CITY OF
Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY

*This meeting is being voice recorded for listening on the City of Millersburg website.*

**Rules of Conduct for Public Hearings**

*1. No person shall be disorderly, abusive, or disruptive of the orderly conduct of the hearing.*

*2. Persons shall not testify without first receiving recognition from the presiding officer and stating their full name and residence address.*

*3. No person shall present irrelevant, immaterial, or repetitious testimony or evidence.*

*4. There shall be no audience demonstrations such as applause, cheering, display of signs, or other conduct disruptive of the hearing.*

# CITY OF MILLERSBURG
# CITY COUNCIL MEETING

Millersburg City Hall
4222 NE Old Salem Road
Albany OR 97321
January 22, 2018 @ 4:00 p.m.

## Agenda

A. CALL TO ORDER

B. ROLL CALL

C. PLEDGE OF ALLEGIANCE

D. CHANGES AND ADDITIONS TO THE AGENDA

E. PUBLIC COMMENT

F. UNFINISHED BUSINESS

G. NEW BUSINESS
   1) Adoption of Storm Water Master Plan
   Action:________________________________________
   2) MS4 Permit Discussion
   Action:________________________________________
   3) Parks Committee Appointment (Rob Yencopal)
   Action:________________________________________

H. CLOSING PUBLIC COMMENT

I. CLOSING COUNCIL COMMENT

J. ADJOURNMENT

*Note: Council may adjourn to executive session in accordance with ORS 192.660.*

<u>Upcoming Meetings & Events</u>:
January 30, 2019 @ 5:00 p.m. – Parks Committee Work Session
February 12, 2019 @ 6:30 p.m. – City Council Meeting
February 13, 2019 @ 6:00 p.m. – Planning Commission Work Session
February 19, 2019 @ 6:00 p.m. – Planning Commission Meeting

*The location of the meeting is accessible to the disabled. If you have a disability that requires accommodation to attend or participate, please notify the Millersburg City Hall in advance by calling 541-928-4523.*

# Final Report

## City of Millersburg Stormwater Master Plan

January 2019

CITY OF Millersburg

A COMMUNITY LINKING AGRICULTURE AND INDUSTRY

Prepared For

City of Millersburg, Oregon

January 2019

Cardno


REGISTERED PROFESSIONAL
ENGINEER
18081
OREGON
SEP. 19, 1995
JAMES HARPER
EXPIRES:06/30/2019

# Executive Summary

In 2018, The City of Millersburg initiated development of a Stormwater Master Plan to provide a clear understanding of existing stormwater infrastructure, to provide an outline of stormwater projects to address both existing and future system capacity needs, and to identify improvements to protect and improve water quality. This Master Plan project includes the development of stormwater system mapping, modeling of the system to develop an understanding of the existing system and the potential impacts of future development, a list of Capital Improvement Projects (CIPs) to address existing problem areas, and a strategy for expanding the system to safely accommodate future development.

## Master Plan Analysis

Development of the Master Plan involved four primary analyses to evaluate the City's existing stormwater infrastructure and programs.

### Stormwater System Capacity Evaluation

Section 4 documents the development of a hydrologic and hydraulic model (H/H) model to simulate rainfall and runoff characteristics within Millersburg. The model simulates stormwater flows through pipe networks, drainage ditches, creeks, and culverts to identify areas that are over capacity. The model considers both current conditions and the impacts of future development on the stormwater flows. Stormwater infrastructure capacity concerns are presented in Table 4-8.

### Reported Issue Areas

Discussion with City staff, compilation of public concerns, and comments from a public open house were used to identify problem areas within the stormwater infrastructure. The aim was to identify problems that would not be identified through hydraulic modeling, such as deteriorating pipes, frequent maintenance concerns, inadequate maintenance access, or underserved areas resulting in flooding. Problem areas are documented in Section 2.7 and in Table 4-8.

### Visual Inspection

Field visits were conducted on March 13 and April 12, 2018 to evaluate and assess the existing conditions of City's stormwater infrastructure. Roughly 10% of the City's infrastructure was visually inspected at random. The City of Millersburg's stormwater infrastructure was generally observed to be in good condition, structurally sound, and with little evidence of sediment deposit in the built-out and established areas. Section 5 includes maintenance and other programmatic recommendations to help protect existing and future infrastructure.

### Maintenance and Program Evaluation

The City's stormwater management program was formed around Oregon drainage law and interests of public safety. Millersburg is currently identified as a political jurisdiction in the Upper Willamette Subbasin in Chapter 10 of the Willamette River TMDL Study and has been identified in the Proposed Oregon DEQ General Permit for the National Pollutant discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit for Phase II Communities. Sections 5 and 6.5 provide an evaluation of the City's current stormwater program, recommendations for enhancements to the current program, and recommendations for the City on how to meet TMDL requirements and the NPDES MS4 permit requirements.

## Recommendations

The programmatic recommendation in Section 5, and CIP recommendations in Section 6 present an integrated strategy to address stormwater management concerns identified as part of the Master Plan Analysis. Recommendations include a regime of preventative maintenance activities, a list of updates and additions to the City's stormwater design standards, and a list of recommended CIPs to address existing and future conditions flooding problems. The recommended CIP plan includes 11 specific projects, including 2 projects intended to guide City discussion with Linn County regarding capacity issues in Old Salem Road. Detailed cost estimates and conceptual designs are provided in Appendix C.

| Project | Priority | Total Cost |
|---|---|---|
| North Tributary of Crooks Creek Improvements | High | $ 186,000 |
| Morningstar Estates Outfall Modification | Medium | $ 203,725 |
| Becker Ridge Detention Ponds Modification | Medium | $ 17,980 |
| Transportation System Plan Stormwater Improvements | Low | $ 2,082,500 |
| Woods Road Drainage Capacity Increase | Low | $ 559,004 |
| Old Salem Road (Linn County) Build-Out Capacity Improvements | Low | $ 707,491 |
| Old Salem Road (Linn County) Existing Capacity Improvements | Low | $ 370,801 |
| Kathryn St & Knox Butte Ave Storm Improvements | Low | $ 217,500 |
| Hoffman Estates Capacity Increase | Low | $ 156,890 |
| Umpqua Lane Detention Pipes Modification | Low | $ 109,910 |
| Crooks Creek Sedimentation Concerns | Low | $ 70,000 |

# Table of Contents

# Appendices



# Tables

## Figures

# Acronyms and Abbreviations

| | |
|---|---|
| CIP | Capital Improvement Project |
| City | The City of Millersburg |
| cfs | Cubic feet per second |
| DEQ | Oregon Department of Environmental Quality |
| DSL | Oregon Department of State Lands |
| EPA | United States Environmental Protection Agency |
| GIS | Geographic Information System |
| HDPE | High density polyethylene |
| H/H | Hydrologic/Hydraulic |
| LID | Low Impact Design |
| Master Plan | Stormwater master plan |
| MS4 | Municipal Separate Storm Sewer System |
| NAD83 | North American Datum of 1983 |
| NAVD88 | North American Vertical Datum of 1988 |
| NGVD29 | National Geodetic Vertical Datum of 1929 |
| NRCS | National Resource Conservation Service |
| ORN | Oregon State Plane North |
| RCP | Reinforced concrete pipe |
| SWMM | Storm Water Management Model |
| TMDL | Total Maximum Daily Load |
| USGS | United States Geological Survey |
| WQ | Water Quality |

# 1 Introduction

## 1.1 Plan Purpose

The purpose of this plan is to evaluate the current condition of the City of Millersburg's stormwater infrastructure, and develop a program to address he City's current and future stormwater needs. This plan addresses stormwater infrastructure, operation and maintenance, future growth, design standards, state permits, and long-term funding.

