-FPW166	Circular	56	891.97	891.8						0	3.5	0.013	0.50	0.40	
L-FVR157	L-FVR157	N-FPW074	N-FPW073	Circular	24	892.04	891.97						0	3.5	0.013	0.40	0.50	
L-FVR158	L-FVR158	N-FPW075	N-FPW167	Circular	200	892.64	892.04						0	3	0.013	0.50	0.40	
L-FVR078	L-FVR078	N-FPW079	PW-A1.11	Circular	36	893.11	891.76						0	1.75	0.013	1.00	0.20	
L-FVR082	L-FVR082	N-FPW083	PW-A1.11.3	Arch	108	890.23	889.93						0	3	0.013	1.00	0.40	
L-FVR091	L-FVR091	N-FPW084	N-FPW083	Circular	108	891.09	890.23						0	2.5	0.013	1.00	0.20	
L-FVR409	L-FVR409	N-FPW084	N-FPW089	Trapezoidal	100	897.6	897											
L-FVR093	L-FVR093	N-FPW086	PW-A1.11.2	Arch	28	893.03	892.91						0	1.833	0.013	0.50	0.40	
L-FVR453	L-FVR453	N-FPW086	N-FPW171	Trapezoidal	160	898.4	898.4											
L-FVR094_1	L-FVR094	N-FPW087	N-FPW086	Circular	30	893.34	893.03						0	2	0.013	0.40	0.20	
L-FVR094.1	L-FVR094	N-FPW087	N-FPW086	Circular	30	893.34	893.03						0	2	0.013	0.40	0.20	
L-FVR083	L-FVR083	N-FPW089	N-FPW083	Circular	78	890.4	890.23						0	3	0.013	0.50	0.20	
L-FVR376	L-FVR376	N-FPW089	PW-A1.11.3	Trapezoidal	10	897.5	897.5											
L-FVR084_1	L-FVR084	N-FPW090	N-FPW089	Circular	88	891.07	890.4						0	3	0.013	0.10	0.40	
L-FVR084.1	L-FVR084	N-FPW090	N-FPW089	Circular	88	891.07	890.4						0	3	0.013	0.10	0.40	
L-FVR085_1	L-FVR085	N-FPW091	N-FPW090	Circular	272	891.82	891.07						0	3	0.013	0.40	0.20	
L-FVR085.1	L-FVR085	N-FPW091	N-FPW090	Circular	272	891.82	891.07						0	3	0.013	0.40	0.20	
L-FVR086_1	L-FVR086	N-FPW092	N-FPW091	Circular	51	892.02	891.82						0	3	0.013	1.00	0.20	
L-FVR086.1	L-FVR086	N-FPW092	N-FPW091	Circular	51	892.02	891.82						0	3	0.013	1.00	0.20	
L-FVR087_1	L-FVR087	N-FPW093	N-FPW092	Circular	32	892.12	892.02						0	3	0.013	0.50	0.20	
L-FVR087.1	L-FVR087	N-FPW093	N-FPW092	Circular	32	892.12	892.02						0	3	0.013	0.50	0.20	
L-FVR088_1	L-FVR088	N-FPW094	N-FPW093	Circular	131	892.55	892.12						0	3	0.013	0.10	0.20	
L-FVR088.1	L-FVR088	N-FPW094	N-FPW093	Circular	131	892.55	892.12						0	3	0.013	0.10	0.20	
L-FVR089_1	L-FVR089	N-FPW095	N-FPW094	Circular	67	892.63	892.55						0	3	0.013	1.00	0.40	
L-FVR089.1	L-FVR089	N-FPW095	N-FPW094	Circular	67	892.63	892.55						0	3	0.013	1.00	0.40	
L-FVR096	L-FVR096	N-FPW097	PW-A1.11.3	Circular	89	890.64	890.04						0	2.5	0.013	1.00	0.20	
L-FVR097	L-FVR097	N-FPW098	N-FPW097	Circular	110	891.17	890.72						0	2.5	0.013	0.50	0.20	
L-FVR098	L-FVR098	N-FPW099	N-FPW098	Circular	680	891.5	891.2						0	2	0.013	0.10	0.20	
L-FVR099	L-FVR099	N-FPW100	N-FPW099	Circular	666	891.94	891.5						0	2	0.013	1.00	0.20	
L-FVR405	L-FVR405	N-FPW100	PW-A1.8.3	Trapezoidal	10	895.96	895.96											
L-FVR420	L-FVR420	N-FPW100	N-FPW098	Trapezoidal	1238	901.1	899.9											
L-FVR100	L-FVR100	N-FPW101	N-FPW100	Circular	130	892.64	891.94						0	2	0.013	1.00	0.20	

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FVR103	L-FVR103	N-FPW105	PW-A1.8.2	Circular	475	895.17	892.5						0	1	0.013	1.00	0.20	
L-FVR104	L-FVR104	N-FPW106	N-FPW105	Circular	475	897.84	895.17						0	1	0.013	0.10	0.20	
L-FVR109_1	L-FVR109	N-FPW110	PW-A1.8.2	Circular	65	892.89	892.5						0	2	0.013	1.00	0.20	
L-FVR109.1	L-FVR109	N-FPW110	PW-A1.8.2	Circular	65	892.89	892.5						0	2	0.013	1.00	0.20	
L-FVR111	L-FVR111	N-FPW112	PW-A1.5	Circular	129	894.21	894.08						0	4	0.013	1.00	1.00	
L-FVR112	L-FVR112	N-FPW113	N-FPW112	Circular	109	894.43	894.21						0	3	0.013	1.00	0.20	
L-FVR113	L-FVR113	N-FPW114	N-FPW113	Circular	98	894.62	894.43						0	3	0.013	0.50	0.20	
L-FVR114	L-FVR114	N-FPW115	N-FPW114	Circular	29	898.88	898.76						0	3	0.013	0.50	0.20	
L-FVR117_1	L-FVR117	N-FPW118	PW-A1.3	Circular	223	892.99	892.48						0	4	0.013	1.00	0.20	
L-FVR117.1	L-FVR117	N-FPW118	PW-A1.3	Circular	223	892.99	892.48						0	4	0.013	1.00	0.20	
L-FVR118	L-FVR118	N-FPW119	N-FPW118	Circular	256	893.35	892.99						0	4	0.013	0.10	0.20	
L-FVR119	L-FVR119	N-FPW120	N-FPW119	Circular	95	893.44	893.35						0	4	0.013	0.50	0.20	
L-FVR120	L-FVR120	N-FPW121	N-FPW120	Circular	116	893.89	893.44						0	4	0.013	0.50	0.20	
L-FVR121	L-FVR121	N-FPW122	N-FPW121	Circular	80	894.07	893.89						0	4	0.013	0.10	0.20	
L-FVR122	L-FVR122	N-FPW123	N-FPW122	Circular	80	894.25	894.07						0	4	0.013	0.10	0.20	
L-FVR123	L-FVR123	N-FPW124	N-FPW123	Circular	56	894.35	894.25						0	4	0.013	0.10	0.20	
L-FVR124	L-FVR124	N-FPW125	N-FPW124	Circular	88	894.57	894.35						0	4	0.013	0.10	0.20	
L-FVR125	L-FVR125	N-FPW126	N-FPW125	Circular	104	894.75	894.57						0	4	0.013	0.10	0.20	
L-FVR126	L-FVR126	N-FPW127	N-FPW126	Circular	184	895.14	894.75						0	4	0.013	0.10	0.20	
L-FVR127	L-FVR127	N-FPW128	N-FPW127	Circular	63	895.21	895.14						0	4	0.013	0.10	0.40	
L-FVR128	L-FVR128	N-FPW129	N-FPW128	Circular	36	895.35	895.34						0	3.5	0.013	0.40	0.20	
L-FVR448	L-FVR448	N-FPW129	PW-A1.9	Trapezoidal	1780	902.84	900.2											
L-FVR129	L-FVR129	N-FPW130	N-FPW129	Circular	88	895.6	895.42						0	3.5	0.013	0.10	0.20	
L-FVR130	L-FVR130	N-FPW131	N-FPW130	Circular	104	896.08	895.74						0	3	0.013	0.10	0.20	
L-FVR131	L-FVR131	N-FPW132	N-FPW131	Circular	99	896.5	896.2						0	3	0.013	0.10	0.40	
L-FVR140	L-FVR140	N-FPW133	N-FPW132	Circular	151	896.86	896.55						0	3	0.013	0.40	0.20	
L-FVR141	L-FVR141	N-FPW134	N-FPW133	Circular	85	897.13	896.91						0	3	0.013	0.10	0.20	
L-FVR142	L-FVR142	N-FPW135	N-FPW134	Circular	90	897.37	897.23						0	3	0.013	0.10	0.20	
L-FVR143	L-FVR143	N-FPW136	N-FPW135	Circular	94	897.62	897.42						0	3	0.013	0.10	0.20	
L-FVR144	L-FVR144	N-FPW137	N-FPW136	Circular	129	897.89	897.67						0	3	0.013	0.10	0.20	
L-FVR145	L-FVR145	N-FPW138	N-FPW137	Circular	116	898.32	897.89						0	2.75	0.013	0.10	0.20	
L-FVR146	L-FVR146	N-FPW139	N-FPW138	Circular	215	899.08	898.47						0	2.5	0.013	0.10	0.20	
L-FVR147	L-FVR147	N-FPW140	N-FPW139	Circular	250	900.08	899.26						0	2.5	0.013	0.10	0.20	
L-FVR148	L-FVR148	N-FPW141	N-FPW140	Circular	114	900.52	900.27						0	2.5	0.013	0.10	0.20	
L-FVR149	L-FVR149	N-FPW142	N-FPW141	Circular	366	901.57	900.62						0	2.5	0.013	0.10	0.20	
L-FVR150	L-FVR150	N-FPW143	N-FPW142	Circular	85	901.92	901.66						0	2.25	0.013	0.10	0.20	
L-FVR151	L-FVR151	N-FPW144	N-FPW143	Circular	142	902.64	902.12						0	2.25	0.013	0.10	0.20	
L-FVR152	L-FVR152	N-FPW145	N-FPW144	Circular	240	903.43	902.64						0	1.75	0.013	0.10	0.20	
L-FVR132	L-FVR132	N-FPW147	N-FPW132	Circular	9	898.4	898.1						0	1.5	0.013	1.00	0.20	
L-FVR133_1	L-FVR133	N-FPW148	N-FPW147	Circular	40	898.59	898.45						0	1.5	0.013	0.10	0.20	
L-FVR133.1	L-FVR133	N-FPW148	N-FPW147	Circular	40	898.59	898.45						0	1.5	0.013	0.10	0.20	
L-FVR134	L-FVR134	N-FPW149	N-FPW148	Circular	14	898.6	898.6						0	1.5	0.013	0.50	0.20	
L-FVR135	L-FVR135	N-FPW150	N-FPW149	Circular	100	899.06	898.62						0	1.5	0.013	0.50	0.20	
L-FVR136	L-FVR136	PW-A1.2	N-FPW150	Circular	10	899.35	899.1						0	1.5	0.013	1.00	1.00	
L-FVR425	L-FVR425	PW-A1.2	N-FPW129	Trapezoidal	150	905.5	902.96											
L-FVR317	L-FVR317	N-FPW155	N-FPW054	Circular	74	892.96	892.63						0	2.25	0.013	1.00	0.50	
L-FVR318_1	L-FVR318	N-FPW156	N-FPW168	Arch	20	893.48	893.44						0	1.5	0.013	0.00	0.00	
L-FVR318.1	L-FVR318	N-FPW156	N-FPW168	Arch	20	893.48	893.44						0	1.5	0.013	0.00	0.00	
L-FVR319	L-FVR319	N-FPW157	N-FPW156	Arch	30	893.54	893.48						0	1.5	0.013	0.00	0.00	
L-FVR166	L-FVR166	N-FPW158	N-FPW059	Arch	20	893.6	893.58						0	1.5	0.013	0.40	0.50	
L-FVR320	L-FVR320	N-FPW158	N-FPW157	Arch	20	893.58	893.54						0	1.5	0.013	0.00	0.00	
L-FVR454	L-FVR454	N-FPW159	N-FPW086	Trapezoidal	1400	900	896.95											
L-FVR321_1	L-FVR321	N-FPW159	PW-A1.10	Circular	101	893.7	892.87						0	2	0.013	1.00	0.20	
L-FVR321.1	L-FVR321	N-FPW159	PW-A1.10	Circular	101	893.7	892.87						0	2	0.013	1.00	0.20	
L-FVR322_1	L-FVR322	N-FPW160	N-FPW159	Circular	198	895.68	893.7						0	2	0.013	1.00	0.20	
L-FVR322.1	L-FVR322	N-FPW160	N-FPW159	Circular	198	895.68	893.7						0	2	0.013	1.00	0.20	
L-FVR323_1	L-FVR323	N-FPW161	N-FPW160	Circular	168	897.36	895.68						0	1.5	0.013	0.10	0.20	
L-FVR323.1	L-FVR323	N-FPW161	N-FPW160	Circular	168	897.36	895.68						0	1.5	0.013	0.10	0.20	

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FVR186	L-FVR186	N-FVR001	VR-30	Natural	1320	880	878.4	860	910	0.050	0.042	0.050						
L-FVR189	L-FVR189	N-FVR003	VRA1.16.4a	Circular	40	885.36	885.23						0	1.5	0.024	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FVR190	L-FVR190	N-FVR004	N-FVR003	Natural	112	885.76	885.36	30	150	0.050	0.035	0.050						
L-FVR191	L-FVR191	N-FVR005	N-FVR004	Circular	40	885.81	885.76						0	1.5	0.024	0.50	0.50	Groove End with Projecting (Circ, Conc)
L-FVR192	L-FVR192	N-FVR006	N-FVR005	Natural	621	888.8	886.3	0	80	0.050	0.035	0.050						
L-FVR194	L-FVR194	N-FVR008	VR-31	Circular	124	889.18	888.5						0	2	0.013	1.00	0.20	
L-FVR196_1	L-FVR196	N-FVR010	VR-A1.16.3	Circular	131	889.72	889.53						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR196_2	L-FVR196	N-FVR010	VR-A1.16.3	Circular	131	889.72	889.53						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR300	L-FVR300	N-FVR014	N-1158	Natural	1093	887.09	886.66	2150	2220	0.050	0.042	0.050						
L-FVR201	L-FVR201	N-FVR016	N-1393	Natural	120	888.19	887.8	1590	1640	0.050	0.042	0.050						
L-FVR203	L-FVR203	N-FVR017	N-FVR016	Circular	145	890.26	890.24						0	5.5	0.013	1.00	0.20	
L-FVR204_1	L-FVR204	N-FVR018	N-FVR017	Circular	313	890.79	890.26						0	5.5	0.013	0.10	0.20	
L-FVR204.1	L-FVR204	N-FVR018	N-FVR017	Circular	313	890.79	890.26						0	5.5	0.013	0.10	0.20	
L-FVR206	L-FVR206	N-FVR020	N-FVR052	Circular	162	891.73	891.38						0	5	0.013	0.10	0.20	
L-FVR207	L-FVR207	N-FVR021	N-FVR020	Circular	60	891.83	891.73						0	5	0.013	0.10	0.20	
L-FVR208	L-FVR208	N-FVR022	N-FVR021	Circular	303	892.39	891.9						0	5	0.013	0.10	0.20	
L-FVR209	L-FVR209	N-FVR023	N-FVR022	Circular	79	892.59	892.39						0	5	0.013	0.10	0.40	
L-FVR210	L-FVR210	N-FVR024	N-FVR023	Circular	30	892.65	892.61						0	4.5	0.013	0.40	0.20	
L-FVR211	L-FVR211	N-FVR025	N-FVR024	Circular	142	892.79	892.63						0	4.5	0.013	0.10	0.20	
L-FVR212	L-FVR212	N-FVR026	N-FVR025	Circular	20	892.82	892.79						0	4.5	0.011	0.10	0.20	
L-FVR213	L-FVR213	N-FVR027	N-FVR026	Circular	179	893.67	892.82						0	4.5	0.013	0.10	0.20	
L-FVR450	L-FVR450	N-FVR028	PW-A1.13	Trapezoidal	2980	901.8	895											
L-FVR214_1	L-FVR214	N-FVR028	N-FVR027	Circular	82	893.94	893.67						0	4.5	0.013	0.10	0.20	
L-FVR214.1	L-FVR214	N-FVR028	N-FVR027	Circular	82	893.94	893.67						0	4.5	0.013	0.10	0.20	
L-FVR215	L-FVR215	N-FVR029	N-FVR028	Circular	354	895.11	893.94						0	4.5	0.013	0.10	0.20	
L-FVR216	L-FVR216	N-FVR030	N-FVR029	Circular	73	896.06	895.72						0	2.5	0.013	0.10	0.40	
L-FVR217	L-FVR217	N-FVR031	N-FVR030	Circular	41	896.32	896.11						0	2.5	0.013	1.00	0.20	
L-FVR412	L-FVR412	N-FVR031	N-FVR028	Trapezoidal	237	903	901.8											
L-FVR219	L-FVR219	N-FVR033	VR-A1.12b	Circular	25	898.07	897.86						0	1.5	0.013	1.00	0.20	
L-FVR220	L-FVR220	N-FVR034	N-FVR033	Circular	376	898.8	898.07						0	1.5	0.013	0.10	0.40	
L-FVR244	L-FVR244	N-FVR035	N-FVR034	Circular	297	899.39	898.8						0	1.5	0.013	0.10	0.20	
L-FVR314	L-FVR314	N-FVR036	VR-A1.11	Natural	274	891.47	890.31	800	860	0.050	0.042	0.050						
L-FVR231	L-FVR231	N-FVR037	N-FVR036	Circular	80	891.56	891.47						14	5.5	0.024	1.00	0.00	
L-FVR232	L-FVR232	N-FVR038	N-FVR037	Circular	230	891.82	891.56						0	5.5	0.013	1.00	0.20	
L-FVR233	L-FVR233	N-FVR039	N-FVR038	Circular	290	892.14	891.82						0	5.5	0.013	0.10	0.20	
L-FVR235	L-FVR235	N-FVR041	VR-A1.10	Circular	50	892.62	892.57						0	5.5	0.013	0.50	0.20	
L-FVR236	L-FVR236	N-FVR043	N-FVR041	Circular	50	892.68	892.62						0	5.5	0.013	0.50	0.20	
L-FVR237	L-FVR237	N-FVR044	N-FVR043	Circular	95	892.83	892.68						0	5	0.013	0.10	0.20	
L-FVR238	L-FVR238	N-FVR045	N-FVR044	Circular	110	893	892.83						0	5	0.013	0.10	0.20	
L-FVR239	L-FVR239	N-FVR046	N-FVR045	Circular	205	893.34	893						0	5	0.013	0.10	0.20	
L-FVR240	L-FVR240	N-FVR047	N-FVR046	Circular	30	893.39	893.34						0	5	0.013	0.10	0.40	
L-FVR246	L-FVR246	N-FVR048	N-FVR051	Circular	240	894.09	893.71						0	5	0.013	0.10	0.20	
L-FVR242	L-FVR242	N-FVR049	N-FVR048	Circular	218	894.44	894.09						0	5	0.013	0.10	0.40	
L-FVR241	L-FVR241	N-FVR051	N-FVR047	Circular	200	893.71	893.39						0	5	0.013	0.40	0.20	
L-FVR221_1	L-FVR221	N-FVR052	VR-A1.12a	Circular	129	891.38	891.2						0	5.5	0.013	0.10	0.20	
L-FVR221.1	L-FVR221	N-FVR052	VR-A1.12a	Circular	129	891.38	891.2						0	5.5	0.013	0.10	0.20	
L-FVR253_1	L-FVR253	N-FVR058	N-FVR049	Arch	246	895.42	894.44						0	1.833	0.013	1.00	0.40	
L-FVR253.1	L-FVR253	N-FVR058	N-FVR049	Arch	246	895.42	894.44						0	1.833	0.013	1.00	0.40	
L-FVR053	L-FVR053	N-FVR059	N-FVR058	Arch	27	895.53	895.42						0	1.833	0.013	0.10	0.20	
L-FVR223	L-FVR223	N-FVR062	VR-A1.11.4	Circular	252	893.67	893.3						0	3.5	0.013	0.50	0.20	
L-FVR224	L-FVR224	N-FVR063	N-FVR062	Circular	143	897.22	896.5						0	3.5	0.013	0.50	0.20	
L-FVR225	L-FVR225	N-FVR064	N-FVR063	Circular	118	897.37	897.22						0	1	0.013	0.50	0.20	
L-FVR227	L-FVR227	N-FVR066	VR-A1.11.3	Circular	111	898.4	897.97						0	1	0.013	1.00	0.20	
L-FVR230	L-FVR230	N-FVR070	N-FVR036	Natural	1158	892	891.47	490	540	0.050	0.042	0.050						
L-FVR257	L-FVR257	N-FVR073	N-FVR070	Circular	150	893.19	893.02						0	4.5	0.013	0.50	0.10	
L-FVR258	L-FVR258	N-FVR074	N-FVR073	Circular	275	893.49	893.18						0	4.5	0.013	0.50	0.20	
L-FVR259	L-FVR259	N-FVR075	N-FVR074	Circular	268	893.78	893.49						0	4.5	0.013	0.10	0.40	
L-FVR260	L-FVR260	N-FVR076	N-FVR075	Circular	399	899.48	898.08						0	1	0.013	1.00	0.20	