The City of Millersburg has experienced a great deal of growth in the past five years. Upcoming projects from statewide transportation funding mean that the City will likely continue to experience significant growth. It is critical the City plan for such growth in a way that maintains the integrity of the community. Stormwater master planning offers a mechanism to anticipate and address infrastructure and programmatic needs that coincide with the added development that accompanies growth.

The City will use this Master Plan as a tool to proactively address stormwater management with prioritized stormwater capital improvement projects (CIPs) that work in conjunction with the City's ongoing stormwater program. These projects provide an opportunity for the City to incorporate solutions to stormwater system capacity, water quality, and public safety into current planning approaches.

Programmatic recommendations included as part of this plan will also address long-term strategies to help the City maintain its stormwater system and meet the requirements of its Total Maximum Daily Load program with the Oregon Department of Environmental Quality (DEQ).

## 1.2 Plan Objectives

This Master Plan evaluates and addresses issues present in the City's current stormwater system in regard to conveyance capacity. Additionally, recommendations to address water quality and stream stabilization are included alongside the development of capital improvement projects. The primary goals of this Master Plan are as follows:

- Inventory and map the City's current stormwater infrastructure
- Develop a hydrologic and hydraulic model of the City's current stormwater system
- Evaluate the City's current stormwater system for deficiencies at existing flow rates and future capacity issues at build out flow rates
- Develop a set of CIPs to address current issues and guide strategy for the expansion of the City's stormwater system
- Develop planning level cost estimates for the recommended CIPs
- Recommend prioritization and develop a plan for implementation of the recommended CIPs
- Provide recommendations for an ongoing maintenance and inspection program

## 1.3 Approach

The Master Plan approach was developed to meet the City's stormwater management objectives and increase the understanding of current stormwater infrastructure. The data collection, evaluation, and CIP strategies were conducted as follows:

1. The City's stormwater infrastructure was mapped and compiled into a geographic information system (GIS) through a combination of georeferenced as-built drawings, field survey, and field verification.

2. Collected data was used to develop the stormwater hydrologic and hydraulic model and associated model attributes such as sub-catchment drainage areas, land uses, soils, and topography.
3. City staff were interviewed to identify known drainage issue areas.
4. A public open house was held on issue areas and community input was collected.
5. Alternative projects were developed to be included in a stormwater Capital Improvement Program (CIP).
6. Working with City Staff recommended projects were selected from the alternatives and a list of CIP projects was developed for improvements to the City's stormwater system.
7. Planning level project cost estimates were prepared for each project including capital expense, engineering design, and administrative costs.
8. Projects were categorized as short-term, medium-term, or long-term targets based on priority and design considerations.
9. The Master Plan was presented at a City Council work session and adopted at a subsequent City Council meeting.

The City of Millersburg is located in close proximity to the City of Albany and has adopted many of Albany's design and construction standards. The City of Millersburg does not maintain its own GIS system, instead it utilizes City of Albany and Linn County GIS through intergovernmental agreements. In addition, the City of Albany is currently completing a stormwater master plan. Therefore, throughout this report, City of Albany and Linn County data and City of Albany standards are referenced.

## 1.4 Plan Organization

This Master Plan is organized as follows:

> Section 1 serves as the Master Plan introduction and describes the plan purpose, objectives, and overall approach.

> Section 2 describes the study area characteristics, including reported issue areas.

> Section 3 includes a description of the GIS mapping effort of the City's current stormwater infrastructure.

> Section 4 describes the methods, variables, and parameters used to develop the hydrologic/hydraulic model of the City's stormwater system.

> Section 5 describes the City's current stormwater program and provides recommended programmatic changes to meet the City's goals/values.

> Section 6 provides a summary of the CIP recommended projects and program recommendations to help the City meet its NPDES and TMDL program requirements.

# 2 Study Area Characteristics

## 2.1 Location

The City of Millersburg is located 18 miles south of Salem, Oregon, along Interstate 5. Millersburg is located in Linn County and is bounded by the Willamette River to the southwest, Interstate 5 to the east, and the City of Albany to the south.