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					Pipes & Culverts					
L-FVR265	L-FVR265	N-FVR079	VR-A1.5	Circular	90	896.09	895.5						0	2.5	0.013	1.00	0.20	
L-FVR273	L-FVR273	N-FVR087	N-1173	Natural	191	899	898	170	190	0.050	0.042	0.050						
L-FVR274_1	L-FVR274	N-FVR088	N-FVR087	Circular	18	899.3	899.2						0	1.25	0.024	0.50	0.20	
L-FVR274.1	L-FVR274	N-FVR088	N-FVR087	Circular	18	899.3	899.2						0	1.25	0.024	0.50	0.20	
L-FVR275_1	L-FVR275	N-FVR089	N-FVR088	Circular	44	899.4	899.3						0	1.25	0.024	0.10	0.20	
L-FVR275.1	L-FVR275	N-FVR089	N-FVR088	Circular	44	899.4	899.3						0	1.25	0.024	0.10	0.20	
L-FVR278	L-FVR278	N-FVR092	VR-A1.4	Natural	580	905.8	899.1	10	120	0.050	0.035	0.050						
L-FVR279	L-FVR279	N-FVR093	N-FVR092	Circular	54	905.47	905.42						0	2.33	0.024	0.50	0.50	
L-FVR280	L-FVR280	N-FVR094	N-FVR093	Natural	722	907.5	905.6	20	200	0.050	0.035	0.050						
L-FVR282	L-FVR282	N-FVR096	VR-A1.3b	Natural	430	908.49	907.68	20	60	0.050	0.035	0.050						
L-FVR283	L-FVR283	N-FVR097	N-FVR096	Circular	70	908.97	908.49						0	2.33	0.024	0.50	0.50	
L-FVR284	L-FVR284	N-FVR098	N-FVR097	Natural	369	909.7	909.5	0	50	0.050	0.035	0.050						
L-FVR288	L-FVR288	N-FVR102	VR-A1.3.2	Circular	280	910.9	910.32						0	1.5	0.011	0.10	0.20	
L-FVR289	L-FVR289	N-FVR103	N-FVR102	Circular	270	911.17	910.9						0	1.5	0.011	0.10	0.20	
L-FVR291	L-FVR291	N-FVR105	VR-A1.2	Natural	105	895.5	895.5	885	960	0.050	0.037	0.050						
L-FVR302	L-FVR302	N-FVR115	N-232	Natural	521	918	912.2	50	130	0.050	0.042	0.050						
L-FVR303	L-FVR303	N-FVR116	N-FVR115	Rectangular	100	918.79	918						16	5	0.013	0.50	0.50	
L-FVR304	L-FVR304	N-FVR117	N-FVR116	Natural	211	920.5	918.79	90	150	0.050	0.042	0.050						
L-FVR309	L-FVR309	N-FVR122	TribJ-3	Natural	2513	966	921.75	280	310	0.050	0.042	0.050						
L-FVR250	L-FVR250	N-FVR126	N-FVR133	Circular	144	933.74	935.05						0	4	0.013	0.10	0.20	
L-FVR268	L-FVR268	N-FVR128	N-FVR129	Circular	35	936.68	936.58						0	3.5	0.013	0.10	0.20	
L-FVR267	L-FVR267	N-FVR129	N-FVR130	Circular	18	936.29	936.13						0	3.5	0.013	0.10	0.20	
L-FVR252	L-FVR252	N-FVR130	N-FVR131	Circular	11	936.09	936.08						0	3.5	0.013	0.10	0.20	
L-FVR251	L-FVR251	N-FVR131	N-FVR132	Circular	18	935.98	935.53						0	3.5	0.013	0.50	0.20	
L-FVR313	L-FVR313	N-FVR132	N-FVR126	Circular	125	935.5	934.38						0	3.5	0.013	0.50	0.20	
L-FVR249	L-FVR249	N-FVR133	N-FVR134	Circular	153	932.35	930.14						0	4	0.013	0.10	0.20	
L-FVR248	L-FVR248	N-FVR134	N-FVR135	Circular	76	930.14	928.66						0	4	0.013	0.50	0.20	
L-FVR247_1	L-FVR247	N-FVR135	VR-A2.2b	Circular	76	928.66	928.53						0	5	0.013	1.00	0.20	
L-FVR247.1	L-FVR247	N-FVR135	VR-A2.2b	Circular	76	928.66	928.53						0	5	0.013	1.00	0.20	
L-FVR153	L-FVR153	PW-A1.1	N-FPW145	Circular	20	907.98	906.69						0	1.25	0.013	1.00	1.00	
L-FVR367	L-FVR367	PW-A1.1	N-FVR143	Trapezoidal	50	911.4	911.4											
L-FVR090_1	L-FVR090	PW-A1.10	N-FPW095	Circular	87	892.87	892.63						0	3	0.013	1.00	1.00	
L-FVR090.1	L-FVR090	PW-A1.10	N-FPW095	Circular	87	892.87	892.63						0	3	0.013	1.00	1.00	
L-FVR076_1	L-FVR076	PW-A1.11	PW-A1.12b	Circular	60	889.7	889.64						0	1.75	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR076.1	L-FVR076	PW-A1.11	PW-A1.12b	Circular	60	889.7	889.64						0	1.75	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR095_1	L-FVR095	PW-A1.11.1	N-FPW087	Circular	31	893.48	893.34						0	2	0.013	0.10	0.50	Groove End with Projecting (Circ, Conc)
L-FVR095.1	L-FVR095	PW-A1.11.1	N-FPW087	Circular	31	893.48	893.34						0	2	0.013	0.10	0.50	Groove End with Projecting (Circ, Conc)
L-FVR092_1	L-FVR092	PW-A1.11.2	N-FPW084	Circular	71	891.77	891.09						0	2.5	0.013	0.10	0.50	Groove End with Projecting (Circ, Conc)
L-FVR092.1	L-FVR092	PW-A1.11.2	N-FPW084	Circular	71	891.77	891.09						0	2.5	0.013	0.10	0.50	Groove End with Projecting (Circ, Conc)
L-FVR368	L-FVR368	PW-A1.11.3	PW-A1.11	Trapezoidal	50	895	895											
L-FVR355w1	L-FVR355	PW-A1.11.3	N-FPW082	Weir	0	894.22	894.22											
L-FVR355w2	L-FVR355	PW-A1.11.3	N-FPW082	Weir	0	894.22	894.22											
L-FVR355o1	L-FVR355	PW-A1.11.3	N-FPW082	Weir	0	894.22	894.22											
L-FVR175	L-FVR175	PW-A1.12.1	N-FPW068	Circular	25	895.5	895.45						0	1.25	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR163	L-FVR163	PW-A1.12.2	N-FPW075	Circular	203	893.44	892.84						0	2.5	0.013	0.50	0.50	
L-FVR315	L-FVR315	PW-A1.12.2	N-FPW056	Circular	204	893.44	893.08						0	2.25	0.013	1.00	0.50	
L-FVR155	L-FVR155	PW-A1.12.3	PW-A1.12a	Circular	169	891.66	891.09						0	3.5	0.013	1.00	0.50	
L-FVR356w1	L-FVR356	PW-A1.12.4	N-FPW046	Weir	0	893	893											
L-FVR356w2	L-FVR356	PW-A1.12.4	N-FPW046	Weir	0	893	893											
L-FVR356o1	L-FVR356	PW-A1.12.4	N-FPW046	Weir	0	893	893											
L-FVR075_1	L-FVR075	PW-A1.12b	PW-A1.12a	Circular	53	889.27	889.2						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR380.1	L-FVR380	PW-A1.12b	N-FB018	Weir	0	894	894											
L-FVR074	L-FVR074	PW-A1.13	N-FPW018	Circular	431	887.32	887.14						0	4.5	0.013	0.40	0.40	
L-FVR350o1	L-FVR350	PW-A1.14.1	N-FPW022	Orifice	0	886.44	886.44						0	0	0	0.00	0.00	
L-FVR351w1	L-FVR351	PW-A1.14.1	N-FPW021	Weir	0	893.3	893.3											
L-FVR351w2	L-FVR351	PW-A1.14.1	N-FPW021	Weir	0	893.3	893.3											
L-FVR352o1	L-FVR352	PW-A1.14.2	N-FPW017	Orifice	0	886.2	886.2						0	0	0	0.00	0.00	
L-FVR348o1	L-FVR348	PW-A1.14.3	N-FPW163	Orifice	0	885.7	885.7						0	0	0	0.00	0.00	

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					Pipes & Culverts					
L-FVR349w1	L-FVR349	PW-A1.14.3	N-FPW036	Weir	0	893.44	893.44											
L-FVR349w2	L-FVR349	PW-A1.14.3	N-FPW036	Weir	0	893.44	893.44											
L-FVR346w1	L-FVR346	PW-A1.14.4	N-FPW028	Weir	0	892.01	892.01											
L-FVR346w2	L-FVR346	PW-A1.14.4	N-FPW028	Weir	0	892.01	892.01											
L-FVR346o1	L-FVR346	PW-A1.14.4	N-FPW028	Weir	0	892.01	892.01											
L-FVR043	L-FVR043	PW-A1.14.5	N-FPW026	Circular	69	887.03	886.98						0	2.5	0.013	0.50	1.00	Groove End with Projecting (Circ, Conc)
L-FVR411	L-FVR411	PW-A1.15.1	N-FPW012	Trapezoidal	106	896.7	896.15											
L-FVR353w1	L-FVR353	PW-A1.15.1	N-FPW014	Weir	0	893.54	893.54											
L-FVR353w2	L-FVR353	PW-A1.15.1	N-FPW014	Weir	0	893.54	893.54											
L-FVR353.1	L-FVR353	PW-A1.15.1	N-FPW014	Weir	0	893.54	893.54											
L-FVR034	L-FVR034	PW-A1.17.1	PW-A1.17.2	Circular	80	887.9	887.7						0	2.25	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR345w1	L-FVR345	PW-A1.17.2	N-FPW008	Weir	0	890.7	890.7											
L-FVR345w2	L-FVR345	PW-A1.17.2	N-FPW008	Weir	0	890.7	890.7											
L-FVR345o1	L-FVR345	PW-A1.17.2	N-FPW008	Weir	0	890.7	890.7											
L-FVR369	L-FVR369	PW-A1.17.3	PW-A1.16	Trapezoidal	50	889	889											
L-FVR364w1	L-FVR364	PW-A1.17.3	N-FPW001	Weir	0	887.54	887.54											
L-FVR364w2	L-FVR364	PW-A1.17.3	N-FPW001	Weir	0	887.54	887.54											
L-FVR364o1	L-FVR364	PW-A1.17.3	N-FPW001	Weir	0	887.54	887.54											
L-FVR116_1	L-FVR116	PW-A1.3	PW-A1.8.3	Circular	167	892.48	891.98						0	4	0.013	1.00	0.20	
L-FVR116.1	L-FVR116	PW-A1.3	PW-A1.8.3	Circular	167	892.48	891.98						0	4	0.013	1.00	0.20	
L-FVR115	L-FVR115	PW-A1.4	N-FPW115	Circular	309	900.16	898.88						0	3	0.013	0.10	0.20	
L-FVR370	L-FVR370	PW-A1.4	PW-A1.3	Trapezoidal	933	907.1	902.9											
L-FVR354w1	L-FVR354	PW-A1.5	N-FPW111	Weir	0	896	896											
L-FVR354w2	L-FVR354	PW-A1.5	N-FPW111	Weir	0	896	896											
L-FVR354o1	L-FVR354	PW-A1.5	N-FPW111	Weir	0	896	896											
L-FVR358w1	L-FVR358	PW-A1.5	N-FPW110	Weir	0	902.19	902.19											
L-FVR358w2	L-FVR358	PW-A1.5	N-FPW110	Weir	0	902.19	902.19											
L-FVR371	L-FVR371	PW-A1.6.1	PW-A1.6.3	Trapezoidal	33	901	901											
L-FVR360w1	L-FVR360	PW-A1.6.1	N-FPW108	Weir	0	901	901											
L-FVR360.1	L-FVR360	PW-A1.6.1	N-FPW108	Weir	0	901	901											
L-FVR360o1	L-FVR360	PW-A1.6.1	N-FPW108	Weir	0	901	901											
L-FVR372	L-FVR372	PW-A1.6.2	PW-A1.6.3	Trapezoidal	33	901.9	901.9											
L-FVR359w1	L-FVR359	PW-A1.6.2	N-FPW109	Weir	0	901	901											
L-FVR359w2	L-FVR359	PW-A1.6.2	N-FPW109	Weir	0	901	901											
L-FVR359o1	L-FVR359	PW-A1.6.2	N-FPW109	Weir	0	901	901											
L-FVR408	L-FVR408	PW-A1.6.3	PW-A1.8.1	Trapezoidal	1068	902	894											
L-FVR362o1	L-FVR362	PW-A1.6.3	N-FPW164	Orifice	0	897	897						0	0	0	0.00	0.00	
L-FVR363.1	L-FVR363	PW-A1.6.3	N-FPW107	Weir	0	901	901											
L-FVR363w2	L-FVR363	PW-A1.6.3	N-FPW107	Weir	0	901	901											
L-FVR080	L-FVR080	PW-A1.7	N-FPW079	Circular	48	895.8	895.16						0	2.33	0.011	1.00	1.00	
L-FVR375	L-FVR375	PW-A1.7	B-A1.1	Trapezoidal	2595	897.9	890.5											
L-FVR102_1	L-FVR102	PW-A1.8.1	PW-A1.8.3	Circular	75	892.25	892.2						0	4	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR102.1	L-FVR102	PW-A1.8.1	PW-A1.8.3	Circular	75	892.25	892.2						0	4	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR108_1	L-FVR108	PW-A1.8.2	PW-A1.8.3	Circular	47	892.5	892.13						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR108.1	L-FVR108	PW-A1.8.2	PW-A1.8.3	Circular	47	892.5	892.13						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR108_2	L-FVR108	PW-A1.8.2	PW-A1.8.3	Circular	47	892.5	892.13						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR331w1	L-FVR331	PW-A1.8.3	N-FPW102	Weir	0	894.5	894.5											
L-FVR331w2	L-FVR331	PW-A1.8.3	N-FPW102	Weir	0	894.5	894.5											
L-FVR331o1	L-FVR331	PW-A1.8.3	N-FPW102	Weir	0	894.5	894.5											
L-FVR324_1	L-FVR324	PW-A1.9	N-FPW161	Circular	304	900.4	897.36						0	1.5	0.013	0.10	1.00	
L-FVR324.1	L-FVR324	PW-A1.9	N-FPW161	Circular	304	900.4	897.36						0	1.5	0.013	0.10	1.00	
L-FVR297	L-FVR297	VR-A1.1	N-132	Natural	152	901.34	900.64	330	370	0.050	0.037	0.050						
L-FVR234	L-FVR234	VR-A1.10	N-FVR039	Circular	390	892.57	892.14						0	5.5	0.013	0.10	0.20	
L-FVR333w1	L-FVR333	VR-A1.11.1	N-FVR139	Weir	0	901.58	901.58											
L-FVR333w2	L-FVR333	VR-A1.11.1	N-FVR139	Weir	0	901.58	901.58											
L-FVR333o1	L-FVR333	VR-A1.11.1	N-FVR139	Weir	0	901.58	901.58											
L-FVR336w1	L-FVR336	VR-A1.11.2	N-FVR140	Weir	0	903.03	903.03											
L-FVR336w2	L-FVR336	VR-A1.11.2	N-FVR140	Weir	0	903.03	903.03											

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

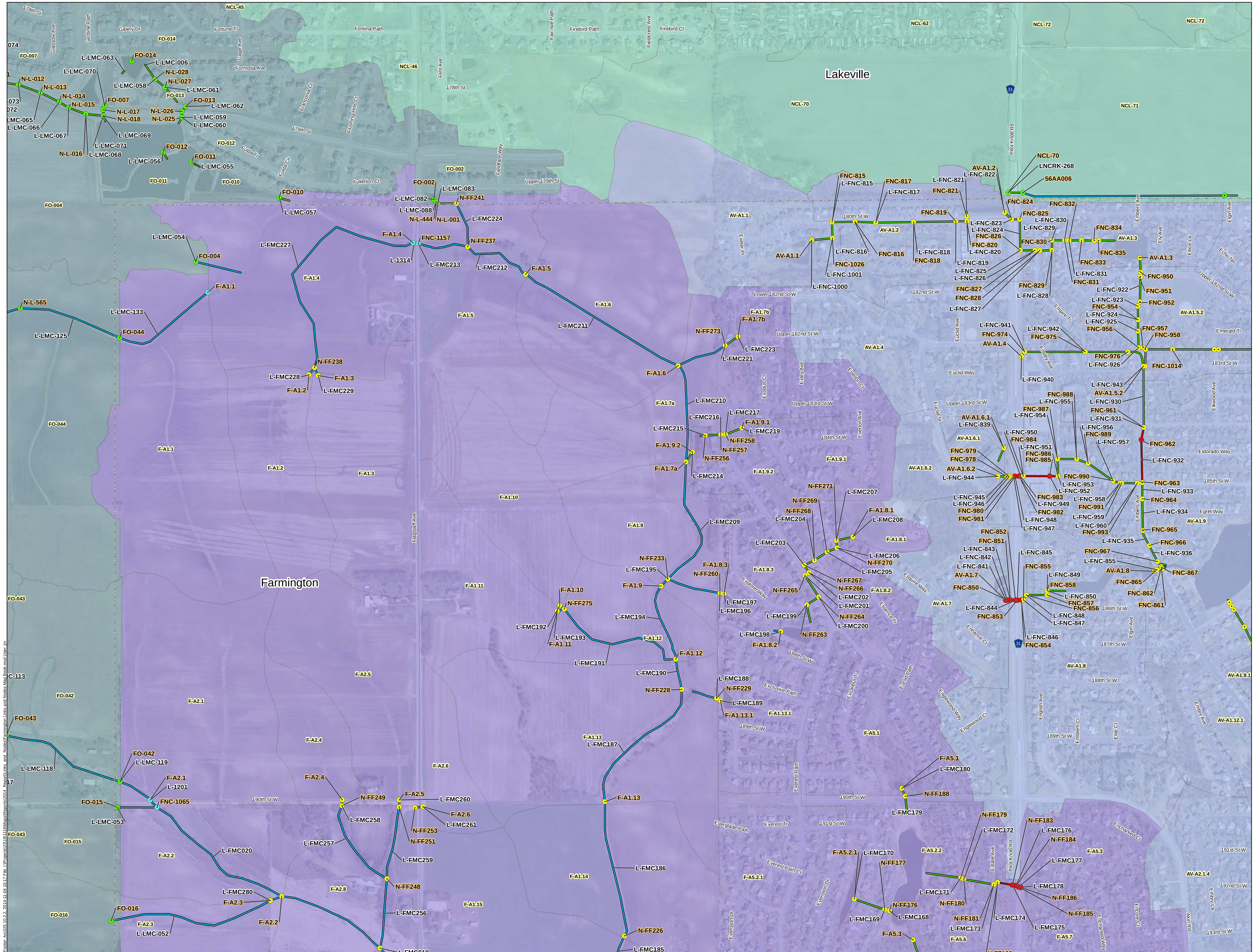
Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FVR336o1	L-FVR336	VR-A1.11.2	N-FVR140	Weir	0	903.03	903.03											
L-FVR226	L-FVR226	VR-A1.11.3	N-FVR064	Circular	252	898.04	897.48						0	1	0.013	0.50	1.00	
L-FVR379	L-FVR379	VR-A1.11.3	N-1362	Trapezoidal	812	898.7	898.4											
L-FVR222	L-FVR222	VR-A1.11.4	VR-A1.11	Natural	413	893.3	892.4	350	380	0.050	0.042	0.050						
L-FVR205	L-FVR205	VR-A1.12a	N-FVR018	Circular	92	891.2	890.79						0	5.5	0.013	0.40	0.20	
L-FVR210_1	L-FVR218	VR-A1.12b	N-FVR031	Circular	401	897.08	896.18						0	2.5	0.013	0.10	0.40	
L-FVR210.1	L-FVR218	VR-A1.12b	N-FVR031	Circular	401	897.08	896.18						0	2.5	0.013	0.10	0.40	
L-FVR245	L-FVR245	VR-A1.12c	N-FVR035	Circular	295	899.98	899.39						0	1.5	0.013	0.10	0.20	
L-FVR445	L-FVR445	VR-A1.12c	N-FVR169	Trapezoidal	591	906.6	905.55											
L-FVR446	L-FVR446	VR-A1.12c	VR-A1.9b	Trapezoidal	425	905.1	904.03											
L-FVR200	L-FVR200	VR-A1.13b	N-FVR014	Circular	160	889.66	889.38						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-1321	L-1321	VR-A1.14	N-1162	Natural	67	883.8	883.7	960	1092	0.100	0.043	0.045						
L-FVR199	L-FVR199	VR-A1.15	N-1162	Circular	114	889.42	888.84						0	2	0.013	0.50	0.50	
L-FVR344w1	L-FVR344	VR-A1.16.3	N-FVR009	Weir	0	894.4	894.4											
L-FVR344w2	L-FVR344	VR-A1.16.3	N-FVR009	Weir	0	894.4	894.4											
L-FVR344o1	L-FVR344	VR-A1.16.3	N-FVR009	Weir	0	894.4	894.4											
L-FVR188	L-FVR188	VRA1.16.4a	N-FVR001	Circular	125	885.23	885						0	3	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FVR193_1	L-FVR193	VRA1.16.4b	N-FVR006	Circular	105	888.12	887.74						0	1.5	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FVR193.1	L-FVR193	VRA1.16.4b	N-FVR006	Circular	105	888.12	887.74						0	1.5	0.013	1.00	0.50	Groove End with Projecting (Circ, Conc)
L-FVR197	L-FVR197	VR-A1.16.5	N-FVR010	Circular	108	890.03	889.86						0	2.25	0.013	1.00	1.00	
L-FVR394	L-FVR394	VR-A1.2.1	VR-A1.2.2	Trapezoidal	33	907.7	907.7											
L-FVR342o1	L-FVR342	VR-A1.2.1	N-FVR142	Orifice	0	903	903						0	0	0	0.00	0.00	
L-FVR343w1	L-FVR343	VR-A1.2.1	N-FVR108	Weir	0	907.7	907.7											
L-FVR343w2	L-FVR343	VR-A1.2.1	N-FVR108	Weir	0	907.7	907.7											
L-FVR383o1	L-FVR383	VR-A1.2.1	N-FVR148	Orifice	0	903	903						0	0	0	0.00	0.00	
L-FVR384w1	L-FVR384	VR-A1.2.1	N-FVR147	Weir	0	907.7	907.7											
L-FVR384w2	L-FVR384	VR-A1.2.1	N-FVR147	Weir	0	907.7	907.7											
L-FVR387w1	L-FVR387	VR-A1.2.1	N-FVR149	Weir	0	907.7	907.7											
L-FVR387w2	L-FVR387	VR-A1.2.1	N-FVR149	Weir	0	907.7	907.7											
L-FVR386o1	L-FVR386	VR-A1.2.1	N-FVR150	Orifice	0	903	903						0	0	0	0.00	0.00	
L-FVR389o1	L-FVR389	VR-A1.2.1	N-FVR152	Orifice	0	903	903						0	0	0	0.00	0.00	
L-FVR390w1	L-FVR390	VR-A1.2.1	N-FVR151	Weir	0	907.7	907.7											
L-FVR390w2	L-FVR390	VR-A1.2.1	N-FVR151	Weir	0	907.7	907.7											
L-FVR395	L-FVR395	VR-A1.2.2	VR-A1.2.3	Trapezoidal	33	908.3	908.3											
L-FVR339o1	L-FVR339	VR-A1.2.2	N-FVR141	Orifice	0	903	903						0	0	0	0.00	0.00	
L-FVR340w1	L-FVR340	VR-A1.2.2	N-FVR107	Weir	0	907	907											
L-FVR340w2	L-FVR340	VR-A1.2.2	N-FVR107	Weir	0	907	907											
L-FVR293	L-FVR293	VR-A1.2.3	N-FVR105	Circular	110	901	900.5						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR396	L-FVR396	VR-A1.2.3	VR-A1.2	Trapezoidal	50	903.7	903.7											
L-FVR398o1	L-FVR398	VR-A1.3.1	N-FVR153	Orifice	0	909.2	909.2						0	0	0	0.00	0.00	
L-FVR287	L-FVR287	VR-A1.3.2	VR-A1.3.3	Circular	86	910.62	910.5						0	1.25	0.011	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR286_1	L-FVR286	VR-A1.3.3	VR-A1.3a	Circular	86	910.5	910.38						0	1.25	0.013	0.50	1.00	
L-FVR286.1	L-FVR286	VR-A1.3.3	VR-A1.3a	Circular	86	910.5	910.38						0	1.25	0.013	0.50	1.00	
L-FVR285	L-FVR285	VR-A1.3a	N-FVR098	Circular	84	910	909.7						0	1.5	0.013	0.50	0.20	
L-FVR399	L-FVR399	VR-A1.3a	PW-A1.1	Trapezoidal	1400	912.7	901.55											
L-FVR281_1	L-FVR281	VR-A1.3b	N-FVR094	Circular	55	907.33	907.12						0	2.33	0.024	0.50	0.50	
L-FVR281.1	L-FVR281	VR-A1.3b	N-FVR094	Circular	55	907.33	907.12						0	2.33	0.024	0.50	0.50	
L-FVR276	L-FVR276	VR-A1.4	N-FVR089	Circular	38	899.5	899.4						0	1.25	0.024	0.10	1.00	
L-FVR400	L-FVR400	VR-A1.4	N-FVR087	Trapezoidal	80	902.1	902.1											
L-FVR277_1	L-FVR277	VR-A1.4.1	VR-A1.4	Circular	100	901.26	899.8						0	1	0.013	1.00	1.00	
L-FVR277.1	L-FVR277	VR-A1.4.1	VR-A1.4	Circular	100	901.26	899.8						0	1	0.013	1.00	1.00	
L-FVR266	L-FVR266	VR-A1.6	N-FVR079	Circular	47	896.31	896.09						0	2.5	0.013	0.50	0.20	
L-FVR401	L-FVR401	VR-A1.6	VR-A1.5	Trapezoidal	115	903.2	902.5											
L-FVR263	L-FVR263	VR-A1.7	N-FVR070	Natural	501	893.48	892	820	900	0.050	0.042	0.050						
L-FVR254_1	L-FVR254	VR-A1.8a	N-FVR059	Circular	233	896.2	895.53						0	2.5	0.013	1.00	0.20	
L-FVR254.1	L-FVR254	VR-A1.8a	N-FVR059	Circular	233	896.2	895.53						0	2.5	0.013	1.00	0.20	
L-FVR243	L-FVR243	VR-A1.9a	N-FVR049	Circular	120	894.83	894.44						0	4	0.011	1.00	0.20	
L-FVR310	L-FVR310	VR-A2.1	N-FVR122	Circular	148	967.35	966						0	2	0.013	1.00	0.50	