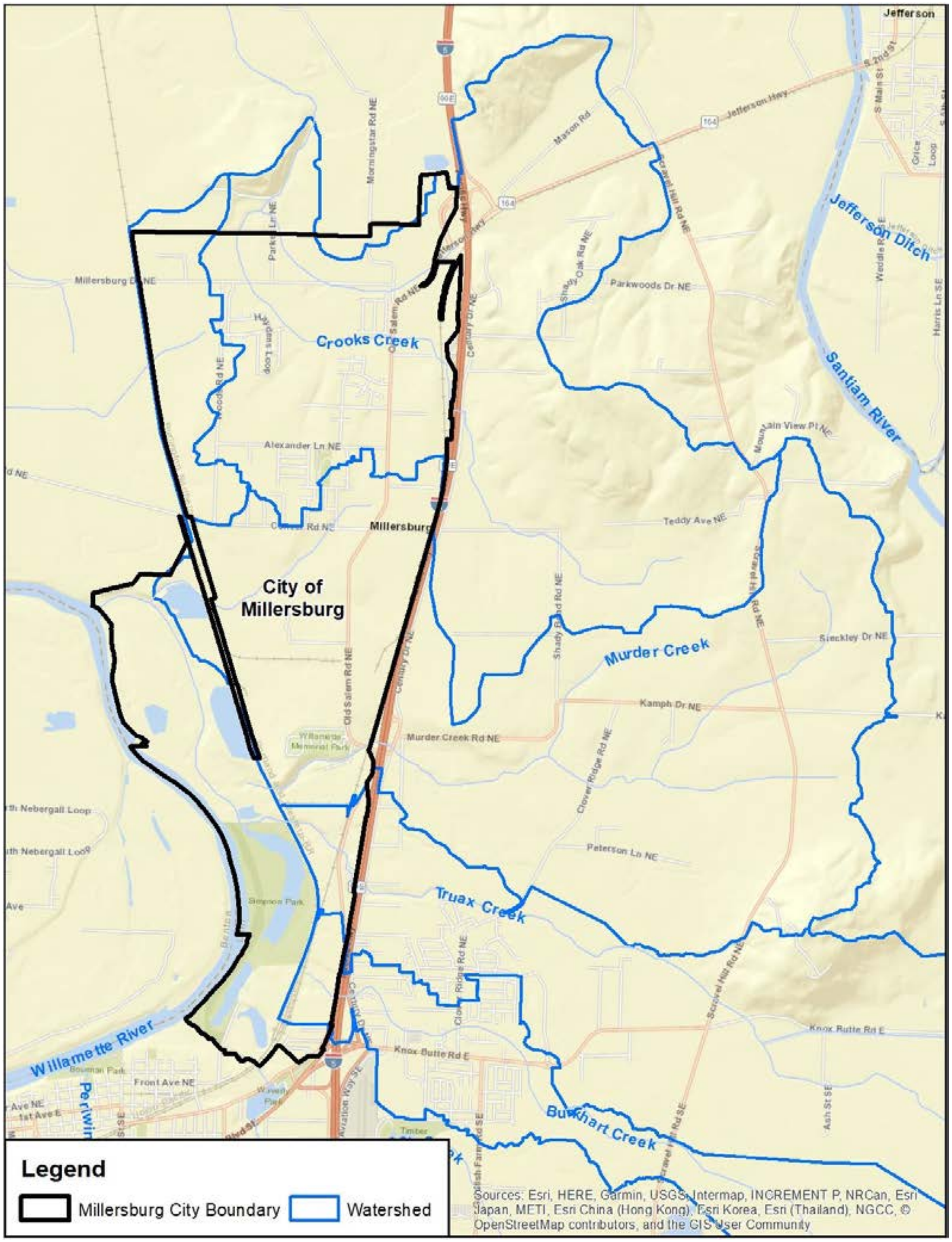



**Figure 2-1 City of Millersburg Map with Watersheds**

The city is approximately 4.5 square miles and is drained by Crooks Creek, Murder Creek, Burkhart Creek, Truax Creek, and Cox Creek. Burkhart and Truax Creek converge with Murder Creek within the city limits. All these creeks drain to the Willamette River at River Miles 111 for Crooks Creek, 114.5 for Murder Creek, and 117.7 for Cox Creek.

The City's drainage system is defined by three watershed regions: the Crooks Creek watershed, Murder Creek watershed, and the Wilson Lake watershed. All of these watersheds flow into the Willamette River, which is one of the Columbia River's primary tributaries.

The Crooks Creek watershed covers roughly a quarter of the City's area. This area covers a majority of the City north of Conser Road NE, and incorporates much of the City's existing residential area. The majority of the City's existing stormwater infrastructure lies within the Crooks Creek watershed.

The Wilson Lake watershed includes roughly a quarter of the City north of Conser Road NE and west of Woods Road NE. This watershed is largely undeveloped and consists of open fields draining to culverts under the Portland & Western Railway along the western City boundary. This watershed is zoned residential and has a large potential for development.

The Murder Creek watershed is the largest watershed in the City. Much of this watershed is zoned industrial, with some residential areas north and west of Conser Road NE and south of Kathryn Avenue NE. This watershed is largely developed south of Murder Creek and largely undeveloped north of Murder Creek. This watershed also includes the watersheds for Burkhart and Truax Creeks which combine with Murder Creek before discharging to the Willamette River.

## 2.2 Topography

Topographic information was compiled using 2016 aerial imagery, and 2010 LiDAR data on the North American Vertical Datum of 1988 (NAVD88). This was then converted to the National Geodetic Vertical Datum of 1929 (NGVD29) to align it with City and County vertical benchmarks and as-built data. This conversion was done by subtracting 3.33 feet from the NAVD88 data.

Millersburg is located within the Willamette River Valley and gently slopes from the east to the west. The highest point within the city is located at elevation 271.9 (NGVD29) and the lowest is near the Willamette River at elevation 168.6 (NGVD29). The Crooks Creek, Murder Creek (including Burkhart and Truax Creeks), and Cox Creek watersheds extend to just west of the Santiam River, with the entire Murder Creek watershed extending as far southeast as Lebanon. Outside the city, the watershed for Murder Creek extends up to an elevation of 639.9, and the watersheds for Burkhart, Truax, and Cox Creek extend up to an elevation of around 350 feet near Lebanon. The creeks within the city generally flow east to west, with the exception of Crooks Creek which flows east to north.

Within the city, slopes are gentle with slopes ranging from 0 to 25.6 percent. The average slope of Crooks Creek passing through the city from east to north is approximately 0.2 percent. Slopes upstream and outside of the city are generally steeper with maximum slopes exceeding 300%. Figure 2-2 illustrates the city and watershed topography.

## 2.3 Soils

Soil classification is an important characteristic to consider when evaluating runoff flow rates and volumes. Soil types within the study area were identified using data from the National Resource Conservation Service (NRCS) Soil Survey. Soil information is based upon data obtained from the NRCS Web Soil Survey which publishes information from the 1974 publication from the U.S. Department of Agriculture Soil Conservation Service titles *Soil Survey of Linn County Area, Oregon.*

Table 2-1 shows soil types, soil characteristics and distribution within the city limits.

**Table 2-1 Soil Characteristics**

| NRCS Map Unit Name | NRCS Map Unit Symbol | Infiltration (in/hr) | Percent Coverage in City |
|---|---|---|---|
| Amity silt loam | 3 | 0.20 - 0.57 | 13.6% |
| Awbrig silty clay loam | 7 | 0.00 - 0.06 | 1.7% |
| Bashaw silty clay | 8 | 0.00 - 0.06 | 8.0% |
| Clackamas gravelly silt loam | 23 | 0.20 - 0.57 | 2.7% |
| Cloquato silt loam | 25 | 0.57 - 1.98 | 0.9% |
| Coburg silty clay loam | 26 | 0.20 - 0.57 | 6.1% |
| Concord silt loam | 27 | 0.06 - 0.20 | 1.4% |
| Conser silty clay loam | 28 | 0.06 - 0.20 | 0.3% |
| Dayton silt loam | 33 | 0.00 - 0.06 | 9.1% |
| Fluvents-Fluvaquents complex, nearly level | 39 | - | 3.8% |
| Holcomb silt loam | 46 | 0.00 - 0.06 | 4.6% |
| Malabon silty clay loam | 63 | 0.20 - 0.57 | 4.1% |
| Newberg fine sandy loam | 73 | 1.98 - 5.95 | 5.2% |
| Ochrepts, very steep | 74H | - | 0.8% |
| Riverwash | 85 | - | 6.9% |
| Santiam silt loam, 3 to 6 percent slopes | 89B | 0.06 - 0.20 | 2.3% |
| Steiwer silt loam, 3 to 12 percent slopes | 95C | 0.20 - 0.57 | 0.6% |
| Willamette silt loam | 102 | 0.57 - 1.98 | 4.1% |
| Woodburn silt loam, 0 to 3 percent slopes | 106A | 0.06 - 0.20 | 16.2% |
| Woodburn silt loam, 3 to 12 percent slopes | 106C | 0.06 - 0.20 | 2.9% |
| Water | W | - | 4.6% |

The soils listed in Table 2-1 are illustrated within the study area in Figure 2-3.

## 2.4 Climate and Rainfall

The Mid-Willamette Valley experiences relatively warm, dry summers and mild wet winters. The Coast Range provides some shielding from Pacific Ocean storms. The following climate data is based on the Western Regional Climate Center historic record from 1893 to 2016 for Corvallis, Oregon (station 351862). The normal daily high temperatures range from approximately 81°F in July to 46°F in January. The normal daily low temperatures range from approximately 51°F in July to 33°F in January.

The average annual precipitation is approximately 41.1 inches with 5.9 inches of snowfall. Most of the precipitation in this area falls between the months of October and May; however, short, intense summertime storms contribute to the annual rainfalls as well.

Reference: *http://www.wrcc.dri.edu/summary/climsmor.html*

## 2.5 Land Use

Millersburg's 2017 population was reported by the U.S. Census Bureau to be 2,315. The city experienced a growth of 255.6% since 2010, with a growth rate of 26.2% between 2016 and 2017. Growth is likely to continue as much of the city is yet undeveloped, with an estimated build-out population of 5,147 in the year 2038 within the current urban growth boundary. Currently, land use includes a mix of residential, commercial, and industrial zones with the residential zones dominating the northern half of the city. Table 2-2 and Figure 2-5 outline the City's current land use classifications, and the coverage of each over the city.

**Table 2-2 Land Use Coverage**

| Land Use Classification | Percent Coverage | Area Coverage, acres |
|---|---|---|
| Industrial | 48% | 1,292 |
| Residential | 36% | 965 |
| Other | 10% | 284 |
| Commercial | 6% | 155 |

### 2.5.1 Impervious Area

In support of the City of Millersburg, the City of Albany's GIS department measured and mapped existing (2010) impervious areas within the City of Millersburg. These include residential homes (roofs), building footprints, and paved surfaces. The mapped pavement areas include parking lots, sidewalks, and paved paths. Compacted gravel surfaces in industrial areas were also included.

Figure 2-4 shows the 2010 impervious areas.

The City of Millersburg's land use map was used to estimate and assign impervious area percentages applicable to future development conditions for hydrologic modeling. Table 2-3 shows the future impervious percentages assigned to each zone, and Table 2-4 shows the expected increase in impervious area by basin. All vacant lands were assumed to be developed in the future condition land use scenario for modeling purposes. Areas zoned Public and Community Commercial were assumed to remain at 2010 impervious percentages into the future condition.

**Table 2-3 Future Impervious Area by Land Use**

| Land Use Classification | Impervious Percentage |
|---|---|
| Industrial | 75% |
| Residential | 50% |
| Other | Site Specific |
| Commercial | 60% |

For the purposes of modeling, future built-out residential areas were assumed to have an impervious coverage of 40%. This percentage represents an average coverage based on exiting built-out lots of the same zoning, rather than 50% which is the maximum coverage allowed by City code.

**Table 2-4 Impervious Increase by Study Area Basin**

| Study Area Basin | Existing Impervious Percentage | Future Impervious Percentage | Increase |
|---|---|---|---|
| Crooks Creek | 21% | 49% | 27% |
| Murder Creek | 18% | 67% | 49% |

## 2.6 Drainage System

The City maintains approximately 9 miles of mainline pipe, 1 mile of lateral pipe, and 10 miles of open channel including creeks, natural drainage ways, and roadside ditches.

For the purpose of the modeling effort of this plan, subcatchments were delineated to capture drainage to City-owned piping and major open channel conveyance. Catch basin, roof laterals and other minor drainage structures were not included as part of this effort.

The drainage areas for Murder Creek and Crooks Creek were also delineated to capture the extent of their respective watersheds, which extend well beyond the City's limits. The Crooks Creek watershed extends east of Interstate 5 until just west of the Santiam River. The Murder Creek watershed in its entirety extends as far as Lebanon to the southeast and comingles with the Cox Creek watershed. However, the main branch of Murder Creek, as well as its tributaries Burkhart Creek and Truax Creek, were not analyzed as part of this modeling effort as no City maintained stormwater infrastructure is present in those areas. A minor tributary to Murder Creek that drains through the City just south of Conser Road NE was analyzed, and its watershed extends east of Interstate 5 and also extends to just west of the Santiam River.

Figure 2-6 illustrates the mapped pipe system on a citywide scale. More detailed mapping associated with system modeling is presented in Section 2.7 and in Appendix A.