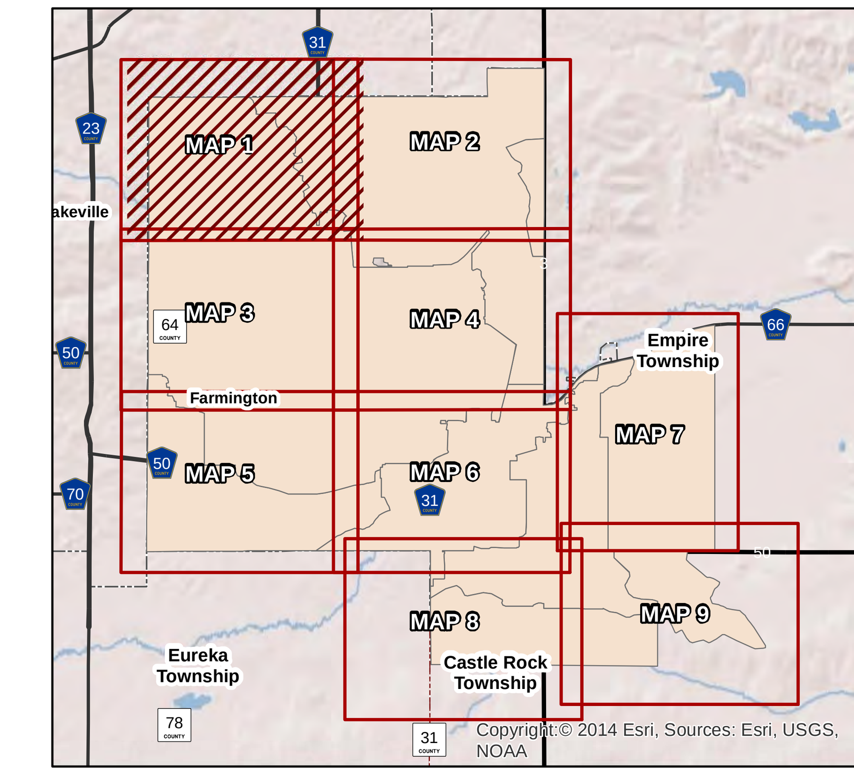
Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FVR269	L-FVR269	VR-A2.2a	N-FVR128	Circular	5	937.88	937.33						0	3.5	0.013	1.00	0.50	
L-FVR404	L-FVR404	VR-A2.2a	N-FVR154	Trapezoidal	75	943.6	943.6											
L-FVR421w1	L-FVR421	VR-A2.2b	N-FVR125	Weir	0	932.93	932.93											
L-FVR421w2	L-FVR421	VR-A2.2b	N-FVR125	Weir	0	932.93	932.93											
L-FVR421o1	L-FVR421	VR-A2.2b	N-FVR125	Weir	0	932.93	932.93											
L-FVR328	L-FVR328	VR-33a	VR-A1.3a	Circular	90	910.46	910						0	1.5	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR378	L-FVR378	VR-33a	N-FVR145	Trapezoidal	33	914.25	914.25											
L-232	L-232	N-FVR138	N-235	Natural	3063.4	891.4	881.069	850	905	0.050	0.042	0.050						
L-FMC002	L-FMC002	N-FF001	N-FF310	Circular	32	898.16	898.08						0	1.5	0.013	0.50	1.00	
L-FMC309o1	L-FMC309	N-FF298	N-FF001	Orifice	0	898.5	898.5						0	0	0	0.00	0.00	
L-FVR101	L-FVR101	N-FPW102	N-FPW101	Circular	25	892.71	892.69						0	1	0.013	1.00	1.00	
L-FVR229	L-FVR229	N-FVR068	VR-A1.11.3	Circular	214	898.58	898.03						0	1	0.013	1.00	1.00	
L-FVR332o1	L-FVR332	N-FVR139	N-FVR068	Orifice	0	899	899						0	0	0	0.00	0.00	
L-FVR228	L-FVR228	N-FVR067	N-FVR066	Circular	44	900.53	900.41						0	1	0.013	0.10	1.00	
L-FVR335o1	L-FVR335	N-FVR140	N-FVR067	Orifice	0	900.53	900.53						0	0	0	0.00	0.00	
L-FVR294	L-FVR294	N-FVR107	VR-A1.2.3	Circular	70	904	903.84						0	2	0.013	1.00	1.00	
L-FVR338w1	L-FVR338	N-FVR141	N-FVR107	Weir	0	906.7	906.7											
L-FVR338o1	L-FVR338	N-FVR141	N-FVR107	Weir	0	906.7	906.7											
L-FVR295	L-FVR295	N-FVR108	VR-A1.2.2	Arch	40	905.5	905.3						0	2	0.013	1.00	1.00	
L-FVR341w1	L-FVR341	N-FVR142	N-FVR108	Weir	0	905.5	905.5											
L-FVR195	L-FVR195	N-FVR009	N-FVR008	Circular	165	890.27	889.18						0	2	0.013	1.00	1.00	
L-FVR033	L-FVR033	N-FPW008	N-FPW007	Circular	41	887.7	887.33						0	1	0.013	1.00	1.00	
L-FVR044_1	L-FVR044	N-FPW028	PW-A1.14.5	Circular	98	887.12	887.01						0	1.25	0.013	1.00	1.00	
L-FVR044.1	L-FVR044	N-FPW028	PW-A1.14.5	Circular	98	887.12	887.01						0	1.25	0.013	1.00	1.00	
L-FVR052	L-FVR052	N-FPW036	N-FPW035	Circular	38	888.2	888.09						0	2	0.013	0.50	1.00	
L-FVR347w1	L-FVR347	N-FPW163	N-FPW036	Weir	0	893.2	893.2											
L-FVR347o1	L-FVR347	N-FPW163	N-FPW036	Weir	0	893.2	893.2											
L-FVR073	L-FVR073	N-FPW022	N-FPW021	Circular	36	888.44	888.4						0	1.75	0.013	0.10	1.00	
L-FVR068	L-FVR068	N-FPW017	N-FPW016	Circular	28	888.2	888.15						0	1	0.013	1.00	1.00	
L-FVR039	L-FVR039	N-FPW014	N-FPW013	Circular	14	890.08	890.04						0	1.5	0.013	1.00	1.00	
L-FVR110	L-FVR110	N-FPW111	N-FPW110	Circular	34	894.02	893.34						0	0.667	0.013	0.10	1.00	
L-FVR081	L-FVR081	N-FPW082	PW-A1.11	Circular	133	890.04	889.72						0	3	0.013	1.00	1.00	
L-FVR062	L-FVR062	N-FPW046	N-FPW045	Circular	35	892.18	892.13						0	1	0.013	0.50	1.00	
L-FVR107	L-FVR107	N-FPW109	PW-A1.6.3	Circular	50	899	898.9						0	2	0.013	1.00	1.00	
L-FVR106	L-FVR106	N-FPW108	PW-A1.6.3	Circular	50	899	898.9						0	2	0.013	1.00	1.00	
L-FVR361w1	L-FVR361	N-FPW164	N-FPW107	Weir	0	900.5	900.5											
L-FVR361o1	L-FVR361	N-FPW164	N-FPW107	Weir	0	900.5	900.5											
L-FVR105	L-FVR105	N-FPW107	N-FPW106	Circular	75	898.4	897.84						0	1	0.013	0.50	1.00	
L-FVR026	L-FVR026	N-FPW001	PW-A1.16	Circular	38	885.29	885						0	2	0.013	0.50	0.50	
L-FVR366	L-FVR366	N-FVR143	N-FVR098	Trapezoidal	1100	910	909.7											
L-FVR377	L-FVR377	N-FVR145	N-1169	Trapezoidal	2575	912.5	902.3											
L-FVR382w1	L-FVR382	N-FVR148	N-FVR147	Weir	0	905.5	905.5											
L-FVR391	L-FVR391	N-FVR147	VR-A1.2.2	Arch	40	905.5	905.3						0	2	0.013	0.00	0.00	
L-FVR385w1	L-FVR385	N-FVR150	N-FVR149	Weir	0	905.5	905.5											
L-FVR392	L-FVR392	N-FVR149	VR-A1.2.2	Arch	40	905.5	905.3						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR388w1	L-FVR388	N-FVR152	N-FVR151	Weir	0	905.5	905.5											
L-FVR393	L-FVR393	N-FVR151	VR-A1.2.2	Arch	40	905.5	905.3						0	2	0.013	1.00	1.00	Groove End with Projecting (Circ, Conc)
L-FVR290	L-FVR290	N-FVR104	N-FVR103	Circular	30	911.2	911.17						0	1.5	0.011	0.50	1.00	
L-FVR397o1	L-FVR397	N-FVR153	N-FVR104	Orifice	0	911.2	911.2						0.000	0.000	0.000	0	0	
L-FVR402	L-FVR402	N-FVR155	N-232	Trapezoidal	930	925.15	915											
L-FVR403	L-FVR403	N-FVR154	VR-A2.2b	Trapezoidal	510	940.7	934											
L-FVR419	L-FVR419	N-FPW170	N-FPW062	Trapezoidal	189	893.68	893.64											
L-FVR418	L-FVR418	N-FPW169	N-FPW158	Trapezoidal	369	893.45	893.45											
L-FVR417	L-FVR417	N-FPW168	PW-A1.12.2	Trapezoidal	228	893.44	893.44											
L-FVR416	L-FVR416	N-FPW167	N-FPW074	Trapezoidal	221	892.04	892.04											
L-FVR415	L-FVR415	N-FPW166	PW-A1.12.3	Trapezoidal	332	891.8	891.66											
L-FVR414	L-FVR414	N-FPW165	N-FPW055	Trapezoidal	162	892.91	892.91											
L-FVR311	L-FVR311	N-FVR125	N-FVR155	Circular	96	931.52	925.15						0.000	2.000	0.024	1	0.4	

Table B-4 Hydraulic Parameters for Farmington Other Areas Conduits and Reaches

Conduit	Link	Upstream Node	Downstream Node	Shape	Length (ft)	Upstream Invert (ft)	Downstream Invert (ft)	Left Bank Station (ft)	Right Bank Station (ft)	Left Overbank Roughness Coefficient	Channel Roughness Coefficient	Right Overbank Roughness Coefficient	Bottom Width (ft)	Depth (Height) (ft)	Roughness Coefficient	Exit Loss Coefficient	Entrance Loss Coefficient	Inlet Type
Farmington Other Areas Conduits and Reaches																		
								Natural Channels					*Pipes & Culverts*					
L-FVR423	L-FVR423	N-FVR156	N-FVR157	Circular	96	926.08	925.15						0.000	2.000	0.024	1	1	Groove End with Projecting (Circ, Conc)
L-FVR424w1	L-FVR424	VR-A2.2c	N-FVR156	Weir	0	929	929											
L-FVR422	L-FVR422	N-FVR157	N-FVR155	Trapezoidal	150	925.15	923											
L-FVR426_1	L-FVR426	N-FVR158	VR-A1.8a	Circular	226	896.85	896.2						0.000	2.500	0.014	0.1	0.2	
L-FVR426.1	L-FVR426	N-FVR158	VR-A1.8a	Circular	226	896.85	896.2						0.000	2.500	0.014	0.1	0.2	
L-FVR427_1	L-FVR427	N-FVR159	N-FVR158	Circular	214	897.92	896.85						0.000	2.500	0.013	0.1	0.4	
L-FVR427.1	L-FVR427	N-FVR159	N-FVR158	Circular	214	897.92	896.85						0.000	2.500	0.013	0.1	0.4	
L-FVR431_1	L-FVR431	N-FVR163	N-FVR159	Circular	258	899.21	897.92						0.000	2.000	0.013	0.4	0.2	
L-FVR431.1	L-FVR431	N-FVR163	N-FVR159	Circular	258	899.21	897.92						0.000	2.000	0.013	0.4	0.2	
L-FVR432_1	L-FVR432	N-FVR164	N-FVR163	Circular	142	899.92	899.21						0.000	2.000	0.013	0.1	0.2	
L-FVR432.1	L-FVR432	N-FVR164	N-FVR163	Circular	142	899.92	899.21						0.000	2.000	0.013	0.1	0.2	
L-FVR433	L-FVR433	VR-A1.8c	N-FVR164	Trapezoidal	50	908.4	907.83											
L-FVR434	L-FVR434	VR-A1.8c	VR-A1.8b	Trapezoidal	20	908.2	908.2											
L-FVR430	L-FVR430	VR-A1.8b	N-FVR161	Circular	361	906.34	899.1						0.000	1.000	0.013	1	1	Groove End with Projecting (Circ, Conc)
L-FVR429	L-FVR429	N-FVR161	N-FVR160	Circular	100	899.1	898.6						0.000	2.000	0.013	0.1	0.2	
L-FVR428_1	L-FVR428	N-FVR160	N-FVR159	Circular	135	898.6	897.92						0.000	2.000	0.013	1	0.2	
L-FVR428.1	L-FVR428	N-FVR160	N-FVR159	Circular	135	898.6	897.92						0.000	2.000	0.013	1	0.2	
L-FVR435	L-FVR435	N-FVR165	VR-A1.9a	Circular	44	894.97	894.83						0.000	4.000	0.013	0.1	0.2	
L-FVR444	L-FVR444	VR-A1.9b	N-FVR173	Circular	400	897.98	897.35						0.000	4.000	0.013	0.1	0.2	
L-FVR451	L-FVR451	VR-A1.9b	N-FVR171	Trapezoidal	2200	905.03	904.24											
L-FVR443_1	L-FVR443	N-FVR173	N-FVR172	Circular	406	897.35	896.71						0.000	4.000	0.013	0.1	0.2	
L-FVR443.1	L-FVR443	N-FVR173	N-FVR172	Circular	406	897.35	896.71						0.000	4.000	0.013	0.1	0.2	
L-FVR442_1	L-FVR442	N-FVR172	N-FVR171	Circular	64	896.71	896.61						0.000	4.000	0.013	1	0.2	
L-FVR442.1	L-FVR442	N-FVR172	N-FVR171	Circular	64	896.71	896.61						0.000	4.000	0.013	1	0.2	
L-FVR447	L-FVR447	N-FVR171	N-FVR030	Trapezoidal	459	904.24	902.06											
L-FVR441_1	L-FVR441	N-FVR171	N-FVR170	Circular	141	896.61	896.39						0.000	4.000	0.013	0.1	0.2	
L-FVR441.1	L-FVR441	N-FVR171	N-FVR170	Circular	141	896.61	896.39						0.000	4.000	0.013	0.1	0.2	
L-FVR440	L-FVR440	N-FVR170	N-FVR169	Circular	310	896.39	895.9						0.000	4.000	0.013	0.1	0.2	
L-FVR439	L-FVR439	N-FVR169	N-FVR168	Circular	260	895.9	895.5						0.000	4.000	0.013	0.1	0.2	
L-FVR438	L-FVR438	N-FVR168	N-FVR167	Circular	120	895.5	895.31						0.000	4.000	0.013	0.1	0.2	
L-FVR436	L-FVR436	N-FVR166	N-FVR165	Circular	163	895.23	894.97						0.000	4.000	0.013	1	0.2	
L-FVR437	L-FVR437	N-FVR167	N-FVR166	Circular	49	895.31	895.23						0.000	4.000	0.013	1	0.2	
L-FVR452	L-FVR452	N-FPW171	PW-A1.11.3	Trapezoidal	300	898.4	896.7											
L-FVR329	L-FVR329	N-679	N-FVR136	Natural	4846	931.8	909.9	480	1140	0.05	0	0						
L-FVR325	L-FVR325	N-FVR136	SB-A2	Natural	2539	909.9	901.84	640	690	0.05	0	0						
L-FVR326	L-FVR326	N-FVR137	N-FVR136	Natural	1878	910.2	909.9	570	690	0.05	0	0						
L-FVR327	L-FVR327	SB-A1	N-FVR137	Circular	72	911.3	910.2						0.000	3.000	0.013	1	0.5	
L-FVR381	L-FVR381	N-FB018	N-FB017	Trapezoidal	1014	892.7	888.89											
L-FVR459	L-FVR459	N-FB020	B-A1.11	Trapezoidal	2430	890.6	885.42											
L-FVR461	L-FVR461	N-FB025	B-A1.11	Trapezoidal	2428	893.7	885.42											
L-FVR463	L-FVR463	N-FB026	B-A1.15	Trapezoidal	1570	890	884.61											





SWMM Node Data Source
- Farmington
- Lakeville
- VRWJPO
- Assumed Data

XP SWMM Link Data Type
- Pipe
- Natural Channel
- Assumed Pipe
- Municipal Boundaries
- Civil Townships

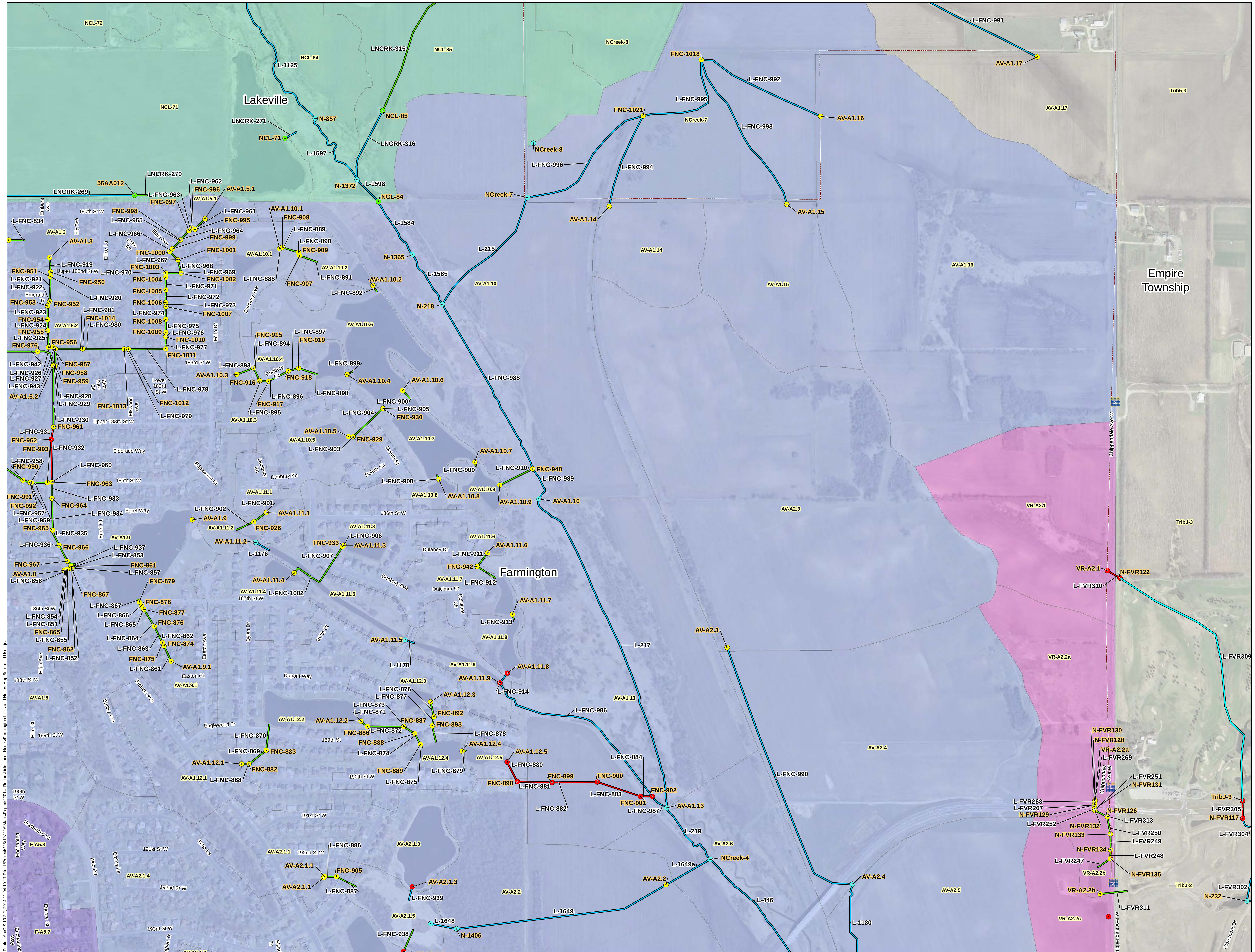
Subwatersheds
- Farmington Middle Creek
- Farmington North Creek
- Farmington Other Areas
- Farmington South Creek
- Lakeville Middle Creek
- Lakeville North Creek
- Lakeville South Creek

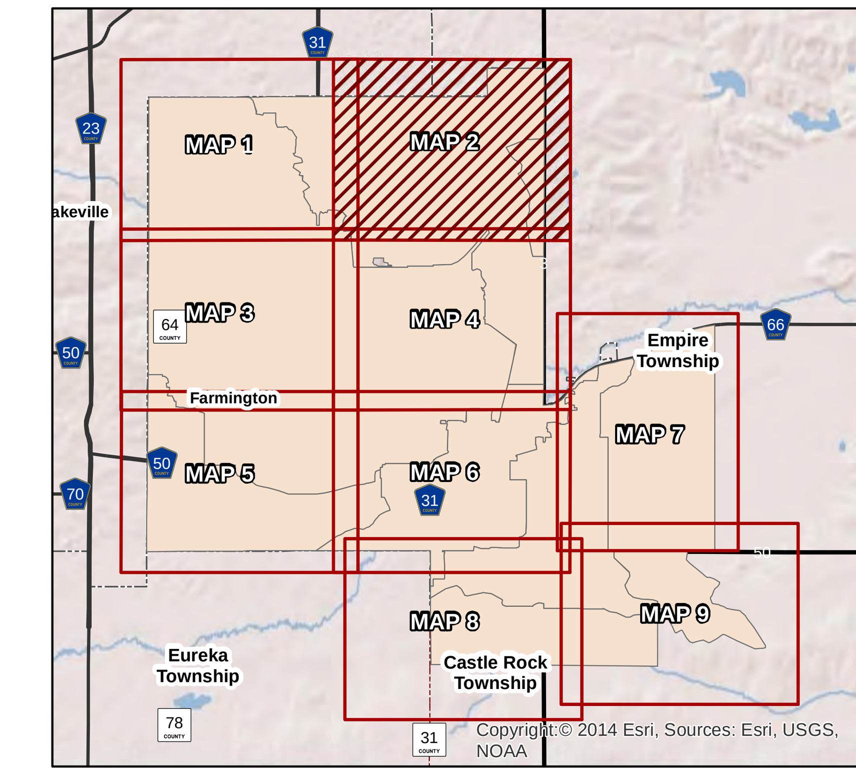
0 200 400 800
Feet

Figure B-1

XP-SWMM NODES & LINKS
City of Farmington

Map 1 of 9





SWMM Node Data Source

- Farmington
- Lakeville
- VRWJPO
- Assumed Data

XP SWMM Link Data Type

- Pipe
- Natural Channel
- Assumed Pipe
- Municipal Boundaries
- Civil Townships

Subwatersheds

- Farmington Middle Creek
- Farmington North Creek
- Farmington Other Areas
- Farmington South Creek
- Lakeville Middle Creek
- Lakeville North Creek
- Lakeville South Creek