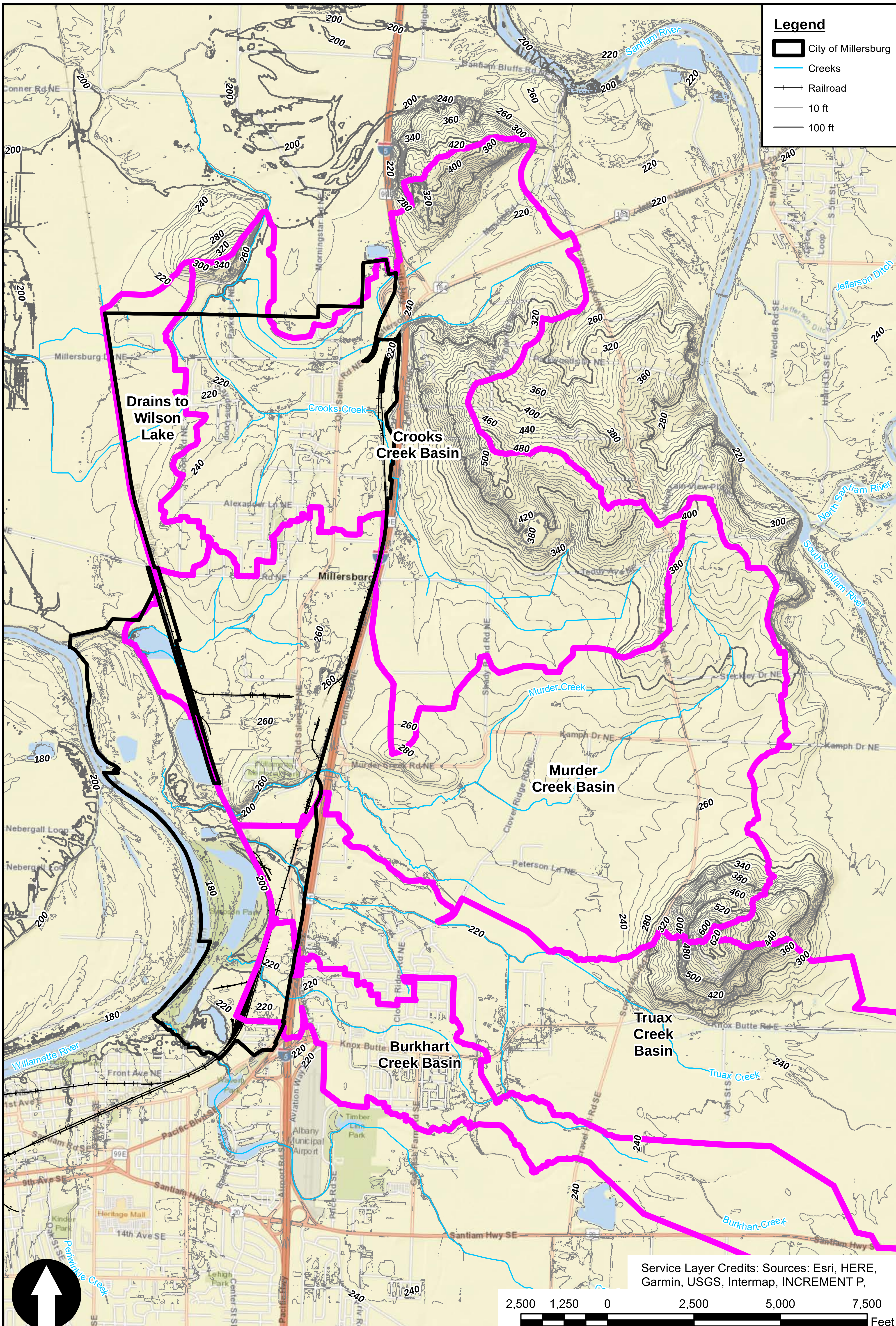
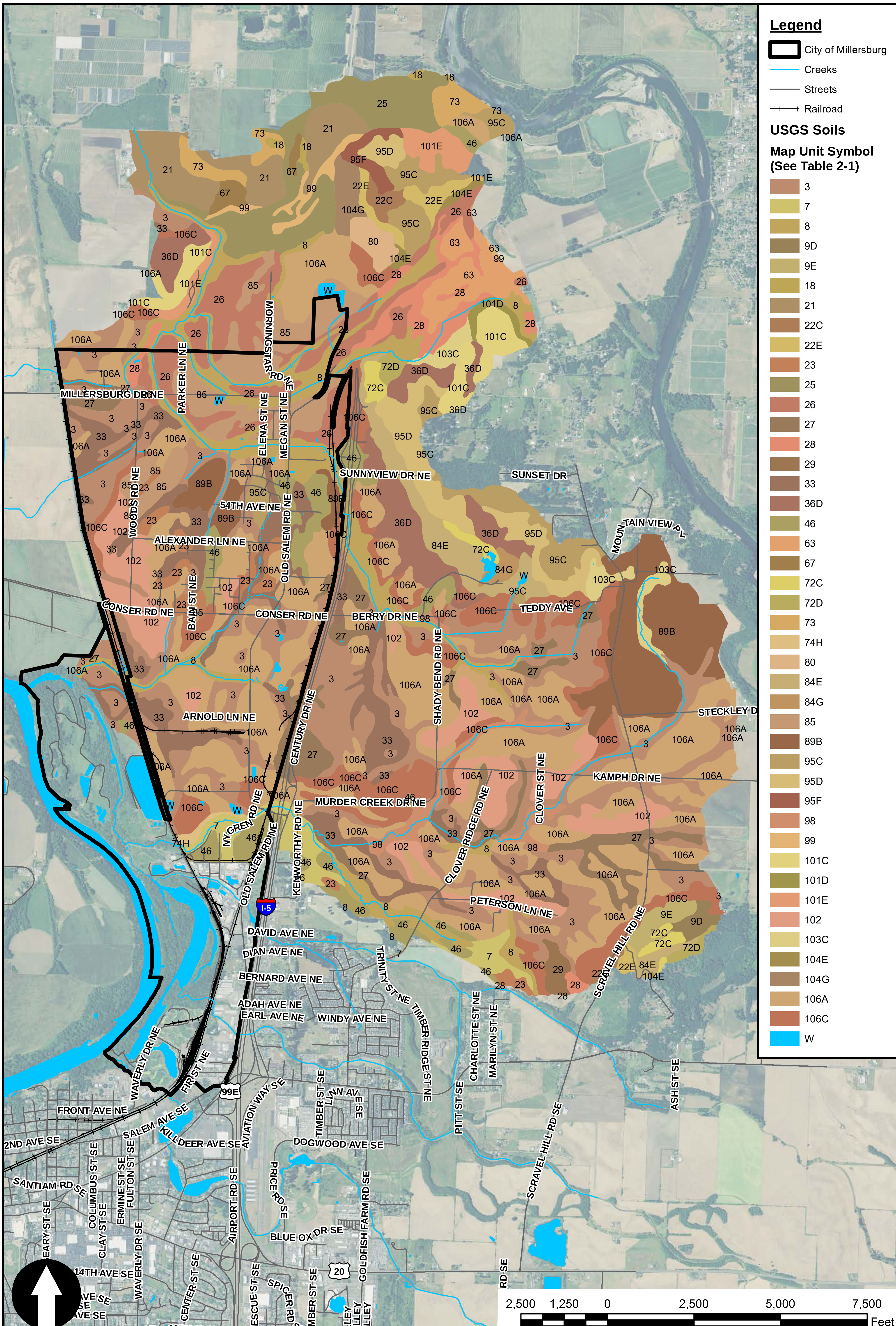



**FIGURE 2-2 TOPOGRAPHIC MAP**

CITY OF MILLERSBURG STORMWATER MASTER PLAN
MILLERSBURG, OREGON




## FIGURE 2-3 SOILS MAP

CITY OF MILLERSBURG STORMWATER MASTER PLAN
MILLERSBURG, OREGON

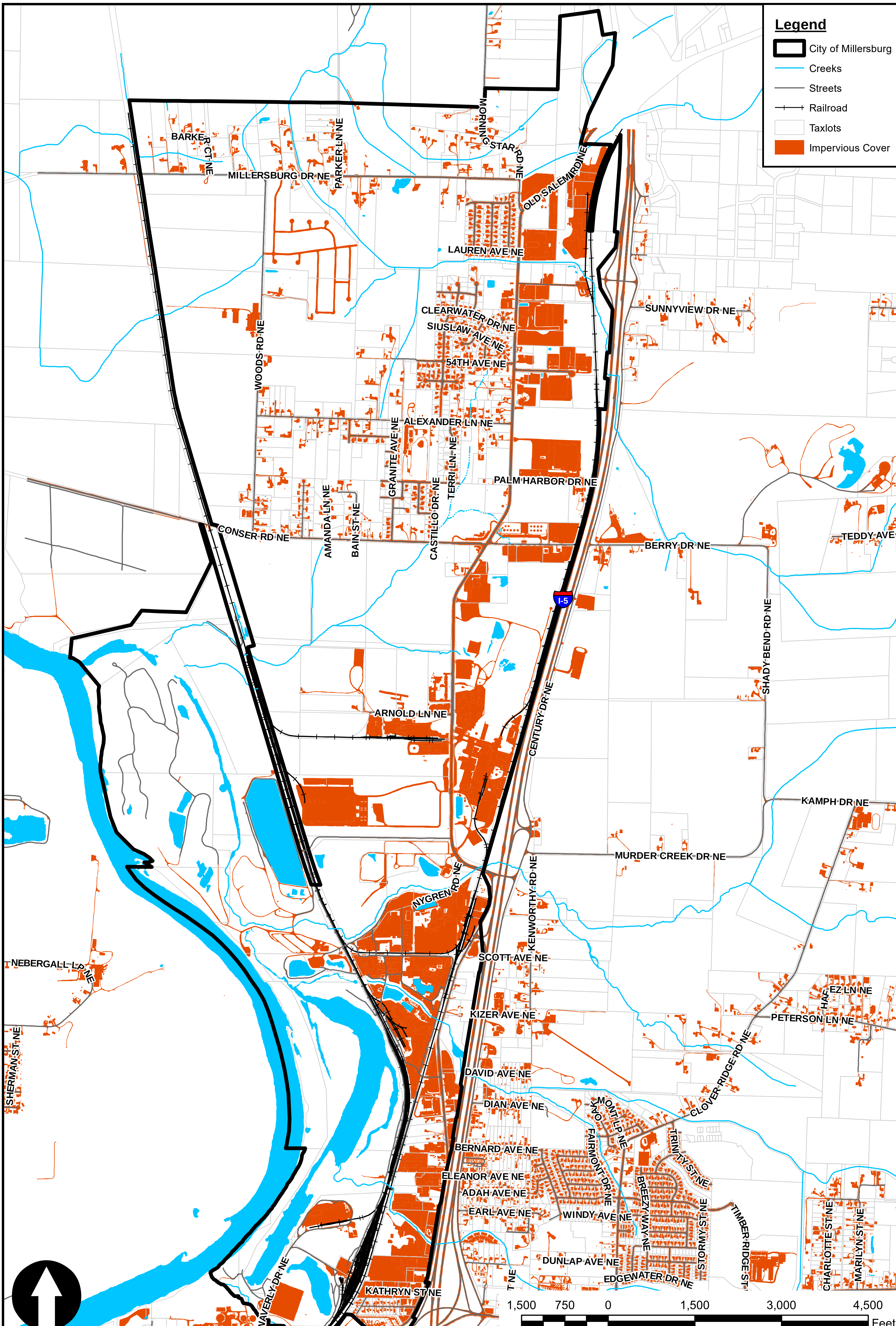



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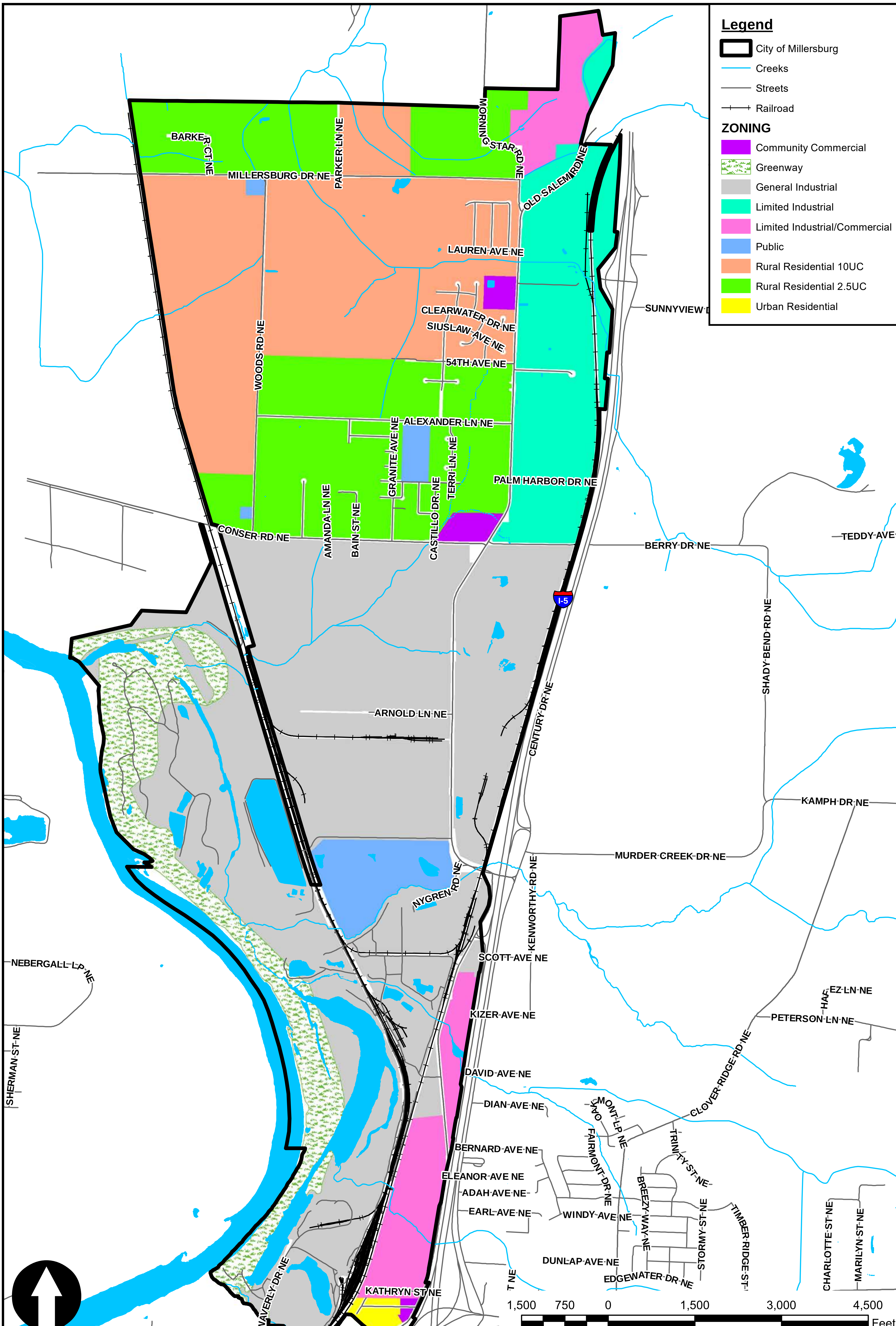
**FIGURE 2-4 2010 IMPERVIOUS AREAS**