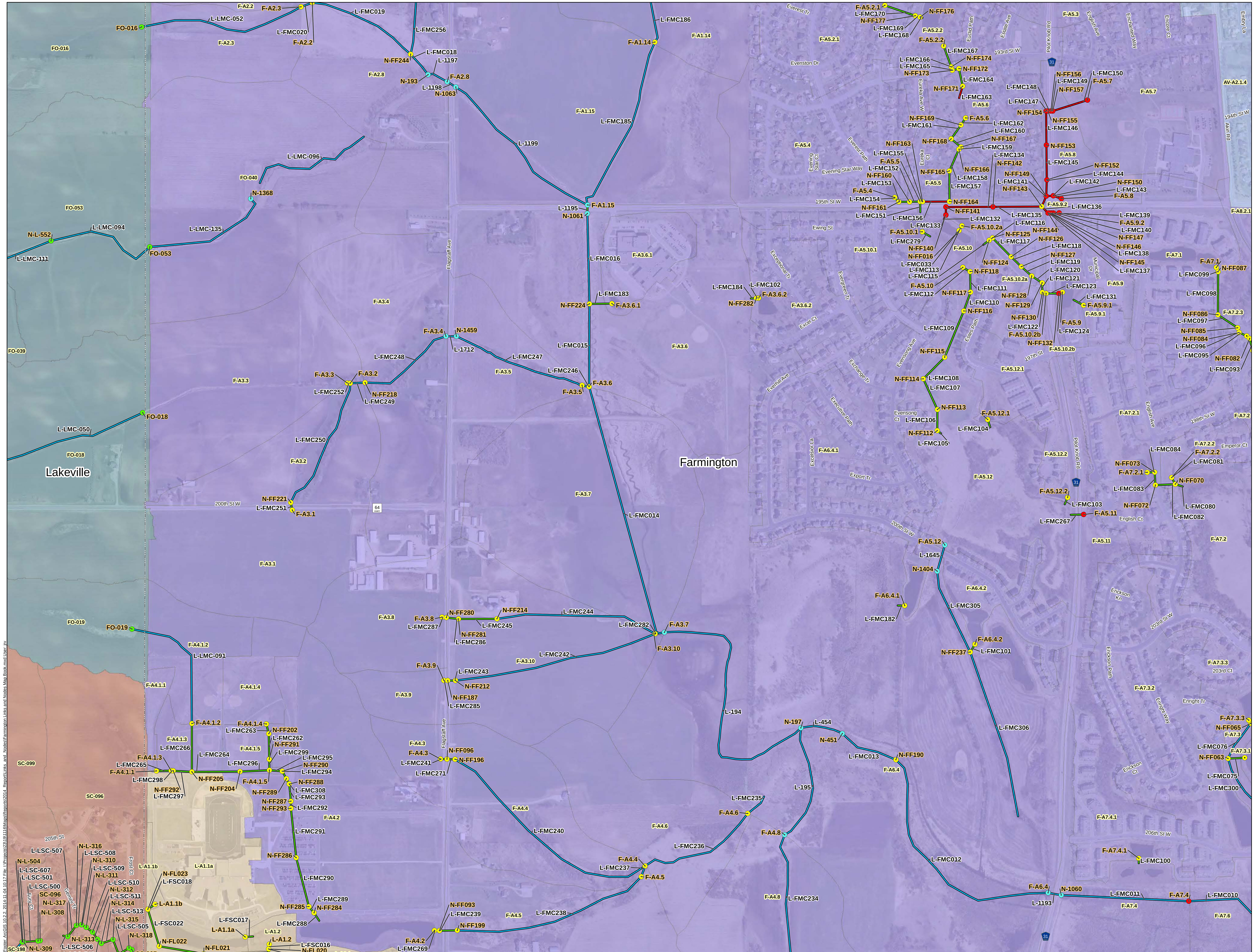
0 200 400 800

Feet

Figure B-2

XP-SWMM NODES & LINKS
City of Farmington

Map 2 of 9



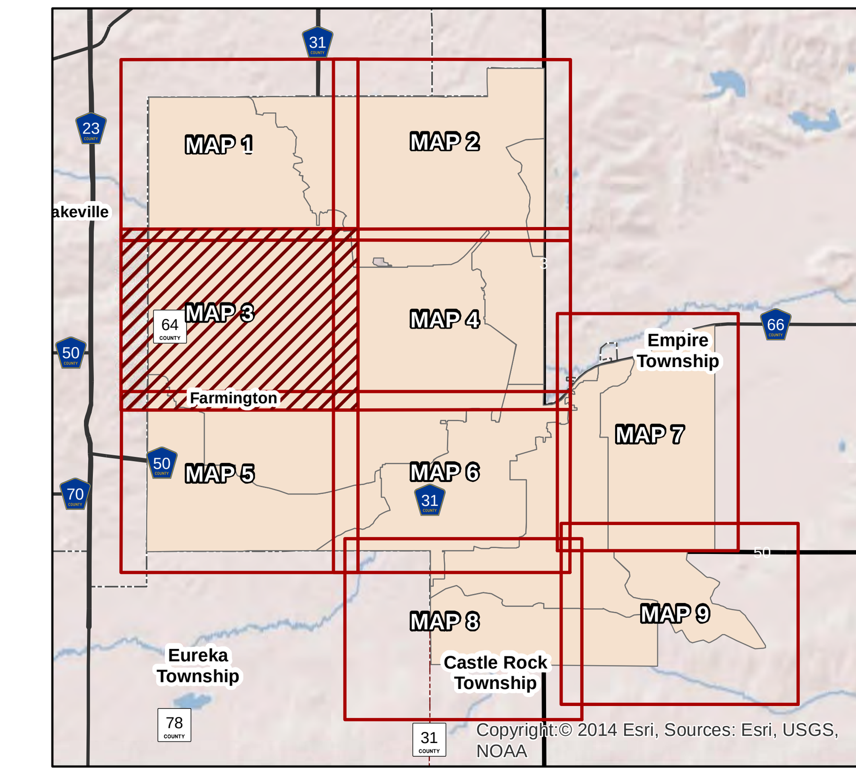
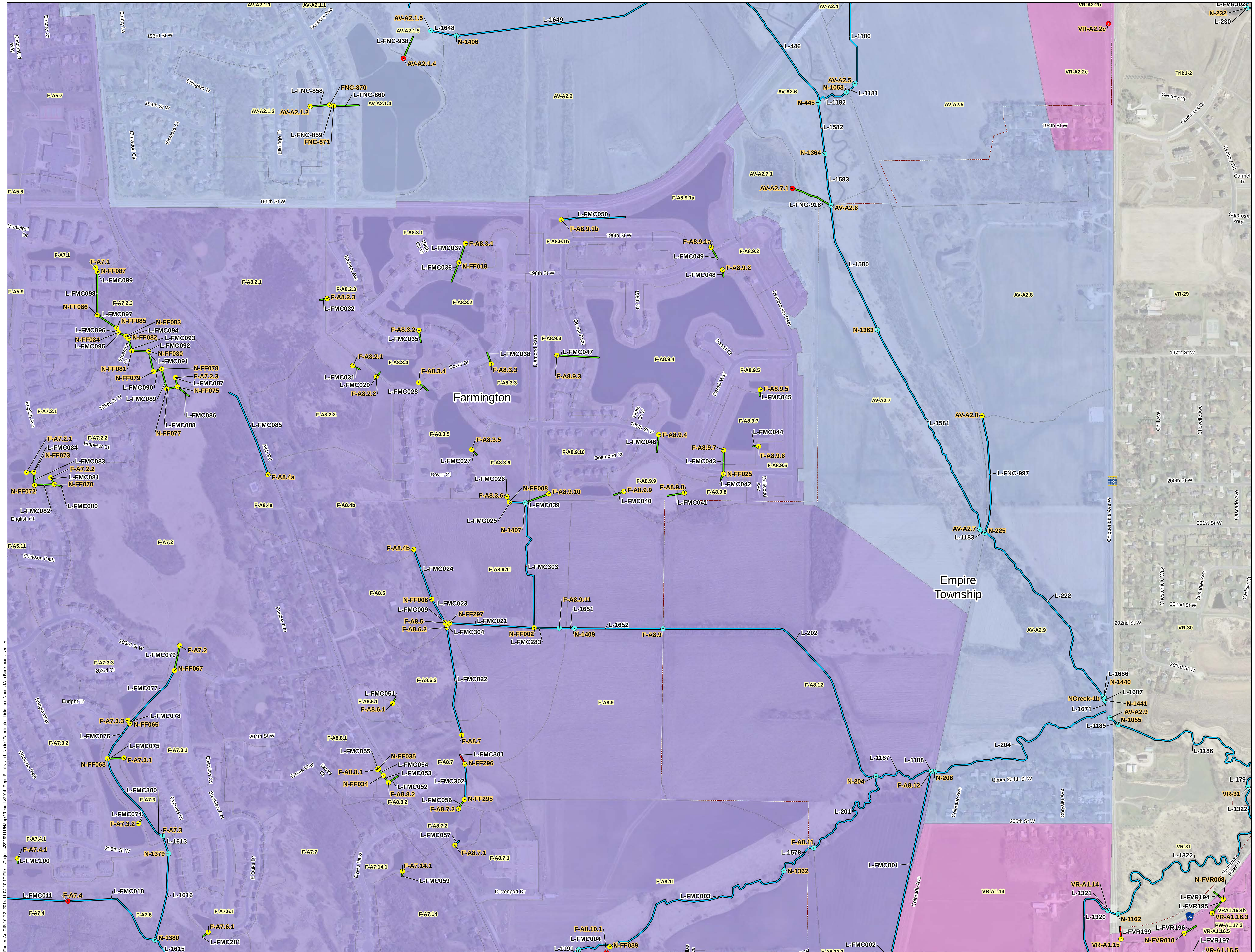
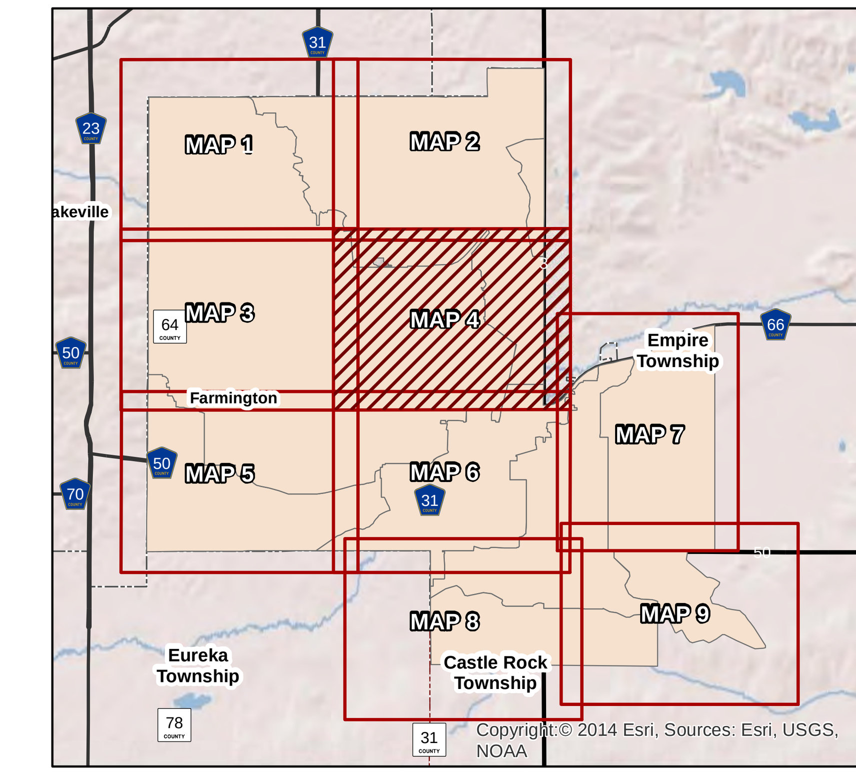


Figure B-3

XP-SWMM NODES & LINKS
City of Farmington

Map 3 of 9





SWMM Node Data Source

- Farmington
- Lakeville
- VRWJPO
- Assumed Data

XP SWMM Link Data Type

- Pipe
- Natural Channel
- Assumed Pipe
- Municipal Boundaries
- Civil Townships

Subwatersheds

- Farmington Middle Creek
- Farmington North Creek
- Farmington Other Areas
- Farmington South Creek
- Lakeville Middle Creek
- Lakeville North Creek
- Lakeville South Creek

N

0 200 400 800
Feet

Figure B-4

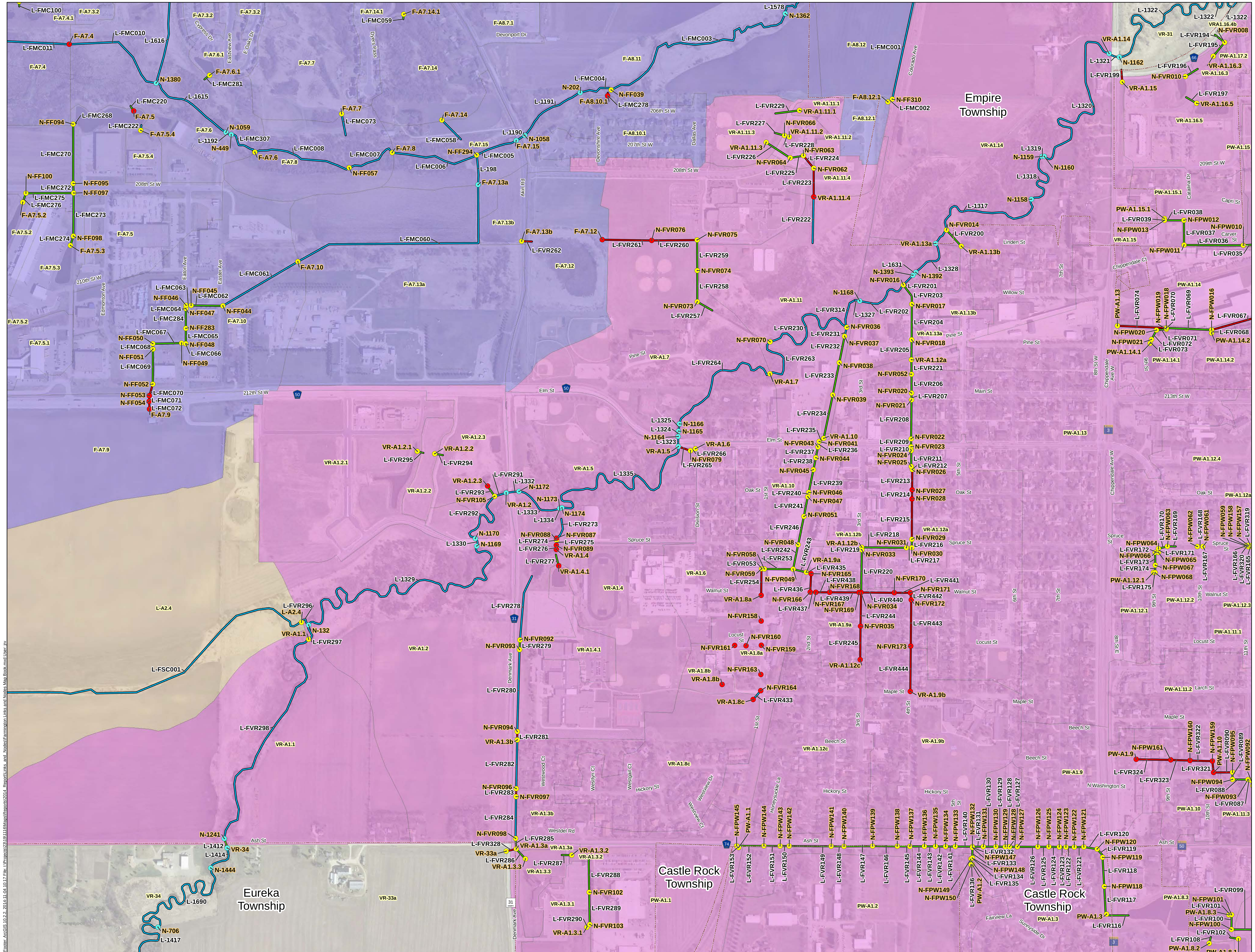
XP-SWMM NODES & LINKS
City of Farmington

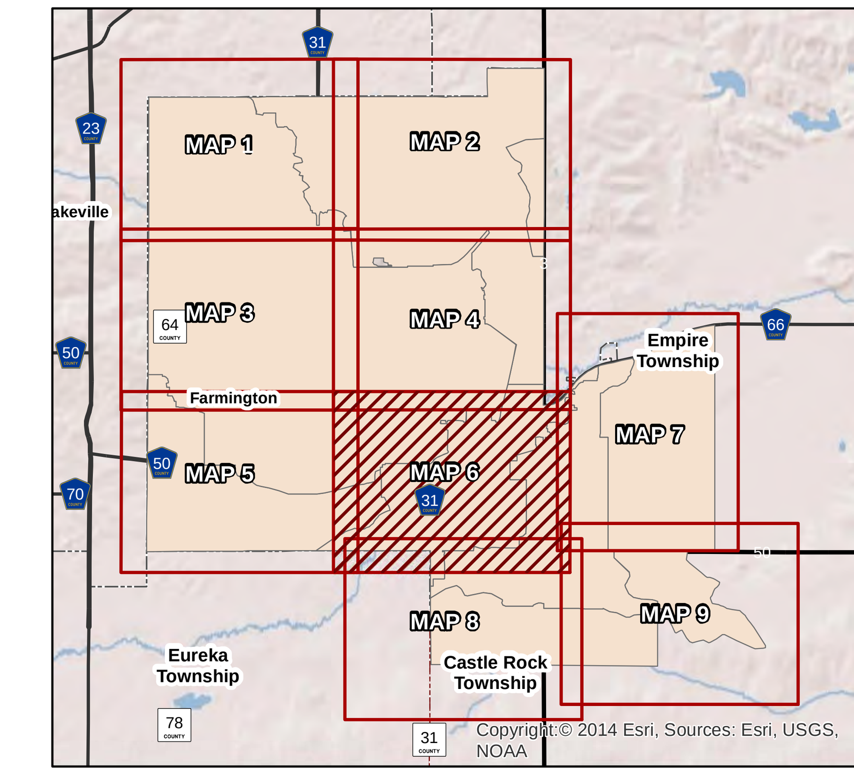
Map 4 of 9

Figure B-5

XP-SWMM NODES & LINKS
City of Farmington

Map 5 of 9





SWMM Node Data Source

- Farmington
- Lakeville
- VRWJPO
- Assumed Data

XP SWMM Link Data Type

- Pipe
- Natural Channel
- Assumed Pipe
- Municipal Boundaries
- Civil Townships

Subwatersheds

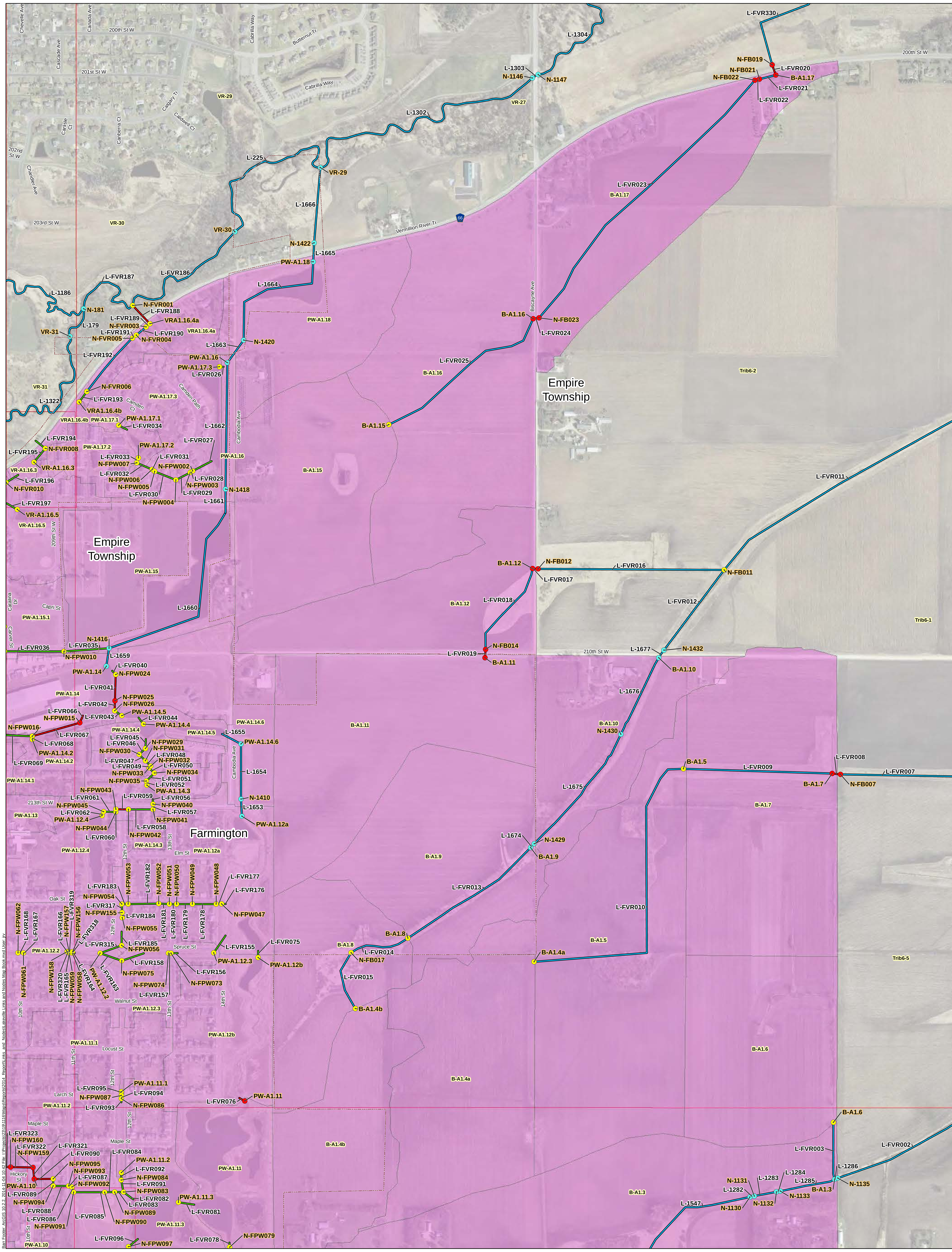
- Farmington Middle Creek
- Farmington North Creek
- Farmington Other Areas
- Farmington South Creek
- Lakeville Middle Creek
- Lakeville North Creek
- Lakeville South Creek

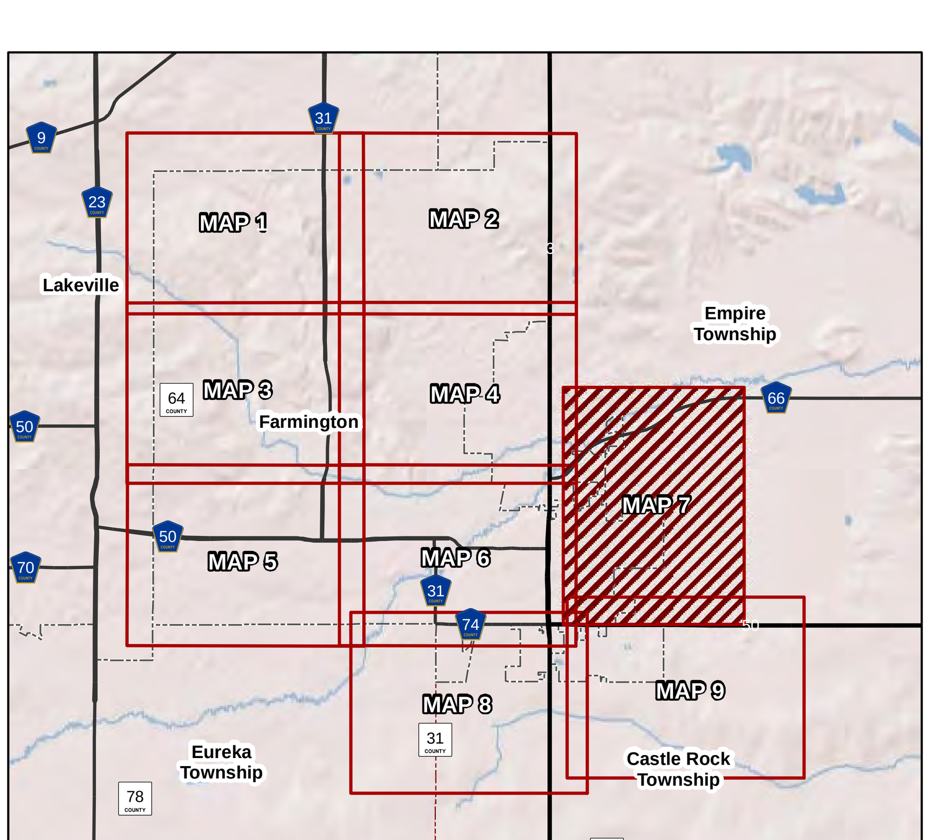
0 200 400 800
Feet

Figure B-6

XP-SWMM NODES & LINKS
City of Farmington

Map 6 of 9





SWMM Node Data Source	XP SWMM Link Data Type	Subwatersheds
Farmington	Pipe	Farmington Middle Creek
Lakeville	Natural Channel	Farmington North Creek
VRWJPO	Assumed Pipe	Farmington Other Areas
Assumed Data	Municipal Boundaries	Farmington South Creek
	Civil Townships	Lakeville Middle Creek
		Lakeville North Creek
		Lakeville South Creek

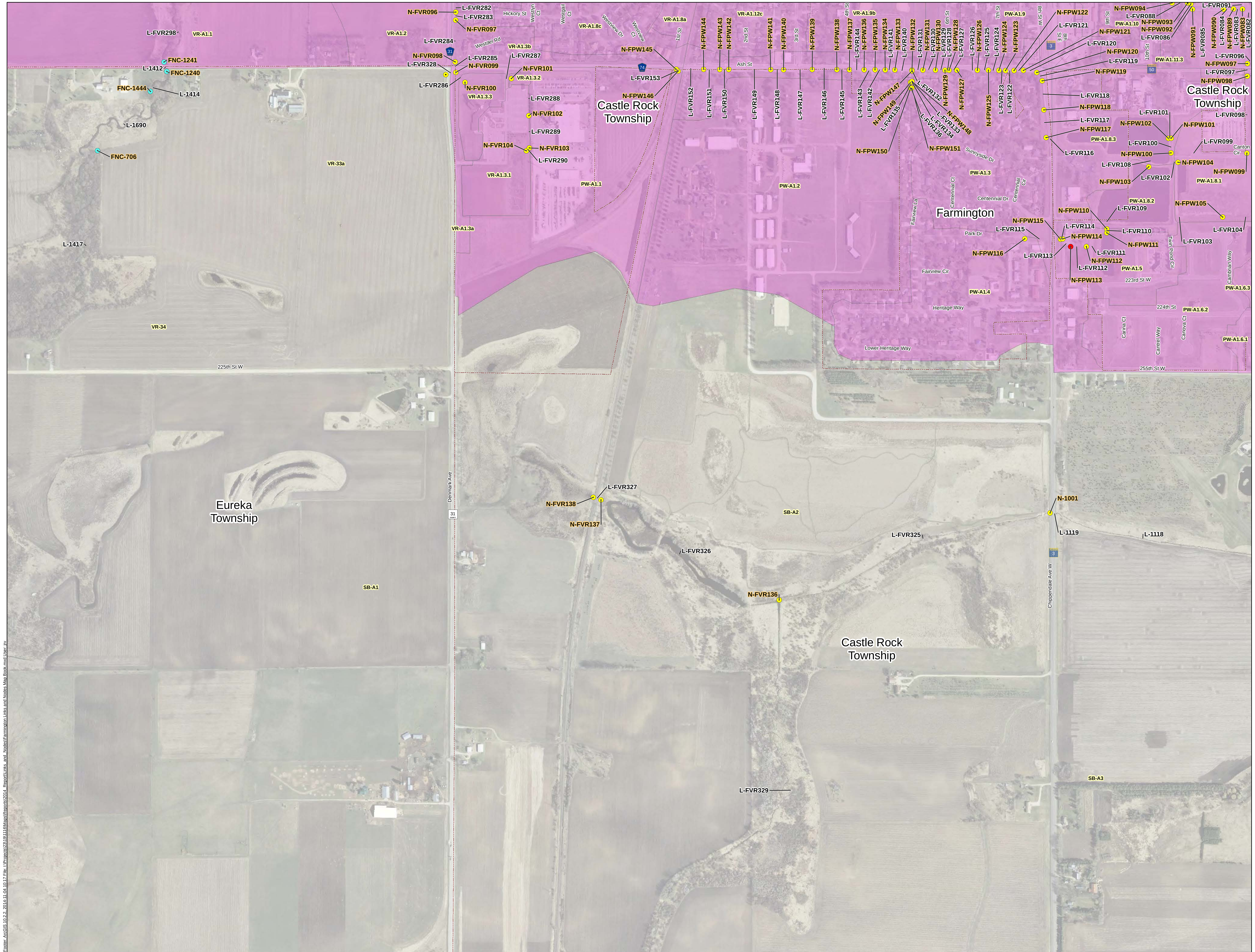
0 200 400 800

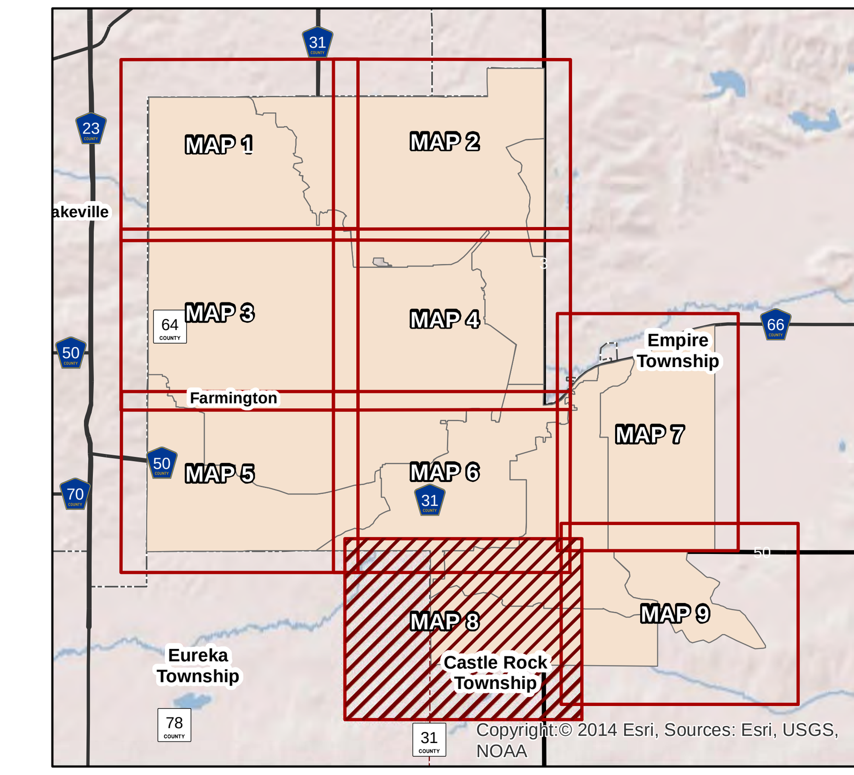
Feet

Figure B-7

XP-SWMM NODES & LINKS
City of Farmington

Map 7 of 9





SWMM Node Data Source
- Farmington
- Lakeville
- VRWJPO
- Assumed Data

XP SWMM Link Data Type
- Pipe
- Natural Channel
- Assumed Pipe
- Municipal Boundaries
- Civil Townships

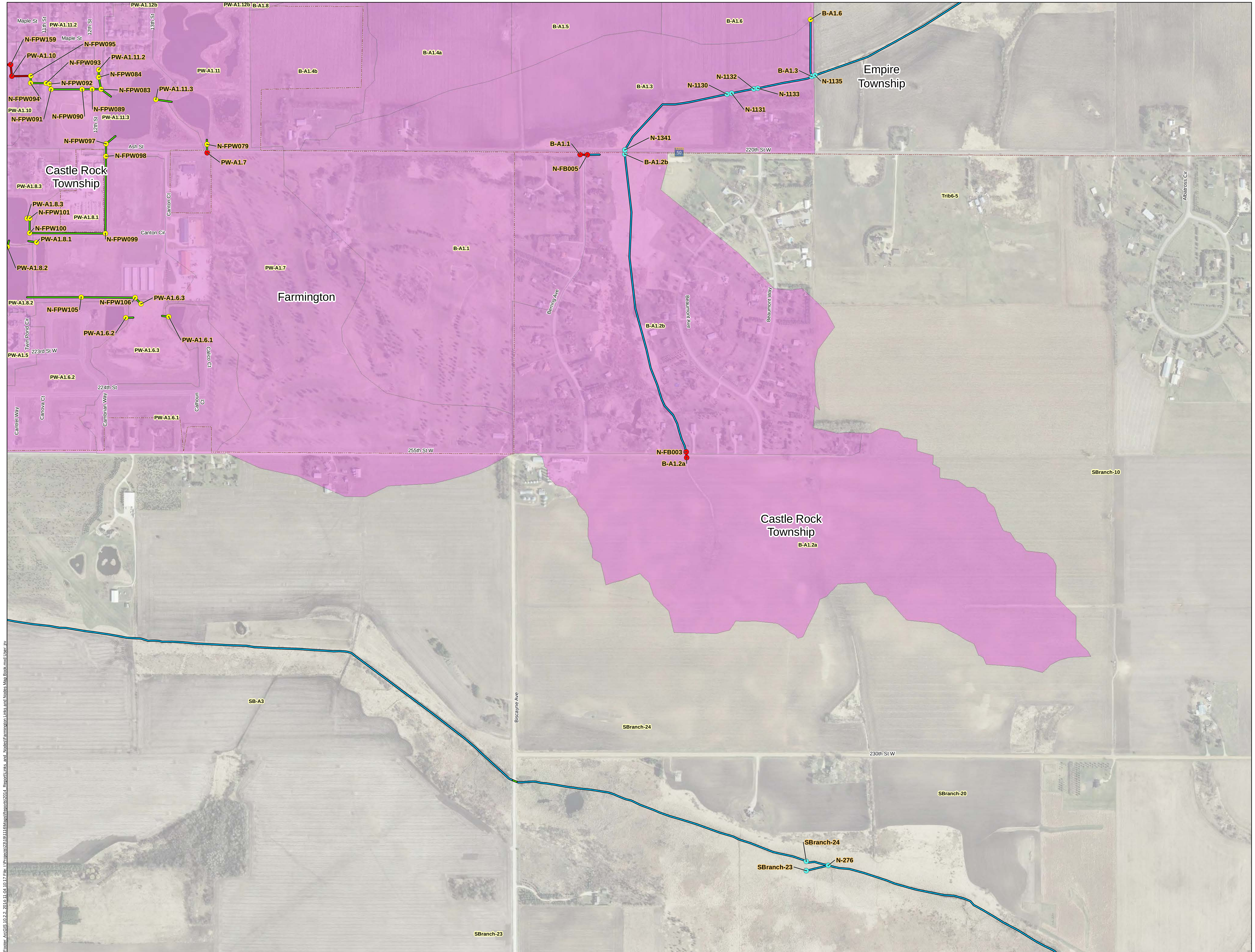
Subwatersheds
- Farmington Middle Creek
- Farmington North Creek
- Farmington Other Areas
- Farmington South Creek
- Lakeville Middle Creek
- Lakeville North Creek
- Lakeville South Creek

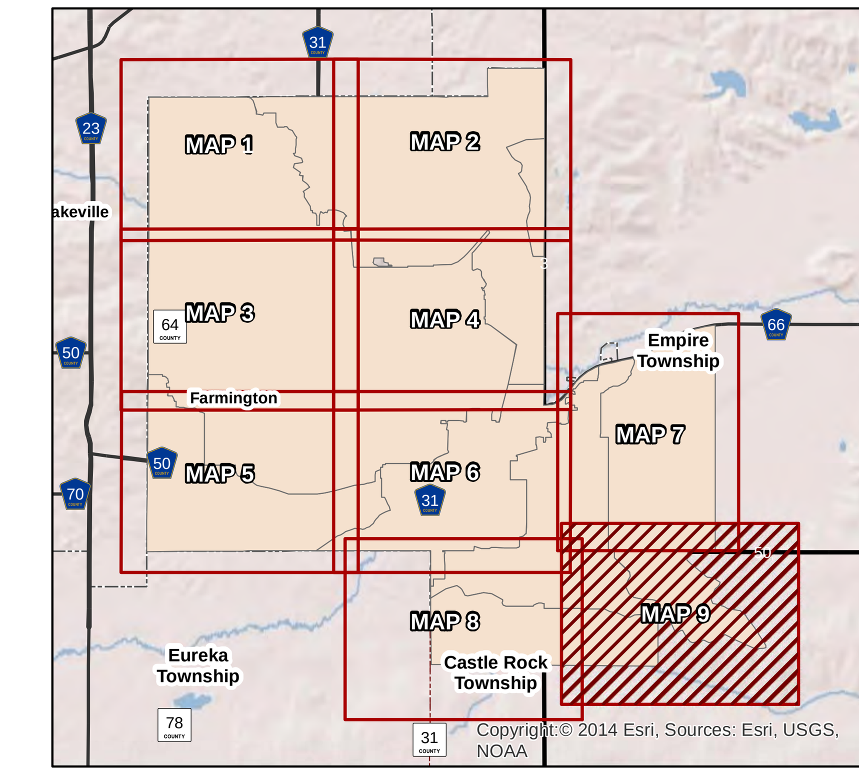
0 200 400 800
Feet

Figure B-8

XP-SWMM NODES & LINKS
City of Farmington

Map 8 of 9





SWMM Node Data Source
- Farmington
- Lakeville
- VRWJPO
- Assumed Data

XP SWMM Link Data Type
- Pipe
- Natural Channel
- Assumed Pipe
- Municipal Boundaries
- Civil Townships

Subwatersheds
- Farmington Middle Creek
- Farmington North Creek
- Farmington Other Areas
- Farmington South Creek
- Lakeville Middle Creek
- Lakeville North Creek
- Lakeville South Creek

0 200 400 800
Feet

Figure B-9

XP-SWMM NODES & LINKS
City of Farmington

Map 9 of 9

Appendix C

Community Flow and Volume Standards – Existing Conditions (Atlas 14)

Table C-1 Existing Conditions Standard Locations Flow Change

XP-SWMM Node	XP-SWMM Link	Reach	Upstream Municipality	Downstream Municipality	Upstream Tributary Area (sq mi)	100 Year Peak Flow Change (cfs)[1,2]	50 Year Peak Flow Change (cfs)[1,2]	10 Year Peak Flow Change (cfs)[1,2]	2 Year Peak Flow Change (cfs)[1,2]	1 Year Peak Flow Change (cfs)[1,2]
N-1261	L-1442	County Ditch 12	New Market Twp.	Eureka Twp	12.1	156 (50%)	131 (46%)	42 (19%)	14 (9%)	20 (18%)
CD12-8	L-1448	County Ditch 12	New Market	New Market Twp.	2.4	66 (29%)	53 (25%)	28 (15%)	19 (17%)	27 (39%)
E SCreek-2 [3]	L-1351	East Branch South Creek	Lakeville	Farmington	0.9	364 (104%)	285 (93%)	118 (58%)	27 (25%)	4 (5%)
MCreek-20 [3]	L-1595	Middle Creek	Lakeville	Farmington	2.4	801 (111%)	596 (105%)	154 (40%)	71 (36%)	77 (59%)
MCreek-1a [3]	L-201	Middle Creek	Farmington	Empire Twp.	11.5	897 (93%)	772 (97%)	265 (50%)	264 (140%)	200 (174%)
NBranch-2	L-1233	North Branch Vermillion River	Empire Twp.	Vermillion Twp.	6.2	796 (160%)	525 (134%)	145 (64%)	22 (25%)	22 (51%)
NCreek-2 [3]	L-1580	North Creek	Farmington	Empire Twp.	20.5	1,010 (71%)	883 (75%)	328 (43%)	202 (64%)	207 (108%)
NCreek-9 [3]	L-1584	North Creek	Lakeville	Farmington	16.9	788 (65%)	740 (75%)	237 (36%)	93 (26%)	85 (32%)
SBranch-26	L-1121	South Branch Vermillion River	Eureka Twp.	Castle Rock Twp.	1.9	345 (105%)	220 (83%)	29 (18%)	-5 (-8%)	4 (10%)
SBranch-9	L-1599	South Branch Vermillion River	Castle Rock Twp.	Empire Twp.	27.1	706 (100%)	392 (62%)	180 (44%)	104 (91%)	64 (182%)
SBranch-8	L-305	South Branch Vermillion River	Empire Twp.	Vermillion Twp.	27.5	695 (98%)	405 (64%)	181 (44%)	96 (88%)	60 (169%)
SCreek-2 [3]	L-830	South Creek	Lakeville	Farmington	15.5	1,451 (129%)	927 (97%)	225 (33%)	74 (19%)	24 (7%)
Trib1-20	L-1022	Tributary 1	Hampton Twp.	Vermillion Twp.	1.5	408 (99%)	272 (82%)	62 (35%)	1 (2%)	8 (15%)
Trib1-13	L-992	Tributary 1	Vermillion Twp.	Marshan Twp.	8.7	607 (163%)	391 (136%)	113 (76%)	17 (24%)	11 (23%)
Trib1-3	L-979	Tributary 1	Marshan Twp.	Hastings	19.2	787 (146%)	393 (87%)	68 (23%)	20 (14%)	33 (35%)
MCreek-3 [3]	L-202	Tributary 1 to Middle Creek	Farmington	Empire Twp.	0.8	-12 (-12%)	-32 (-36%)	-33 (-52%)	-18 (-54%)	-10 (-44%)
NCreek-25 [4]	Link19	Tributary 1 to North Creek	Apple Valley	Lakeville	7.6	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
SBranch-5	L-1078	Tributary 1 to South Branch Vermillion River	Hampton	Hampton Twp.	0.5	91 (26%)	42 (14%)	1 (0%)	-8 (-7%)	-11 (-10%)
SBranch-3	L-1072	Tributary 1 to South Branch Vermillion River	Hampton Twp.	Vermillion Twp.	2.0	447 (111%)	315 (93%)	108 (50%)	41 (41%)	43 (73%)
SCreek-11	L-131	Tributary 1 to South Creek	New Market Twp.	Eureka Twp.	0.6	105 (27%)	48 (14%)	-10 (-4%)	-23 (-14%)	-17 (-14%)
SCreek-10	L-1345	Tributary 1 to South Creek	Lakeville	Eureka Twp.	1.2	566 (168%)	365 (126%)	119 (64%)	41 (42%)	43 (71%)
SCreek-8	L-1344	Tributary 1 to South Creek	Eureka Twp.	Lakeville	2.8	297 (153%)	242 (155%)	108 (114%)	56 (138%)	51 (252%)
SCreek-6 [3]	L-1339	Tributary 1 to South Creek	Lakeville	Farmington	3.9	424 (95%)	399 (117%)	212 (101%)	132 (165%)	111 (212%)
NCreek-24 [4]	L-1167	Tributary 1A to North Creek	Apple Valley	Lakeville	5.8	0 (0%)	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Trib1-12	L-392	Tributary 1C	Vermillion Twp.	Marshan Twp.	0.5	77 (126%)	48 (99%)	7 (24%)	0 (0%)	1 (21%)
Trib1-2	L-1220	Tributary 1D	Marshan Twp.	Hastings	4.7	210 (112%)	141 (94%)	38 (45%)	2 (7%)	6 (36%)
Trib1-18	L-378	Tributary 1E	Hampton Twp.	Vermillion Twp.	0.8	199 (95%)	128 (74%)	28 (29%)	0 (-1%)	5 (24%)
CD12-12	L-1623	Tributary 2 to County Ditch 12	New Market	New Market Twp.	1.6	86 (37%)	65 (32%)	10 (7%)	-4 (-5%)	1 (1%)
SBranch-10	L-301	Tributary 2 to South Branch Vermillion River	Empire Twp.	Castle Rock Twp.	2.0	273 (108%)	130 (55%)	8 (4%)	-7 (-6%)	-5 (-4%)
N-990	L-1103	Tributary 3 to South Branch Vermillion River	Hampton Twp.	Hampton	0.3	112 (90%)	73 (72%)	11 (17%)	0 (-1%)	1 (5%)
SBranch-14	L-294	Tributary 3 to South Branch Vermillion River	Hampton	Hampton Twp.	2.6	592 (106%)	370 (81%)	51 (17%)	-1 (-1%)	12 (13%)
SBranch-13	L-1532	Tributary 3 to South Branch Vermillion River	Hampton Twp.	Castle Rock Twp.	4.7	1,162 (178%)	684 (121%)	158 (43%)	41 (27%)	38 (43%)
SBranch-6	L-295	Tributary 3C to South Branch Vermillion River	Hampton	Hampton Twp.	0.5	86 (36%)	49 (23%)	-3 (-2%)	-9 (-11%)	-6 (-10%)
NCreek-7 [3]	L-215	Tributary 4 to North Creek	Empire Twp.	Farmington	0.8	190 (68%)	149 (70%)	39 (30%)	16 (30%)	18 (63%)
Trib6-6 [3]	L-1547	Tributary 6	Castle Rock Twp.	Empire Twp.	0.4	333 (822%)	234 (794%)	60 (238%)	9 (47%)	9 (63%)
MCreek-18 [3]	L-1200	Tributary 6 to Middle Creek	Lakeville	Farmington	1.2	284 (65%)	211 (57%)	80 (33%)	35 (31%)	36 (54%)
SBranch-4	L-310	Tributary 6 to South Branch Vermillion River	Hampton Twp.	Vermillion Twp.	0.3	79 (88%)	51 (69%)	8 (19%)	0 (-3%)	1 (6%)
Trib6-3 [3]	L-1675	Tributary 6A	Farmington	Empire Twp.	0.2	48 (59%)	25 (38%)	-9 (-22%)	1 (4%)	5 (42%)
MCreek-15 [3]	L-1589	Tributary 6A to Middle Creek	Lakeville	Farmington	0.8	475 (134%)	409 (144%)	166 (93%)	61 (80%)	53 (119%)

Table C-1 Existing Conditions Standard Locations Flow Change

XP-SWMM Node	XP-SWMM Link	Reach	Upstream Municipality	Downstream Municipality	Upstream Tributary Area (sq mi)	100 Year Peak Flow Change (cfs)[1,2]	50 Year Peak Flow Change (cfs)[1,2]	10 Year Peak Flow Change (cfs)[1,2]	2 Year Peak Flow Change (cfs)[1,2]	1 Year Peak Flow Change (cfs)[1,2]
TribC-10	L-340	Tributary C2	Coates	Vermillion Twp.	2.5	279 (65%)	154 (42%)	4 (2%)	-9 (-7%)	2 (2%)
TribC-8	L-346	Tributary C2	Rosemount	Vermillion Twp.	4.6	977 (337%)	662 (300%)	178 (130%)	58 (93%)	53 (147%)
TribC-5	L-352	Tributary C2	Vermillion Twp.	Nininger Twp.	6.3	441 (189%)	265 (136%)	131 (102%)	4 (7%)	11 (28%)
VRTribF-14	L-322	Tributary F	Vermillion Twp.	Vermillion	1.0	144 (95%)	87 (69%)	13 (18%)	-1 (-3%)	3 (19%)
VRTribG-16	L-320	Tributary G	Vermillion Twp.	Vermillion	1.9	166 (54%)	78 (29%)	-5 (-3%)	-16 (-14%)	-11 (-12%)
VRTribH-22	L-257	Tributary H	Empire Twp.	Vermillion Twp.	2.5	310 (163%)	194 (132%)	43 (46%)	10 (17%)	11 (34%)
VRTribR-47	L-1500	Tributary R	Elko	New Market Twp.	0.5	189 (720%)	104 (648%)	18 (127%)	15 (120%)	14 (126%)
VR-45	L-1495	Vermillion River	Elko	New Market Twp.	3.0	678 (202%)	295 (95%)	102 (43%)	81 (70%)	79 (104%)
VR-31 [3]	L-179	Vermillion River	Farmington	Empire Twp.	62.0	2,499 (117%)	1,840 (103%)	704 (61%)	262 (48%)	234 (69%)
N-1288	L-1473	Vermillion River	New Market Twp.	Eureka Twp	4.6	878 (195%)	350 (89%)	217 (91%)	100 (103%)	79 (132%)
VR-34 [3]	L-1413	Vermillion River	Eureka Twp.	Farmington	37.9	1,568 (164%)	1,135 (167%)	246 (78%)	46 (35%)	41 (51%)
VR-32 [3]	L-1317	Vermillion River	Farmington	Empire Twp.	61.7	2,499 (114%)	1,843 (101%)	718 (61%)	292 (52%)	248 (71%)
VR-30 [3]	L-225	Vermillion River	Empire Twp.	Farmington	95.7	3,454 (100%)	2,657 (95%)	1,061 (61%)	544 (71%)	482 (102%)
VR-29 [3]	L-1302	Vermillion River	Farmington	Empire Twp.	97.9	3,449 (99%)	2,666 (94%)	1,070 (61%)	553 (71%)	495 (103%)
VR-24	L-581	Vermillion River	Empire Twp.	Vermillion Twp.	116.4	3,516 (98%)	2,617 (91%)	945 (53%)	449 (65%)	339 (77%)
VR-17	L-319	Vermillion River	Vermillion Twp.	Vermillion	163.9	3,818 (95%)	2,859 (89%)	993 (54%)	272 (38%)	321 (70%)
VR-15	L-324	Vermillion River	Vermillion	Vermillion Twp.	166.5	3,804 (95%)	2,844 (89%)	972 (54%)	277 (39%)	287 (63%)
VR-8	L-1039	Vermillion River	Vermillion Twp.	Marshan Twp.	178.3	3,731 (98%)	2,728 (89%)	927 (57%)	257 (41%)	290 (69%)
VR-7	L-1034	Vermillion River	Marshan Twp.	Nininger Twp.	179.6	3,707 (98%)	2,721 (89%)	925 (57%)	257 (40%)	290 (69%)
VR-6	L-1031	Vermillion River	Nininger Twp.	Hastings	197.5	3,719 (96%)	2,702 (87%)	915 (56%)	256 (40%)	290 (68%)
VR-5	L-1029	Vermillion River	Nininger Twp.	Hastings	197.9	3,713 (96%)	2,702 (87%)	916 (56%)	256 (40%)	290 (68%)
VR-1	WOMP	Vermillion River	Hastings	NA	225.3	3,952 (102%)	2,385 (75%)	934 (57%)	250 (40%)	270 (62%)

[1] Calibrated flow rates are from the 4-day duration design event. Design events of smaller duration are nested within the 4-day distribution used to calculate peak flow rates.