CITY OF MILLERSBURG STORMWATER MASTER PLAN
MILLERSBURG, OREGON

City of Millersburg
A Community Linking Agriculture and Industry




## FIGURE 2-5 LAND USE

CITY OF MILLERSBURG STORMWATER MASTER PLAN
MILLERSBURG, OREGON

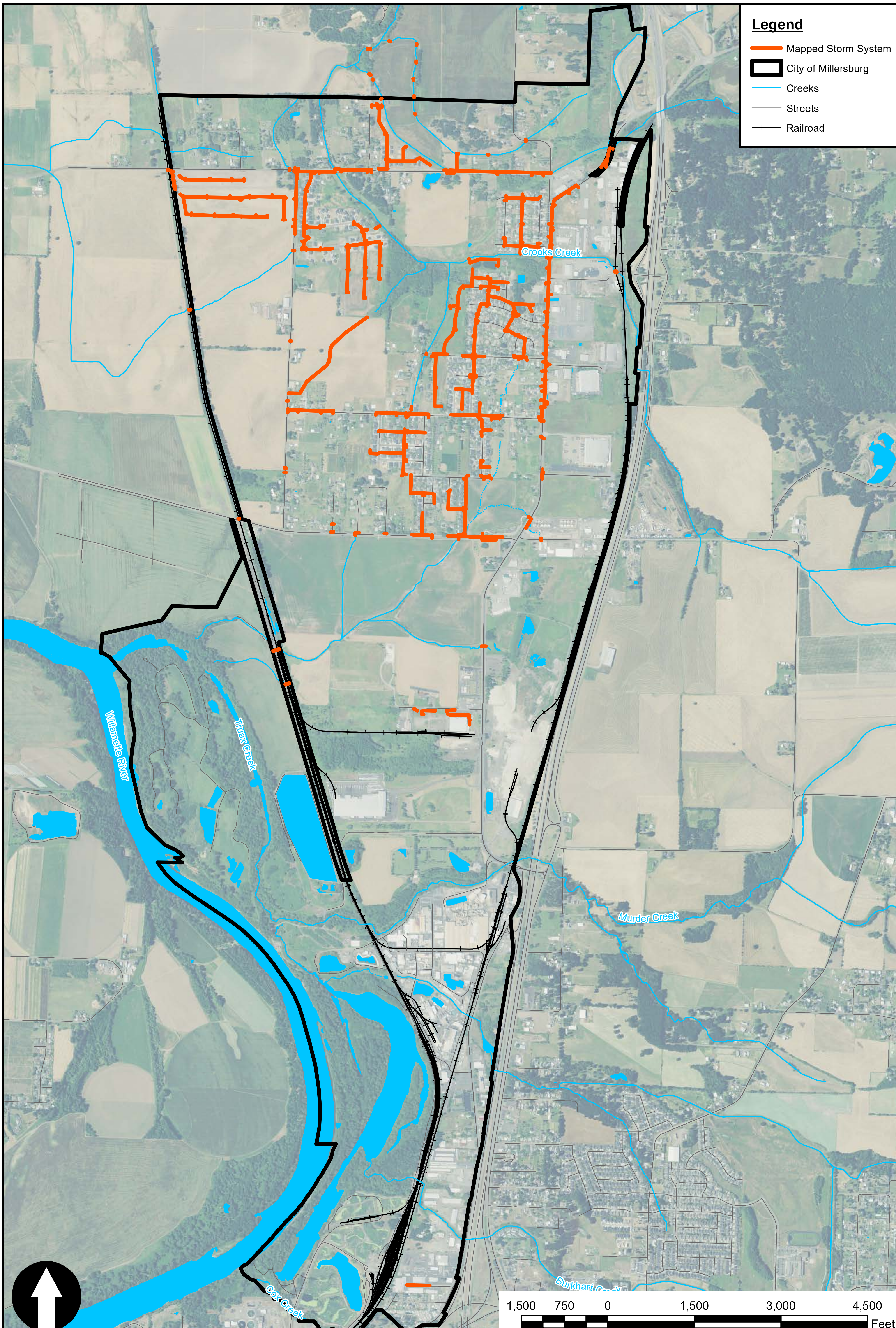



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**FIGURE 2-6 MAPPED DRAINAGE SYSTEM**

CITY OF MILLERSBURG STORMWATER MASTER PLAN
MILLERSBURG, OREGON

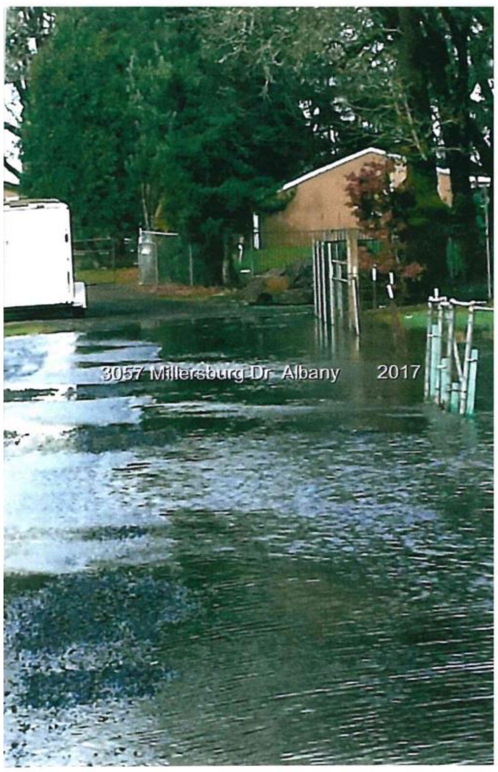
City of Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY

## 2.7 Reported Issue Areas

In addition to reviewing issue areas identified through hydrologic/hydraulic modeling, other locations of concern were identified through public comment. Reported issues were limited to a drainage way north of Millersburg Drive between Crooks Creek and Morningstar Road, and in the south end of the City along Kathryn Street and Knox Butte Avenue.

### 2.7.1 North Millersburg

Issues include flooding and ponding of storm water on private property along the drainage way. The photographs below show the flooding extent documented by landowners adjacent to this drainage way during a storm that occurred in February 2017. The storm in question approximated a 25-year intensity based on regional rain gauge data.