[2] Change in flow rate calculated as (2014 Updated Atlas 14 Model - 2010 TP40 Model). Percent change calculated as (2014 Updated Atlas 14 Model - 2010 TP40 Model)/(2010 TP40 Model).

[3] Flow standard location at Farmington municipal boundary.

[4] Apple Valley flow rates are agreed on by Apple Valley, Lakeville, and the VRWJPO. Inflows were not adjusted as part of the update.

Table C-2 Existing Conditions Standard Locations Peak Flow Rate

XP-SWMM Node	XP-SWMM Link	Reach	Upstream Municipality	Downstream Municipality	Upstream Tributary Area (sq mi)	100 Year Peak Flow (cfs)[1]	50 Year Peak Flow (cfs)[1]	10 Year Peak Flow (cfs)[1]	2 Year Peak Flow (cfs)[1]	1 Year Peak Flow (cfs)[1]
N-1261	L-1442	County Ditch 12	New Market Twp.	Eureka Twp	12.1	472	416	268	161	131
CD12-8	L-1448	County Ditch 12	New Market	New Market Twp.	2.4	292	267	211	132	97
E SCreek-2 [2]	L-1351	East Branch South Creek	Lakeville	Farmington	0.9	714	590	321	138	92
MCreek-20 [2]	L-1595	Middle Creek	Lakeville	Farmington	2.4	1,522	1,166	537	270	207
MCreek-1a [2]	L-201	Middle Creek	Farmington	Empire Twp.	11.5	1,863	1,565	800	453	314
NBranch-2	L-1233	North Branch Vermillion River	Empire Twp.	Vermillion Twp.	6.2	1,292	917	370	111	66
NCreek-2 [2]	L-1580	North Creek	Farmington	Empire Twp.	20.5	2,430	2,062	1,094	520	400
NCreek-9 [2]	L-1584	North Creek	Lakeville	Farmington	16.9	1,991	1,725	898	456	354
SBranch-26	L-1121	South Branch Vermillion River	Eureka Twp.	Castle Rock Twp.	1.9	673	486	191	61	39
SBranch-9	L-1599	South Branch Vermillion River	Castle Rock Twp.	Empire Twp.	27.1	1,412	1,027	591	218	100
SBranch-8	L-305	South Branch Vermillion River	Empire Twp.	Vermillion Twp.	27.5	1,402	1,039	591	206	95
SCreek-2 [2]	L-830	South Creek	Lakeville	Farmington	15.5	2,575	1,887	898	461	338
Trib1-20	L-1022	Tributary 1	Hampton Twp.	Vermillion Twp.	1.5	819	603	239	88	58
Trib1-13	L-992	Tributary 1	Vermillion Twp.	Marshan Twp.	8.7	979	678	262	87	58
Trib1-3	L-979	Tributary 1	Marshan Twp.	Hastings	19.2	1,327	845	357	164	129
MCreek-3 [2]	L-202	Tributary 1 to Middle Creek	Farmington	Empire Twp.	0.8	93	57	31	15	13
NCreek-25 [3]	Link19	Tributary 1 to North Creek	Apple Valley	Lakeville	7.6	80	80	77	55	45
SBranch-5	L-1078	Tributary 1 to South Branch Vermillion River	Hampton	Hampton Twp.	0.5	438	352	187	109	91
SBranch-3	L-1072	Tributary 1 to South Branch Vermillion River	Hampton Twp.	Vermillion Twp.	2.0	850	654	326	142	102
SCreek-11	L-131	Tributary 1 to South Creek	New Market Twp.	Eureka Twp.	0.6	495	397	236	135	108
SCreek-10	L-1345	Tributary 1 to South Creek	Lakeville	Eureka Twp.	1.2	904	655	304	140	103
SCreek-8	L-1344	Tributary 1 to South Creek	Eureka Twp.	Lakeville	2.8	491	398	204	96	72
SCreek-6 [2]	L-1339	Tributary 1 to South Creek	Lakeville	Farmington	3.9	871	742	422	212	163
NCreek-24 [3]	L-1167	Tributary 1A to North Creek	Apple Valley	Lakeville	5.8	27	27	27	27	27
Trib1-12	L-392	Tributary 1C	Vermillion Twp.	Marshan Twp.	0.5	138	97	35	12	7
Trib1-2	L-1220	Tributary 1D	Marshan Twp.	Hastings	4.7	397	290	124	36	23
Trib1-18	L-378	Tributary 1E	Hampton Twp.	Vermillion Twp.	0.8	410	299	124	42	26
CD12-12	L-1623	Tributary 2 to County Ditch 12	New Market	New Market Twp.	1.6	318	267	149	85	71
SBranch-10	L-301	Tributary 2 to South Branch Vermillion River	Empire Twp.	Castle Rock Twp.	2.0	526	368	186	117	98
N-990	L-1103	Tributary 3 to South Branch Vermillion River	Hampton Twp.	Hampton	0.3	236	174	75	27	18
SBranch-14	L-294	Tributary 3 to South Branch Vermillion River	Hampton	Hampton Twp.	2.6	1,148	825	353	144	107
SBranch-13	L-1532	Tributary 3 to South Branch Vermillion River	Hampton Twp.	Castle Rock Twp.	4.7	1,813	1,248	524	193	127
SBranch-6	L-295	Tributary 3C to South Branch Vermillion River	Hampton	Hampton Twp.	0.5	328	259	140	74	57
NCreek-7 [2]	L-215	Tributary 4 to North Creek	Empire Twp.	Farmington	0.8	471	362	169	68	46
Trib6-6 [2]	L-1547	Tributary 6	Castle Rock Twp.	Empire Twp.	0.4	374	264	85	27	24
MCreek-18 [2]	L-1200	Tributary 6 to Middle Creek	Lakeville	Farmington	1.2	720	582	322	145	102
SBranch-4	L-310	Tributary 6 to South Branch Vermillion River	Hampton Twp.	Vermillion Twp.	0.3	170	125	52	18	12
Trib6-3 [2]	L-1675	Tributary 6A	Farmington	Empire Twp.	0.2	128	91	30	20	16
MCreek-15 [2]	L-1589	Tributary 6A to Middle Creek	Lakeville	Farmington	0.8	828	693	345	138	97
TribC-10	L-340	Tributary C2	Coates	Vermillion Twp.	2.5	709	519	247	128	100
TribC-8	L-346	Tributary C2	Rosemount	Vermillion Twp.	4.6	1,266	883	315	120	90

Table C-2 Existing Conditions Standard Locations Peak Flow Rate

XP-SWMM Node	XP-SWMM Link	Reach	Upstream Municipality	Downstream Municipality	Upstream Tributary Area (sq mi)	100 Year Peak Flow (cfs)[1]	50 Year Peak Flow (cfs)[1]	10 Year Peak Flow (cfs)[1]	2 Year Peak Flow (cfs)[1]	1 Year Peak Flow (cfs)[1]
TribC-5	L-352	Tributary C2	Vermillion Twp.	Nininger Twp.	6.3	674	460	260	66	50
VRTribF-14	L-322	Tributary F	Vermillion Twp.	Vermillion	1.0	297	213	85	28	17
VRTribG-16	L-320	Tributary G	Vermillion Twp.	Vermillion	1.9	472	350	186	100	77
VRTribH-22	L-257	Tributary H	Empire Twp.	Vermillion Twp.	2.5	501	341	137	66	45
VRTribR-47	L-1500	Tributary R	Elko	New Market Twp.	0.5	215	120	33	27	25
VR-45	L-1495	Vermillion River	Elko	New Market Twp.	3.0	1,014	605	336	197	155
VR-31 [2]	L-179	Vermillion River	Farmington	Empire Twp.	62.0	4,638	3,629	1,849	807	575
N-1288	L-1473	Vermillion River	New Market Twp.	Eureka Twp	4.6	1,329	745	454	197	138
VR-34 [2]	L-1413	Vermillion River	Eureka Twp.	Farmington	37.9	2,524	1,812	560	175	122
VR-32 [2]	L-1317	Vermillion River	Farmington	Empire Twp.	61.7	4,685	3,675	1,893	852	596
VR-30 [2]	L-225	Vermillion River	Empire Twp.	Farmington	95.7	6,907	5,463	2,808	1,307	953
VR-29 [2]	L-1302	Vermillion River	Farmington	Empire Twp.	97.9	6,943	5,505	2,838	1,329	974
VR-24	L-581	Vermillion River	Empire Twp.	Vermillion Twp.	116.4	7,094	5,508	2,716	1,139	780
VR-17	L-319	Vermillion River	Vermillion Twp.	Vermillion	163.9	7,826	6,082	2,826	984	777
VR-15	L-324	Vermillion River	Vermillion	Vermillion Twp.	166.5	7,802	6,054	2,787	979	740
VR-8	L-1039	Vermillion River	Vermillion Twp.	Marshan Twp.	178.3	7,528	5,781	2,568	892	713
VR-7	L-1034	Vermillion River	Marshan Twp.	Nininger Twp.	179.6	7,496	5,762	2,537	891	712
VR-6	L-1031	Vermillion River	Nininger Twp.	Hastings	197.5	7,574	5,799	2,543	893	715
VR-5	L-1029	Vermillion River	Nininger Twp.	Hastings	197.9	7,566	5,795	2,542	893	715
VR-1	WOMP	Vermillion River	Hastings	NA	225.3	7,819	5,558	2,566	884	707

[1] Calibrated flow rates are from the 4-day duration design event. Design events of smaller duration are nested within the 4-day distribution used to calculate peak flow rates.

[2] Flow standard location at Farmington municipal boundary.

[3] Apple Valley flow rates are agreed on by Apple Valley, Lakeville, and the VRWJPO. Inflows were not adjusted as part of the update.

Table C-3 Existing Conditions Standard Locations Volume Change

XP-SWMM Node	XP-SWMM Link	Reach	Upstream Municipality	Downstream Municipality	Includes Apple Valley Inflows	Upstream Tributary Area (sq mi)	Baseflow (cfs)	100 Year Volume Change (ac-ft)[1,2]	50 Year Volume Change (ac-ft)[1,2]	10 Year Volume Change (ac-ft)[1,2]	2 Year Volume Change (ac-ft)[1,2]	1 Year Volume Change (ac-ft)[1,2]
N-1261	L-1442	County Ditch 12	New Market Twp.	Eureka Twp	No	12	0	904 (70%)	610 (58%)	88 (14%)	-4 (-1%)	28 (16%)
CD12-8	L-1448	County Ditch 12	New Market	New Market Twp.	No	2	0	209 (52%)	141 (42%)	18 (8%)	-3 (-2%)	11 (17%)
E SCreek-2	L-1351	East Branch South Creek	Lakeville	Farmington	No	1	0	114 (76%)	83 (66%)	24 (29%)	7 (18%)	9 (38%)
MCreek-20	L-1595	Middle Creek	Lakeville	Farmington	No	2	0	248 (53%)	185 (47%)	50 (19%)	22 (18%)	30 (38%)
MCreek-1a	L-201	Middle Creek	Farmington	Empire Twp.	No	11	0	1,114 (52%)	830 (47%)	252 (22%)	134 (25%)	163 (48%)
NBranch-2	L-1233	North Branch Vermillion River	Empire Twp.	Vermillion Twp.	No	6	0	469 (97%)	296 (80%)	41 (21%)	1 (1%)	7 (27%)
NCreek-2 [3]	L-1580	North Creek	Farmington	Empire Twp.	Yes	21	0	954 (10%)	730 (8%)	264 (3%)	149 (2%)	183 (3%)
NCreek-9 [3]	L-1584	North Creek	Lakeville	Farmington	Yes	17	0	704 (8%)	540 (6%)	197 (2%)	68 (1%)	93 (2%)
SBranch-26	L-1121	South Branch Vermillion River	Eureka Twp.	Castle Rock Twp.	No	2	0	157 (87%)	105 (75%)	16 (21%)	0 (1%)	3 (32%)
SBranch-9	L-1599	South Branch Vermillion River	Castle Rock Twp.	Empire Twp.	No	27	0	1,995 (85%)	1,288 (71%)	172 (18%)	28 (10%)	66 (56%)
SBranch-8	L-305	South Branch Vermillion River	Empire Twp.	Vermillion Twp.	No	28	0	2,034 (85%)	1,316 (71%)	175 (18%)	28 (10%)	67 (55%)
SCreek-2	L-830	South Creek	Lakeville	Farmington	No	15	0	1,298 (64%)	913 (53%)	234 (21%)	23 (4%)	62 (14%)
Trib1-20	L-1022	Tributary 1	Hampton Twp.	Vermillion Twp.	No	1	0	130 (82%)	87 (69%)	14 (19%)	0 (1%)	3 (23%)
Trib1-13	L-992	Tributary 1	Vermillion Twp.	Marshan Twp.	No	9	0	731 (89%)	475 (74%)	67 (19%)	0 (0%)	15 (24%)
Trib1-3	L-979	Tributary 1	Marshan Twp.	Hastings	No	19	0	1,241 (101%)	775 (82%)	96 (19%)	-1 (-1%)	19 (22%)
MCreek-3	L-202	Tributary 1 to Middle Creek	Farmington	Empire Twp.	No	1	0	96 (52%)	71 (45%)	26 (25%)	17 (31%)	20 (58%)
NCreek-25 [4]	Link19	Tributary 1 to North Creek	Apple Valley	Empire Twp.	No	8	0	NA	NA	NA	NA	NA
SBranch-5	L-1078	Tributary 1 to South Branch Vermillion River	Hampton	Hampton Twp.	No	1	0	44 (63%)	29 (50%)	4 (11%)	0 (-3%)	2 (14%)
SBranch-3	L-1072	Tributary 1 to South Branch Vermillion River	Hampton Twp.	Vermillion Twp.	No	2	0	168 (82%)	109 (67%)	17 (18%)	0 (0%)	4 (18%)
SCreek-11	L-131	Tributary 1 to South Creek	New Market Twp.	Eureka Twp.	No	1	0	50 (55%)	30 (40%)	0 (-1%)	-3 (-14%)	0 (3%)
SCreek-10	L-1345	Tributary 1 to South Creek	Lakeville	Eureka Twp.	No	1	0	116 (74%)	79 (61%)	15 (19%)	1 (3%)	5 (25%)
SCreek-8	L-1344	Tributary 1 to South Creek	Eureka Twp.	Lakeville	No	3	0	369 (97%)	264 (86%)	78 (42%)	31 (41%)	36 (92%)
SCreek-6	L-1339	Tributary 1 to South Creek	Lakeville	Farmington	No	4	0	364 (63%)	248 (52%)	43 (14%)	5 (4%)	21 (23%)
NCreek-24 [4]	L-1167	Tributary 1A to North Creek	Apple Valley	Lakeville	No	6	0	NA	NA	NA	NA	NA
Trib1-12	L-392	Tributary 1C	Vermillion Twp.	Marshan Twp.	No	0	0	34 (110%)	21 (92%)	3 (26%)	0 (4%)	0 (36%)
Trib1-2	L-1220	Tributary 1D	Marshan Twp.	Hastings	No	5	0	281 (121%)	171 (100%)	22 (27%)	1 (4%)	3 (32%)
Trib1-18	L-378	Tributary 1E	Hampton Twp.	Vermillion Twp.	No	1	0	70 (85%)	47 (72%)	8 (23%)	0 (2%)	1 (28%)
CD12-12	L-1623	Tributary 2 to County Ditch 12	New Market	New Market Twp.	No	2	0	131 (47%)	89 (38%)	12 (8%)	-1 (-2%)	9 (17%)
SBranch-10	L-301	Tributary 2 to South Branch Vermillion River	Empire Twp.	Castle Rock Twp.	No	2	0	135 (95%)	83 (75%)	10 (16%)	-1 (-2%)	2 (13%)
N-990	L-1103	Tributary 3 to South Branch Vermillion River	Hampton Twp.	Hampton	No	0	0	31 (80%)	21 (69%)	4 (20%)	0 (2%)	1 (26%)
SBranch-14	L-294	Tributary 3 to South Branch Vermillion River	Hampton	Hampton Twp.	No	3	0	220 (86%)	144 (71%)	21 (19%)	0 (0%)	5 (21%)
SBranch-13	L-1532	Tributary 3 to South Branch Vermillion River	Hampton Twp.	Castle Rock Twp.	No	5	0	401 (87%)	263 (72%)	39 (19%)	0 (1%)	9 (22%)
SBranch-6	L-295	Tributary 3C to South Branch Vermillion River	Hampton	Hampton Twp.	No	1	0	44 (69%)	30 (57%)	4 (14%)	0 (-2%)	1 (16%)
NCreek-7 [3]	L-215	Tributary 4 to North Creek	Empire Twp.	Farmington	No	1	0	2 (1%)	-2 (-2%)	-15 (-23%)	-6 (-24%)	0 (-3%)
Trib6-6	L-1547	Tributary 6	Castle Rock Twp.	Empire Twp.	No	0	0	100 (173%)	74 (156%)	26 (88%)	10 (82%)	9 (126%)
MCreek-18	L-1200	Tributary 6 to Middle Creek	Lakeville	Farmington	No	1	0	109 (52%)	77 (45%)	12 (10%)	2 (5%)	7 (24%)
SBranch-4	L-310	Tributary 6 to South Branch Vermillion River	Hampton Twp.	Vermillion Twp.	No	0	0	25 (82%)	16 (68%)	3 (18%)	0 (0%)	1 (22%)
Trib6-3	L-1675	Tributary 6A	Farmington	Empire Twp.	No	0	0	60 (93%)	29 (54%)	-1 (-2%)	2 (23%)	3 (55%)
MCreek-15	L-1589	Tributary 6A to Middle Creek	Lakeville	Farmington	No	1	0	87 (67%)	66 (62%)	21 (30%)	10 (34%)	11 (66%)
TribC-10	L-340	Tributary C2	Coates	Vermillion Twp.	No	3	0	160 (73%)	95 (54%)	7 (7%)	-3 (-6%)	2 (7%)
TribC-8	L-346	Tributary C2	Rosemount	Vermillion Twp.	No	5	0	337 (94%)	211 (75%)	23 (14%)	-2 (-4%)	5 (11%)
TribC-5	L-352	Tributary C2	Vermillion Twp.	Nininger Twp.	No	6	0	469 (98%)	295 (79%)	43 (20%)	3 (3%)	10 (19%)
VRTribF-14	L-322	Tributary F	Vermillion Twp.	Vermillion	No	1	0	75 (103%)	48 (88%)	7 (24%)	0 (2%)	1 (29%)
VRTribG-16	L-320	Tributary G	Vermillion Twp.	Vermillion	No	2	0	128 (96%)	80 (78%)	9 (17%)	0 (-2%)	2 (15%)
VRTribH-22	L-257	Tributary H	Empire Twp.	Vermillion Twp.	No	3	0	196 (88%)	128 (74%)	20 (22%)	1 (2%)	4 (30%)
VRTribR-47	L-1500	Tributary R	Elko	New Market Twp.	No	0	0	42 (61%)	28 (49%)	4 (11%)	-1 (-3%)	1 (13%)
VR-45	L-1495	Vermillion River	Elko	New Market Twp.	No	3	0	269 (64%)	181 (52%)	24 (11%)	-4 (-4%)	8 (13%)
VR-31	L-179	Vermillion River	Farmington	Empire Twp.	No	62	10	5,305 (74%)	3,606 (62%)	397 (10%)	81 (5%)	225 (21%)

Table C-3 Existing Conditions Standard Locations Volume Change

XP-SWMM Node	XP-SWMM Link	Reach	Upstream Municipality	Downstream Municipality	Includes Apple Valley Inflows	Upstream Tributary Area (sq mi)	Baseflow (cfs)	100 Year Volume Change (ac-ft)[1,2]	50 Year Volume Change (ac-ft)[1,2]	10 Year Volume Change (ac-ft)[1,2]	2 Year Volume Change (ac-ft)[1,2]	1 Year Volume Change (ac-ft)[1,2]
N-1288	L-1473	Vermillion River	New Market Twp.	Eureka Twp	No	5	0	408 (64%)	272 (52%)	34 (11%)	-5 (-4%)	12 (14%)
VR-34	L-1413	Vermillion River	Eureka Twp.	Farmington	No	38	1	2,963 (76%)	1,933 (62%)	241 (13%)	-22 (-3%)	68 (15%)
VR-32	L-1317	Vermillion River	Farmington	Empire Twp.	No	62	10	5,275 (74%)	3,584 (62%)	704 (20%)	80 (5%)	221 (21%)
VR-30	L-225	Vermillion River	Empire Twp.	Farmington	Yes	96	16	6,826 (38%)	4,765 (30%)	1,111 (9%)	322 (4%)	481 (7%)
VR-29	L-1302	Vermillion River	Farmington	Empire Twp.	Yes	98	16	6,832 (37%)	4,783 (29%)	1,109 (9%)	328 (4%)	500 (7%)
VR-24	L-581	Vermillion River	Empire Twp.	Vermillion Twp.	Yes	116	30	8,431 (40%)	5,872 (32%)	1,378 (10%)	348 (4%)	698 (10%)
VR-17	L-319	Vermillion River	Vermillion Twp.	Vermillion	Yes	164	39	11,551 (48%)	7,859 (38%)	1,657 (11%)	397 (4%)	780 (11%)
VR-15	L-324	Vermillion River	Vermillion	Vermillion Twp.	Yes	166	39	11,720 (48%)	7,966 (38%)	1,672 (11%)	400 (4%)	785 (11%)
VR-8	L-1039	Vermillion River	Vermillion Twp.	Marshan Twp.	Yes	178	58	12,086 (50%)	8,164 (39%)	1,685 (11%)	402 (4%)	755 (11%)
VR-7	L-1034	Vermillion River	Marshan Twp.	Nininger Twp.	Yes	180	58	12,154 (50%)	8,208 (40%)	1,694 (11%)	404 (4%)	757 (11%)
VR-6	L-1031	Vermillion River	Nininger Twp.	Hastings	Yes	197	58	13,154 (53%)	8,809 (41%)	1,772 (12%)	404 (4%)	770 (11%)
VR-5	L-1029	Vermillion River	Nininger Twp.	Hastings	Yes	198	58	13,186 (53%)	8,830 (41%)	1,775 (12%)	404 (4%)	771 (11%)
VR-1	WOMP	Vermillion River	Hastings	NA	Yes	225	50	15,081 (57%)	9,955 (44%)	1,872 (12%)	396 (4%)	795 (11%)

[1] Calibrated flow rates are from the 4-day duration design event. Design events of smaller duration are nested within the 4-day distribution used to calculate peak flow rates.

[2] Change in volume calculated as (2014 Updated Atlas 14 Model - 2010 TP40 Model). Percent change calculated as (2014 Updated Atlas 14 Model - 2010 TP40 Model)/(2010 TP40 Model).

[3] Flow standard location at Farmington municipal boundary.

[4] Apple Valley flow rates are agreed on by Apple Valley, Lakeville, and the VRWJPO. Inflows were not adjusted as part of the update.

Table C-4 Existing Conditions Standard Locations Volume

XP-SWMM Node	XP-SWMM Link	Reach	Upstream Municipality	Downstream Municipality	Upstream Tributary Area (sq mi)	Baseflow (cfs)	100 Year Volume (ac-ft)[1]	50 Year Volume (ac-ft)[1]	10 Year Volume (ac-ft)[1]	2 Year Volume (ac-ft)[1]	1 Year Volume (ac-ft)[1]
N-1261	L-1442	County Ditch 12	New Market Twp.	Eureka Twp	12.1	0	2,196	1,659	728	282	202
CD12-8	L-1448	County Ditch 12	New Market	New Market Twp.	2.4	0	610	476	233	103	76
E SCreek-2 [2]	L-1351	East Branch South Creek	Lakeville	Farmington	0.9	0	264	208	106	47	34
MCreek-20 [2]	L-1595	Middle Creek	Lakeville	Farmington	2.4	0	715	575	309	146	109
MCreek-1a [2]	L-201	Middle Creek	Farmington	Empire Twp.	11.5	0	3,253	2,613	1,414	675	504
NBranch-2	L-1233	North Branch Vermillion River	Empire Twp.	Vermillion Twp.	6.2	0	949	666	236	59	33
NCreek-2 [2]	L-1580	North Creek	Farmington	Empire Twp.	20.5	0	10,777	10,144	8,928	6,644	5,756
NCreek-9 [2]	L-1584	North Creek	Lakeville	Farmington	16.9	0	9,822	9,367	8,488	6,415	5,576
SBranch-26	L-1121	South Branch Vermillion River	Eureka Twp.	Castle Rock Twp.	1.9	0	337	245	92	25	14
SBranch-9	L-1599	South Branch Vermillion River	Castle Rock Twp.	Empire Twp.	27.1	0	4,334	3,099	1,120	309	184
SBranch-8	L-305	South Branch Vermillion River	Empire Twp.	Vermillion Twp.	27.5	0	4,421	3,164	1,146	316	188
SCreek-2 [2]	L-830	South Creek	Lakeville	Farmington	15.5	0	3,337	2,630	1,349	640	493
Trib1-20	L-1022	Tributary 1	Hampton Twp.	Vermillion Twp.	1.5	0	289	213	86	27	17
Trib1-13	L-992	Tributary 1	Vermillion Twp.	Marshan Twp.	8.7	0	1,550	1,119	427	125	78
Trib1-3	L-979	Tributary 1	Marshan Twp.	Hastings	19.2	0	2,466	1,717	600	171	109
MCreek-3 [2]	L-202	Tributary 1 to Middle Creek	Farmington	Empire Twp.	0.8	0	280	228	131	70	56
NCreek-25 [3]	Link19	Tributary 1 to North Creek	Apple Valley	Empire Twp.	7.6	0	NA	NA	NA	NA	NA
SBranch-5	L-1078	Tributary 1 to South Branch Vermillion River	Hampton	Hampton Twp.	0.5	0	115	87	40	17	13
SBranch-3	L-1072	Tributary 1 to South Branch Vermillion River	Hampton Twp.	Vermillion Twp.	2.0	0	372	271	110	36	23
SCreek-11	L-131	Tributary 1 to South Creek	New Market Twp.	Eureka Twp.	0.6	0	142	106	48	20	15
SCreek-10	L-1345	Tributary 1 to South Creek	Lakeville	Eureka Twp.	1.2	0	274	208	94	36	25
SCreek-8	L-1344	Tributary 1 to South Creek	Eureka Twp.	Lakeville	2.8	0	750	572	261	104	76
SCreek-6 [2]	L-1339	Tributary 1 to South Creek	Lakeville	Farmington	3.9	0	941	726	344	149	113
NCreek-24 [3]	L-1167	Tributary 1A to North Creek	Apple Valley	Lakeville	5.8	0	NA	NA	NA	NA	NA
Trib1-12	L-392	Tributary 1C	Vermillion Twp.	Marshan Twp.	0.5	0	64	44	15	3	2
Trib1-2	L-1220	Tributary 1D	Marshan Twp.	Hastings	4.7	0	515	343	103	21	11
Trib1-18	L-378	Tributary 1E	Hampton Twp.	Vermillion Twp.	0.8	0	153	111	43	11	6
CD12-12	L-1623	Tributary 2 to County Ditch 12	New Market	New Market Twp.	1.6	0	410	323	164	78	60
SBranch-10	L-301	Tributary 2 to South Branch Vermillion River	Empire Twp.	Castle Rock Twp.	2.0	0	277	193	70	23	16
N-990	L-1103	Tributary 3 to South Branch Vermillion River	Hampton Twp.	Hampton	0.3	0	71	53	22	7	4
SBranch-14	L-294	Tributary 3 to South Branch Vermillion River	Hampton	Hampton Twp.	2.6	0	475	345	135	42	27
SBranch-13	L-1532	Tributary 3 to South Branch Vermillion River	Hampton Twp.	Castle Rock Twp.	4.7	0	866	629	245	75	47
SBranch-6	L-295	Tributary 3C to South Branch Vermillion River	Hampton	Hampton Twp.	0.5	0	109	82	36	14	9
NCreek-7 [2]	L-215	Tributary 4 to North Creek	Empire Twp.	Farmington	0.8	0	127	100	49	20	13
Trib6-6 [2]	L-1547	Tributary 6	Castle Rock Twp.	Empire Twp.	0.4	0	159	121	56	22	15
MCreek-18 [2]	L-1200	Tributary 6 to Middle Creek	Lakeville	Farmington	1.2	0	321	251	124	49	34
SBranch-4	L-310	Tributary 6 to South Branch Vermillion River	Hampton Twp.	Vermillion Twp.	0.3	0	55	41	17	5	3
Trib6-3 [2]	L-1675	Tributary 6A	Farmington	Empire Twp.	0.2	0	125	83	29	13	9
MCreek-15 [2]	L-1589	Tributary 6A to Middle Creek	Lakeville	Farmington	0.8	0	216	172	89	38	27
TribC-10	L-340	Tributary C2	Coates	Vermillion Twp.	2.5	0	379	271	111	46	36
TribC-8	L-346	Tributary C2	Rosemount	Vermillion Twp.	4.6	0	697	493	181	62	45
TribC-5	L-352	Tributary C2	Vermillion Twp.	Nininger Twp.	6.3	0	948	669	251	87	62
VRTribF-14	L-322	Tributary F	Vermillion Twp.	Vermillion	1.0	0	147	103	35	8	5
VRTribG-16	L-320	Tributary G	Vermillion Twp.	Vermillion	1.9	0	261	183	66	21	14

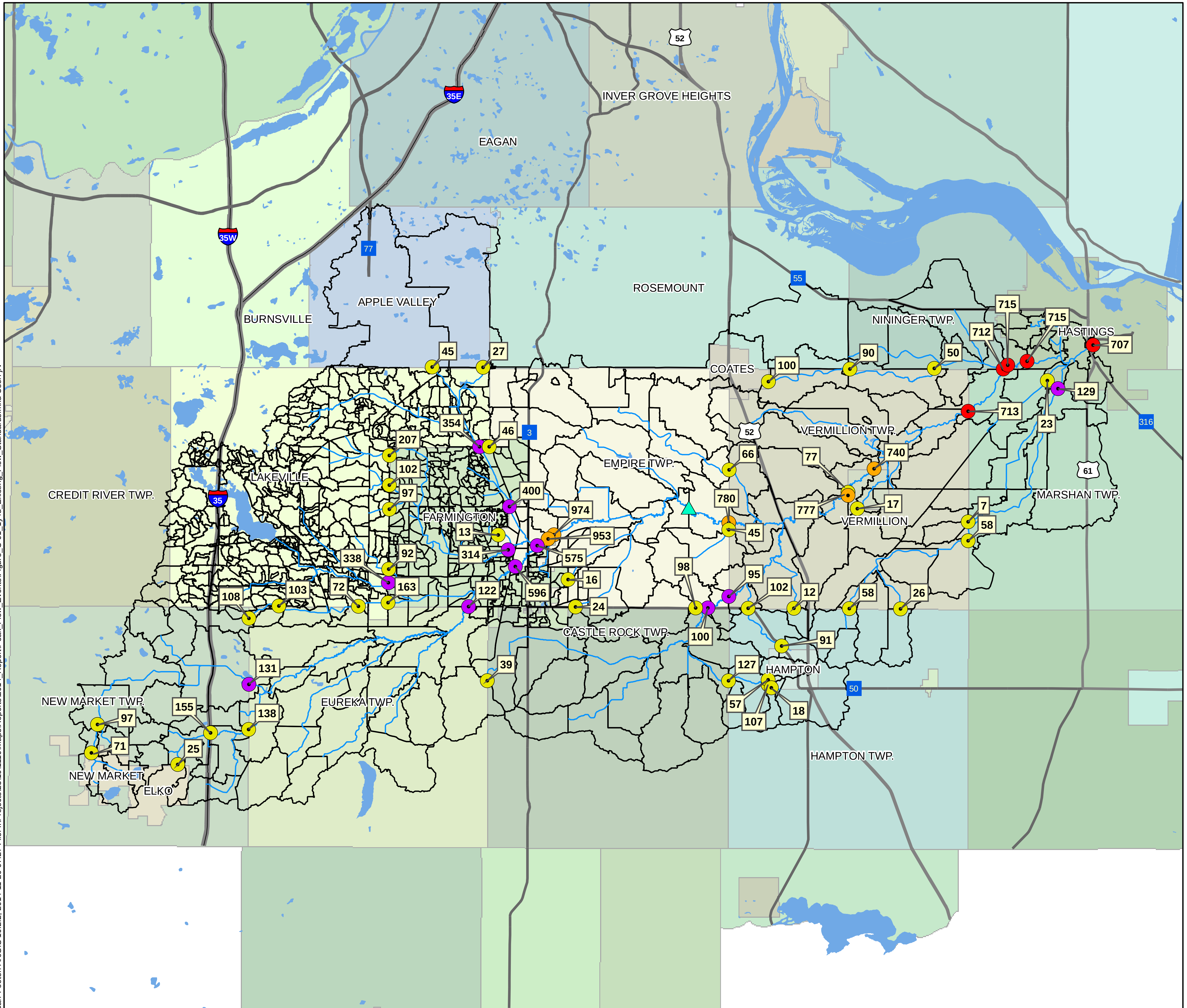
Table C-4 Existing Conditions Standard Locations Volume

XP-SWMM Node	XP-SWMM Link	Reach	Upstream Municipality	Downstream Municipality	Upstream Tributary Area (sq mi)	Baseflow (cfs)	100 Year Volume (ac-ft)[1]	50 Year Volume (ac-ft)[1]	10 Year Volume (ac-ft)[1]	2 Year Volume (ac-ft)[1]	1 Year Volume (ac-ft)[1]
VRTribH-22	L-257	Tributary H	Empire Twp.	Vermillion Twp.	2.5	0	420	301	113	30	17
VRTribR-47	L-1500	Tributary R	Elko	New Market Twp.	0.5	0	111	85	40	16	12
VR-45	L-1495	Vermillion River	Elko	New Market Twp.	3.0	0	692	530	243	98	71
VR-31 [2]	L-179	Vermillion River	Farmington	Empire Twp.	62.0	10	12,480	9,463	4,311	1,785	1,316
N-1288	L-1473	Vermillion River	New Market Twp.	Eureka Twp	4.6	0	1,044	793	358	142	102
VR-34 [2]	L-1413	Vermillion River	Eureka Twp.	Farmington	37.9	1	6,837	5,028	2,060	742	523
VR-32 [2]	L-1317	Vermillion River	Farmington	Empire Twp.	61.7	10	12,383	9,383	4,266	1,764	1,299
VR-30 [2]	L-225	Vermillion River	Empire Twp.	Farmington	95.7	16	24,754	20,740	13,751	8,640	7,231
VR-29 [2]	L-1302	Vermillion River	Farmington	Empire Twp.	97.9	16	25,293	21,215	14,035	8,793	7,356
VR-24	L-581	Vermillion River	Empire Twp.	Vermillion Twp.	116.4	30	29,356	24,267	15,400	9,276	7,655
VR-17	L-319	Vermillion River	Vermillion Twp.	Vermillion	163.9	39	35,670	28,647	16,862	9,643	7,872
VR-15	L-324	Vermillion River	Vermillion	Vermillion Twp.	166.5	39	36,001	28,879	16,944	9,669	7,890
VR-8	L-1039	Vermillion River	Vermillion Twp.	Marshan Twp.	178.3	58	36,222	28,872	16,727	9,536	7,782
VR-7	L-1034	Vermillion River	Marshan Twp.	Nininger Twp.	179.6	58	36,347	28,957	16,754	9,542	7,785
VR-6	L-1031	Vermillion River	Nininger Twp.	Hastings	197.5	58	38,200	30,195	17,153	9,664	7,875
VR-5	L-1029	Vermillion River	Nininger Twp.	Hastings	197.9	58	38,272	30,247	17,174	9,672	7,881
VR-1	WOMP	Vermillion River	Hastings	NA	225.3	50	41,745	32,592	17,939	9,945	8,088

[1] Total volume is the runoff volume generated by the design event only; base flow is not included in the total volume calculation. See the 2010 VRWJPO report (Appendix G) for further discussion of volume calculations.

[2] Flow standard location at Farmington municipal boundary.

[3] Apple Valley flow rates are agreed on by Apple Valley, Lakeville, and the VRWJPO. Inflows were not adjusted as part of the update.



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (784 cfs)
- SWMM Links
- Watersheds
- Lakes

Peak flow rates listed in units of cfs.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

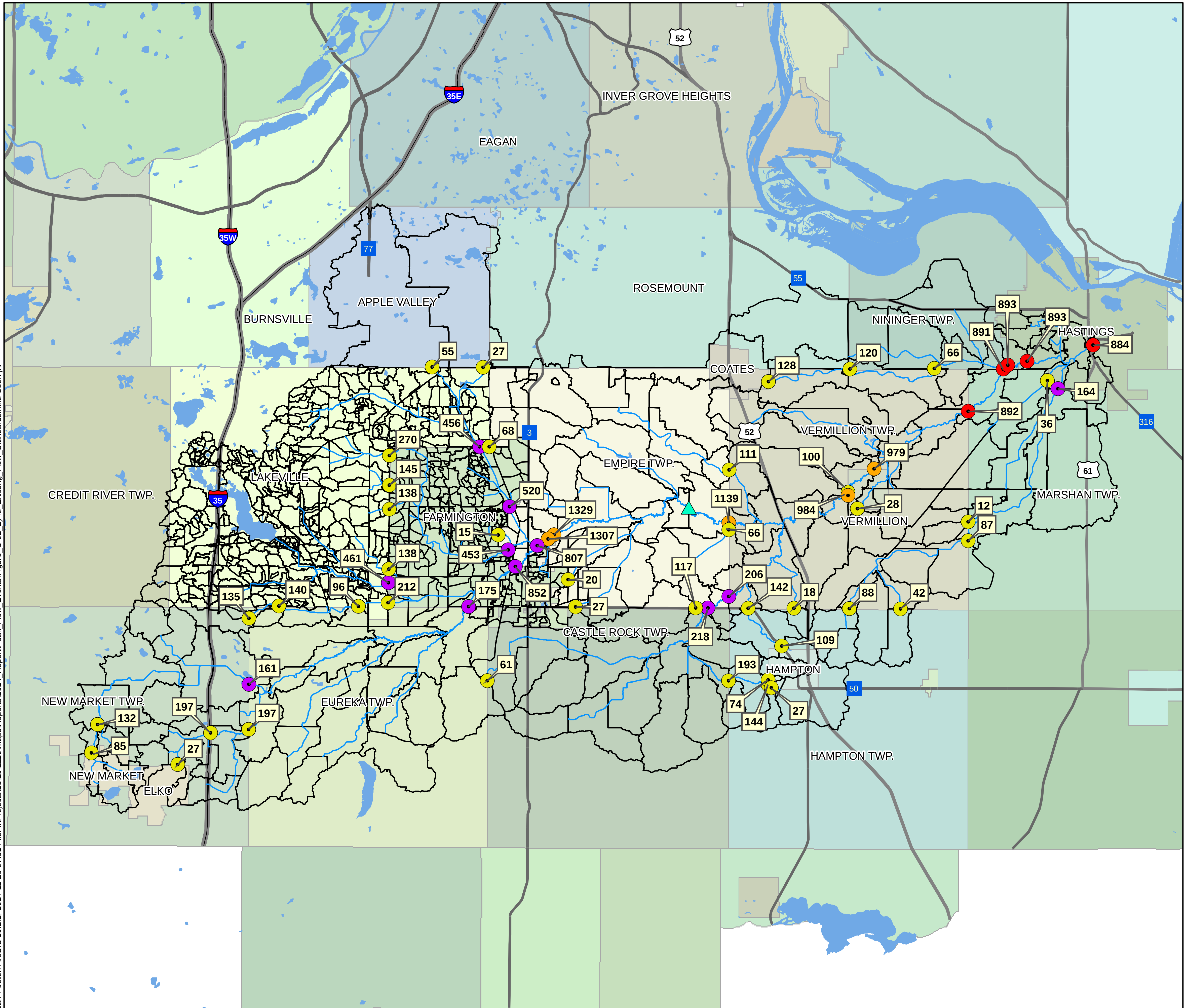
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-1

COMMUNITY FLOW STANDARDS
Existing Conditions (Atlas 14)
1 Year 4 Day Peak Flow
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (1,156 cfs)
- SWMM Links
- Watersheds
- Lakes

Peak flow rates listed in units of cfs.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

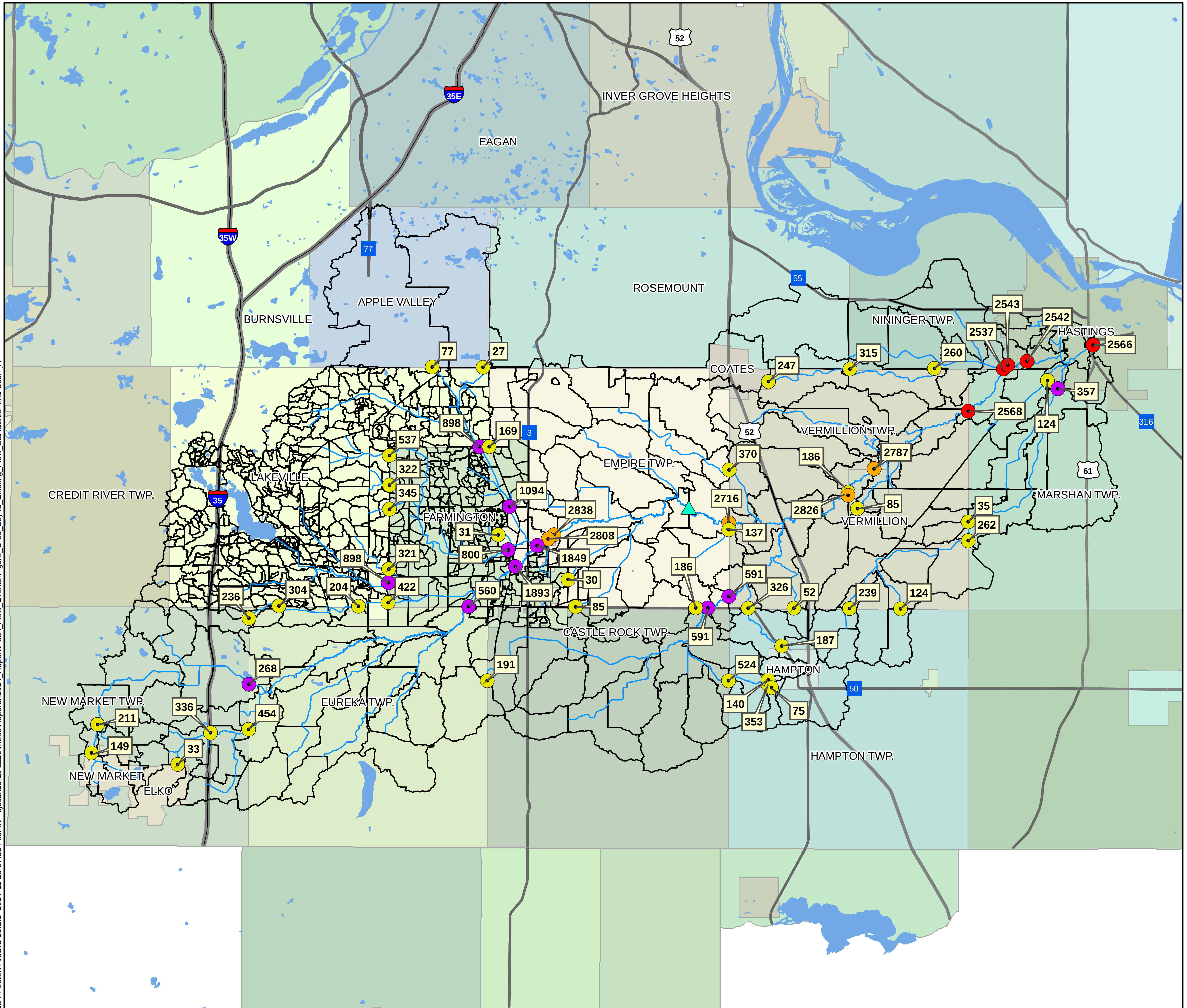
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-2

COMMUNITY FLOW STANDARDS
Existing Conditions (Atlas 14)
2 Year 4 Day Peak Flow
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (2,732 cfs)
- SWMM Links
- Watersheds
- Lakes

Peak flow rates listed in units of cfs.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

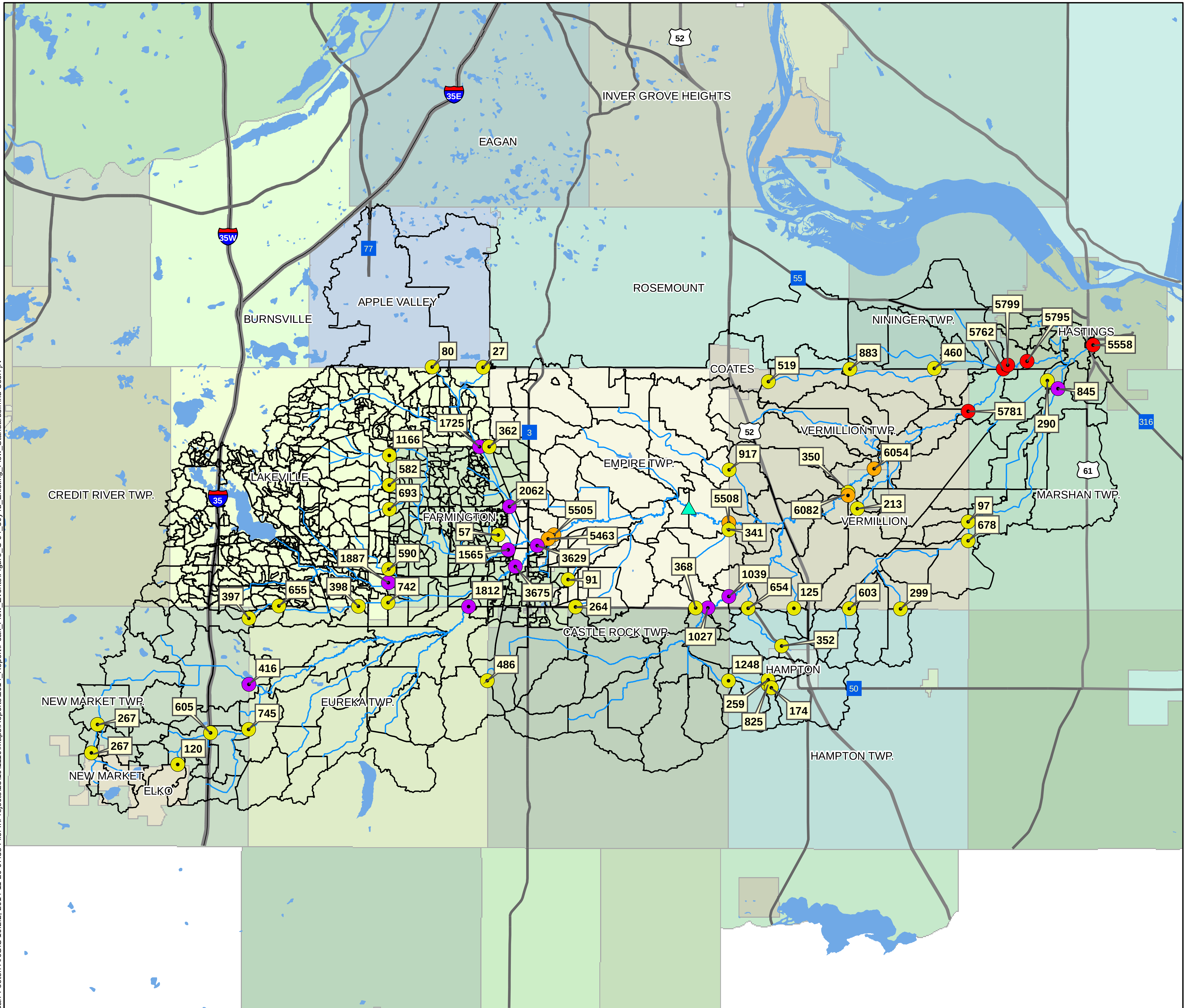
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-3

COMMUNITY FLOW STANDARDS
Existing Conditions (Atlas 14)
10 Year 4 Day Peak Flow
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (5,533 cfs)
- SWMM Links
- Watersheds
- Lakes

Peak flow rates listed in units of cfs.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

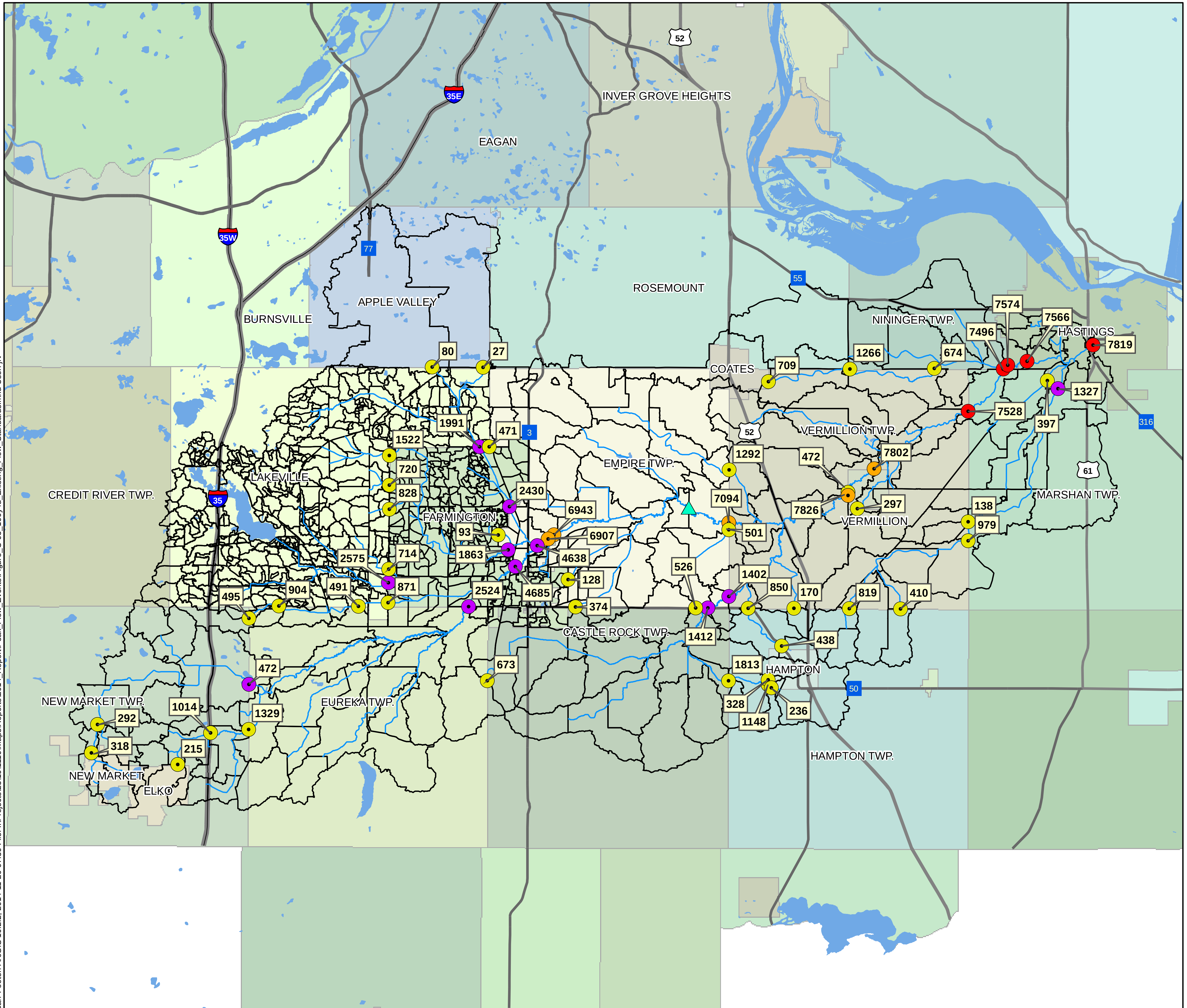
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-4

COMMUNITY FLOW STANDARDS
Existing Conditions (Atlas 14)
50 Year 4 Day Peak Flow
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (7,124 cfs)
- SWMM Links
- Watersheds
- Lakes

Peak flow rates listed in units of cfs.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

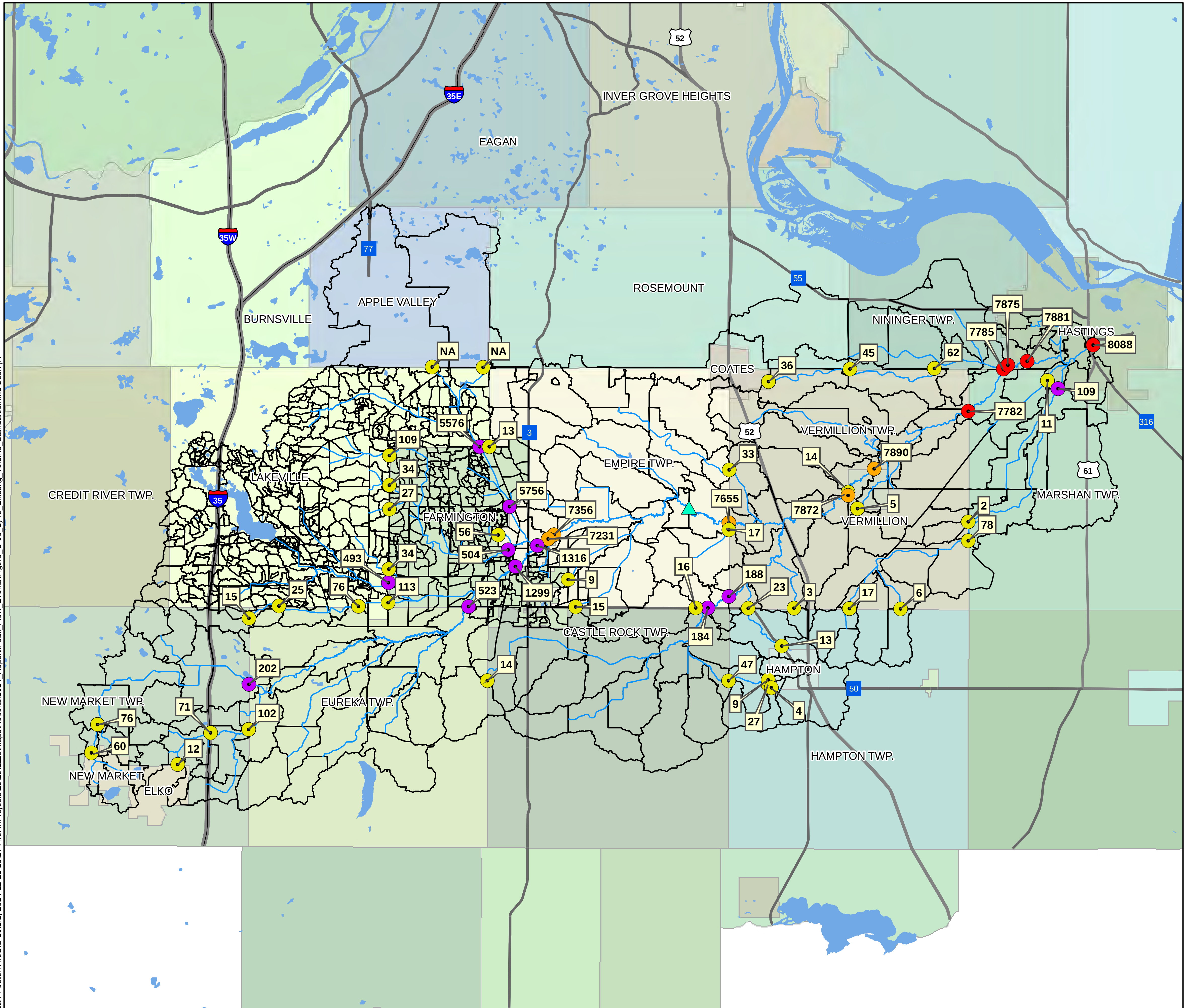
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-5

COMMUNITY FLOW STANDARDS
Existing Conditions (Atlas 14)
100 Year 4 Day Peak Flow
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (7,651 ac-ft)
- SWMM Links
- Watersheds
- Lakes

Runoff volumes listed in units of ac-ft.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

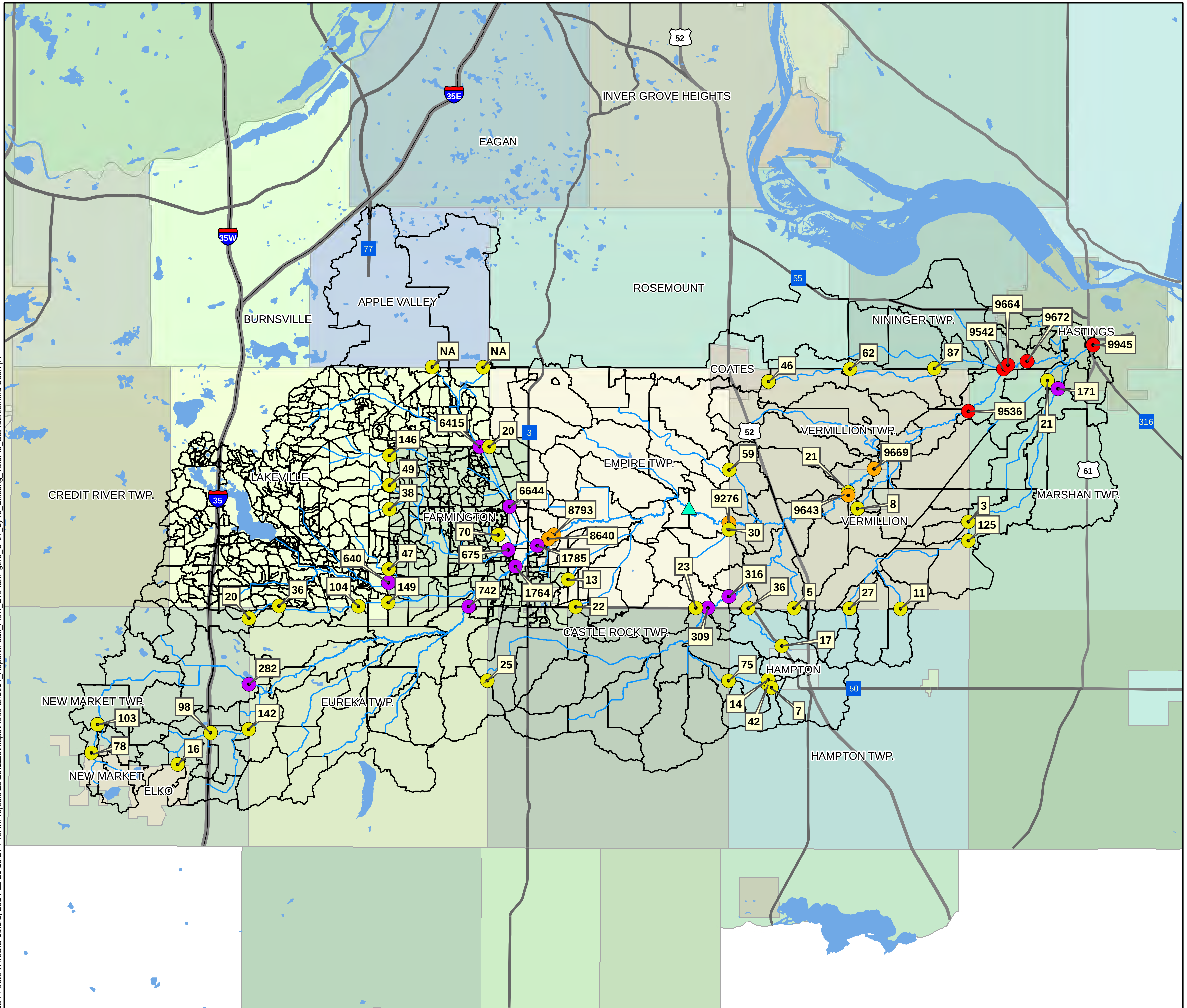
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-6

COMMUNITY VOLUME STANDARDS
Existing Conditions (Atlas 14)
1 Year 4 Day Runoff Volume
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (9,269 ac-ft)
- SWMM Links
- Watersheds
- Lakes

Runoff volumes listed in units of ac-ft.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

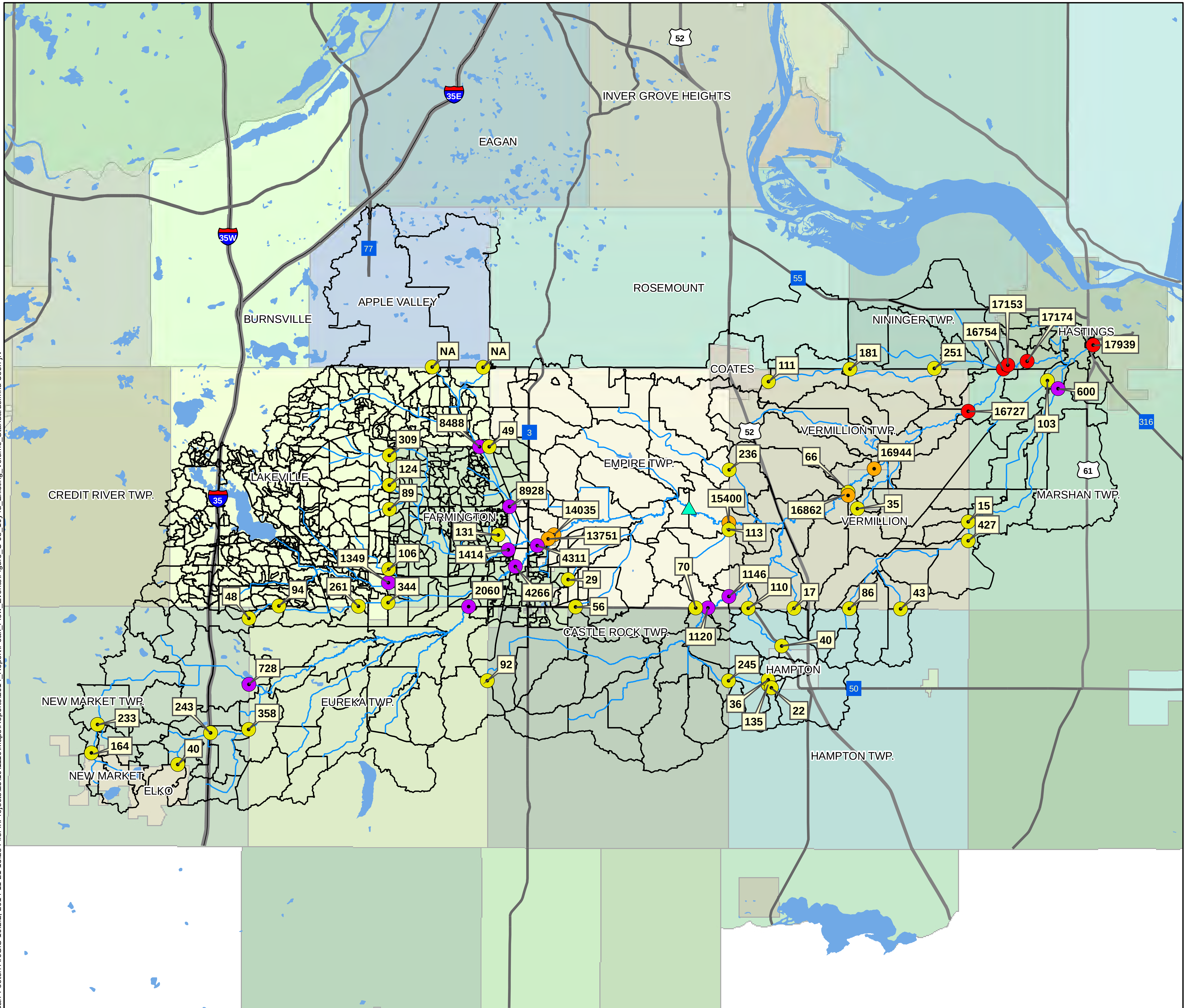
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-7

COMMUNITY VOLUME STANDARDS
Existing Conditions (Atlas 14)
2 Year 4 Day Runoff Volume
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (15,370 ac-ft)
- SWMM Links
- Watersheds
- Lakes

Runoff volumes listed in units of ac-ft.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

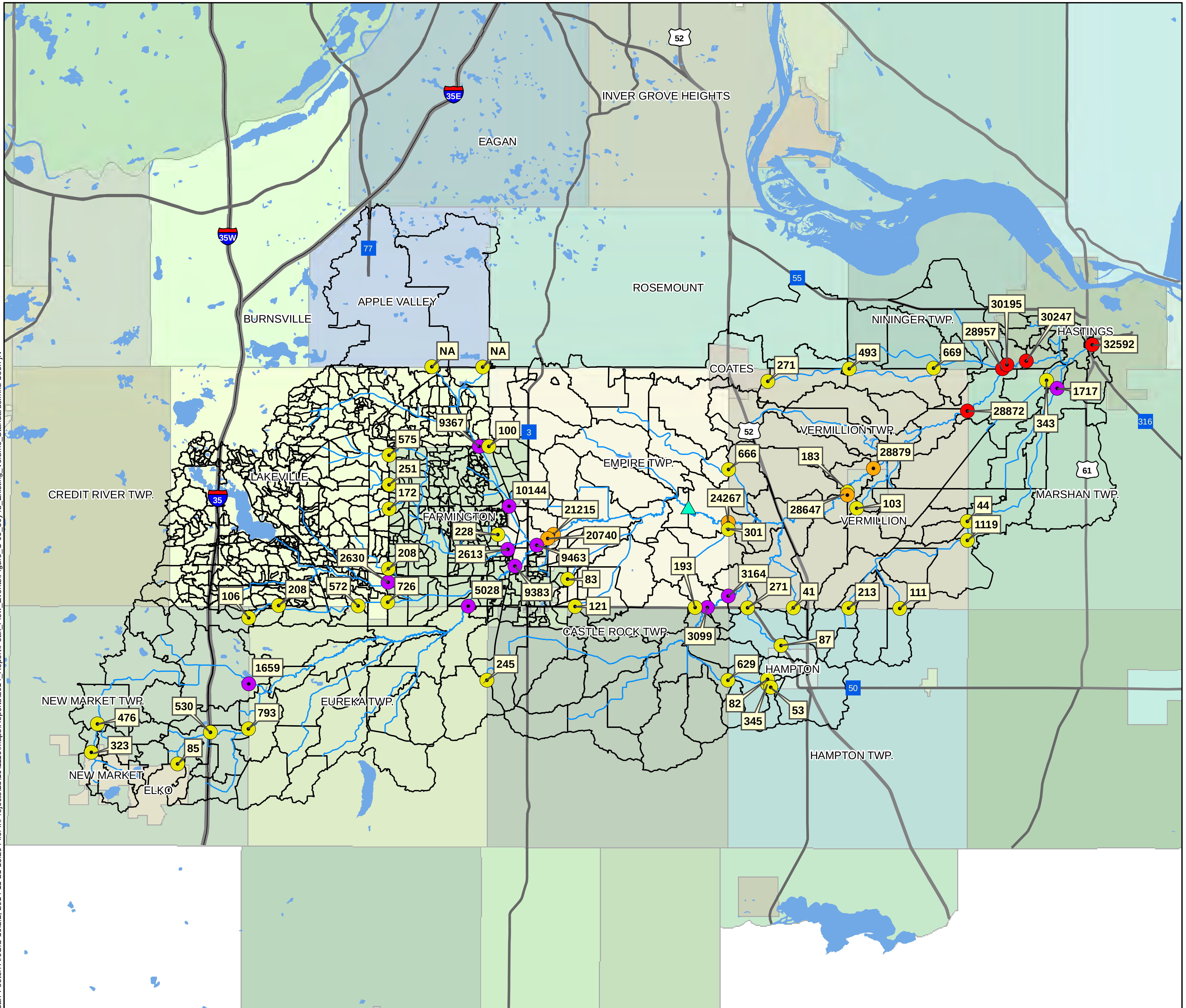
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-8

COMMUNITY VOLUME STANDARDS
Existing Conditions (Atlas 14)
10 Year 4 Day Runoff Volume
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (24,162 ac-ft)
- SWMM Links
- Watersheds
- Lakes

Runoff volumes listed in units of ac-ft.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

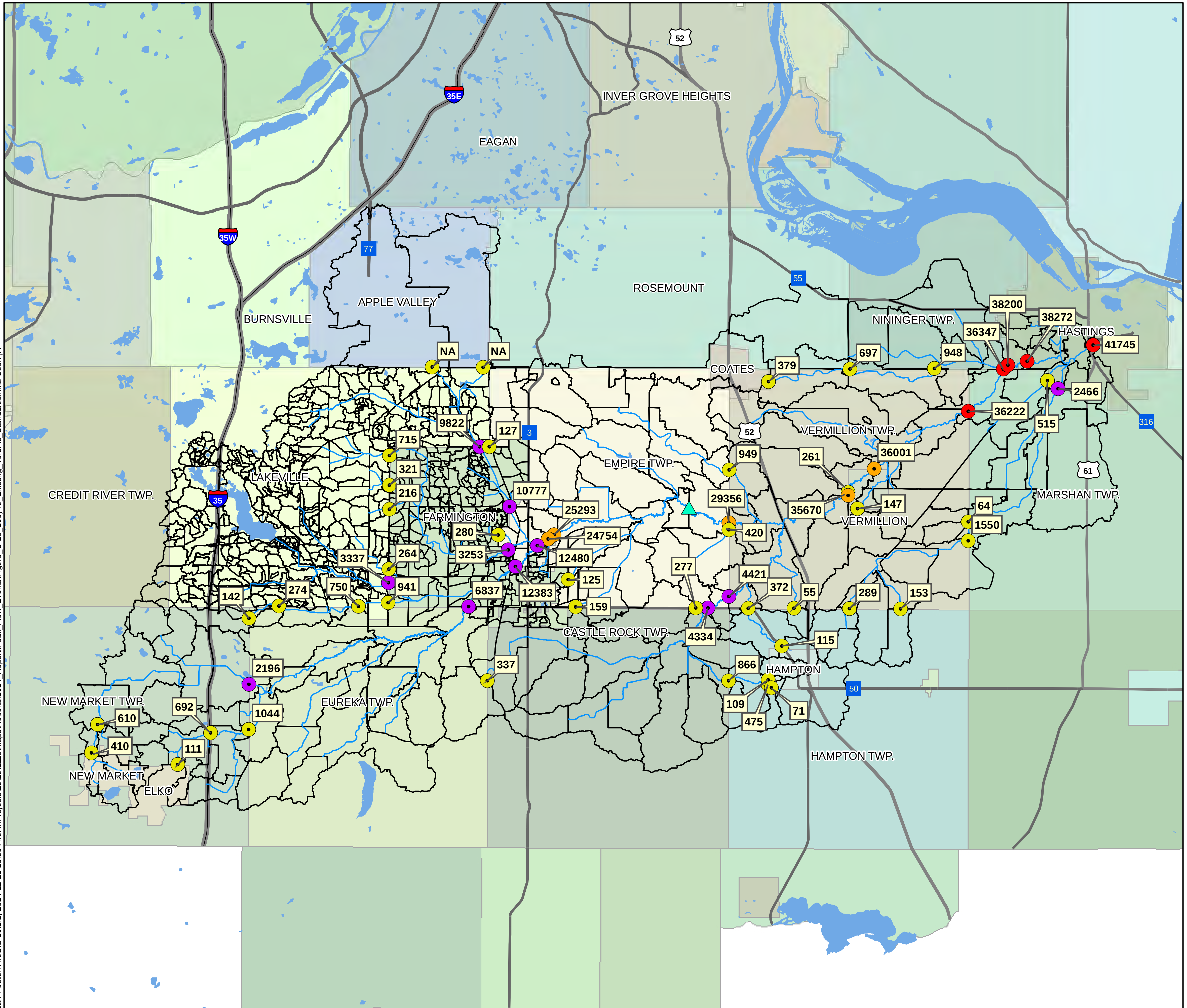
N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-9

COMMUNITY VOLUME STANDARDS
Existing Conditions (Atlas 14)
50 Year 4 Day Runoff Volume
Vermillion River Watershed



Legend

Standard Locations

Tributary Drainage Area

- 0-10 square miles
- 10-67.5 square miles
- 67.5-170 square miles
- 170-225 square miles
- USGS Station (29,196 ac-ft)
- SWMM Links
- Watersheds
- Lakes

Runoff volumes listed in units of ac-ft.

Community Boundaries Source:
Metropolitan Council, Updated as of 10/17/2014.

N

Miles
1 0 1 2

Kilometers
1 0 1 2 3 4

Figure C-10

COMMUNITY VOLUME STANDARDS
Existing Conditions (Atlas 14)
100 Year 4 Day Runoff Volume
Vermillion River Watershed