Landowners adjacent to this drainage way have expressed concern for the flooding that occurs in the area and the potential for exacerbated conditions as the City continues to grow and develop. This area was subject to extra detail and scrutiny in the analysis.

### 2.7.2 South Millersburg

Issues include a lack of stormwater infrastructure in Knox Butte Avenue, and stormwater infrastructure in Kathryn Street which connects to a privately owned system. There have not been many documented reports of flooding issues at those locations, and local knowledge of the underlying gravelly soils in the area may mean that stormwater is simply infiltrating rather than being discharged directly to a known waterway.

# 3 Mapping

## 3.1 Limits of Work

The GIS mapping of stormwater infrastructure was developed using as-built drawings augmented with survey data. The mapping extents were within the City right of way (ROW) with the exception of a few privately maintained culverts identified as items of interest which lie within unincorporated Linn County.

## 3.2 Approach

The mapping of the majority of the City of Millersburg's stormwater infrastructure was based on as-built information. Gaps in available data were identified and ground survey was conducted to supplement where needed.

Ground survey work was completed in March of 2018, and was limited to:

1. Culverts not identified on as-built documents.
2. Creek cross-sections at key locations for data verification.
3. Sanitary and Stormwater manhole rims at key location for as-built accuracy.

### 3.2.1 Horizontal Data

The collected data was georeferenced to the North American Datum of 1983 (NAD83) - Oregon State Plane North (ORN). As-built data was aligned and georeferenced by matching published property corners with Linn County's GIS tax lot information. When available, identified "found" property corners were used as the base points of reference for georeferenced scale, location, and rotation of the as-built data. In cases of conflict, a best fit was found and resolved between as-built property lines, GIS tax lot lines, and ortho-rectified aerial imagery.

### 3.2.2 Vertical Data

Invert, rim, and other relevant elevation data for the City of Millersburg's mapped stormwater system was based on the National Geodetic Vertical Datum of 1929 (NGVD29). This is consistent with Linn County, and City survey benchmarks available within and around the City, and all provided as-built information was based off this datum. This information was recorded in the tabular data of the ESRI shapefiles. Vertical accuracy of the as-built drawings was evaluated by comparing published rim elevations of select structures with measured, surveyed field data of the same structures. The difference between the as-built data and survey data ranged between 0 and 4 inches. As such, the provided as-built data was deemed within an acceptable range for use without correction.

### 3.2.3 Naming Convention

Mapped structures and pipes were named based on an arbitrary numbering of provided as-built drawings formatted such that the name is the as-built number hyphenated with an arbitrary unique 5-digit number (e.g. 05-02500 being the $250^{th}$ mapped structure constructed as part of as-built development 5).

# 4 Stormwater System Capacity Evaluation

To identify flooding problems, two primary methods of system evaluation were utilized. First, the City's public stormwater pipe and channel system was evaluated using a hydrologic and hydraulic model to simulate the rainfall to runoff characteristics and route estimated flows through the City's conduits and channels. The stormwater system was evaluated in both the existing land use condition and full built-out development scenarios. This section provides a description of the modeling methods used for the system capacity evaluation and provides a summary of results.

The second method of system evaluation was to identify drainage capacity and other infrastructure issues through discussions with City staff, visual inspection, and public outreach. The compilation of additional problem areas is documented in Section 2.7.

## 4.1 Model Development

XPSWMM 2018.1 was the software chosen to model the City's storm system. XPSWMM is based on the EPA SWMM model developed in the 1970's as a comprehensive urban runoff model for continuous and event based simulation. XPSWMM was selected for its user friendly model development, report generation, and data management tools. XPSWMM's ability to import and export GIS shapefiles aided significantly in the model development.

The model of the City's storm drainage system includes City-owned stormwater pipes and major open-channel conveyances. Catch basin, roof laterals and other minor drainage structures were not included as part of this effort. System mapping completed for the model development is shown in Appendix A, which contains a key map, and 10 system maps at 1" = 250' scale.

The stormwater system model also includes channel modeling for Crooks Creek and Murder Creek as shown on Figure 2-6. Current channel information was developed from aerial Light Detection and Ranging (LiDAR) topographic information and verified with ground survey at key locations. Culvert and bridge data were incorporated from as-built data and ground survey.

Model development requires input of meteorological data, subcatchment hydrology, and surface water system hydraulic input parameters. Precipitation data, as design storms, were used to evaluate system capacity. Input parameters associated with subcatchment hydrology and surface water system hydraulics were developed through available GIS data.

### 4.1.1 Horizontal and Vertical Datum

The horizontal datum and vertical datum for the project are NAD83 and NGVD29 respectively. See Section 3.2.1 and Section 3.2.2 for more information.

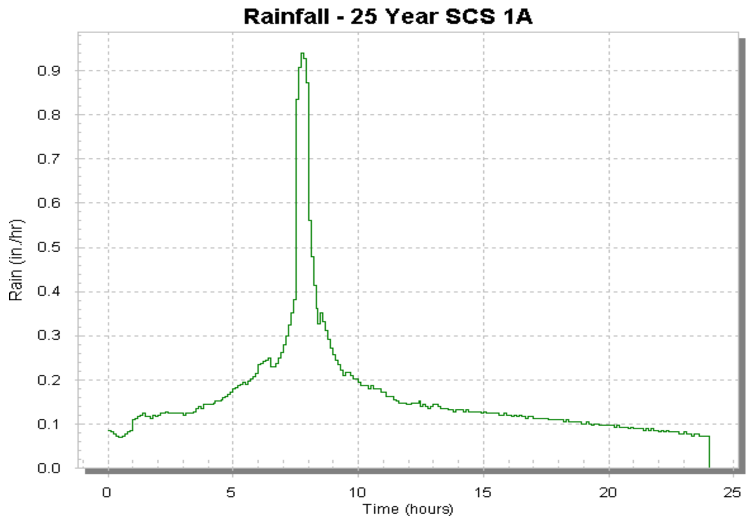
LiDAR data acquired from the State of Oregon Department of Geology and Mineral Industries (DOGAMI) was on the North American Vertical Datum of 1988 (NAVD88) and was converted to NGVD29. The conversion from NAVD88 to NGVD29 is a subtraction of 3.33 feet.

### 4.1.2 Design Storms

Traditional design storms are synthetic rainfall events used to evaluate the capacity of storm drainage systems and design capital improvement projects for the desired level of capacity and flood protection.

Design storms evaluated for this study included the 2-year, 10-year, 25-year, 50-year, and 100-year 24-hour duration design storms. A typical NRCS 24-hour rainfall distribution for a 25-year storm event is shown in Figure 4-1.

**Figure 4-1 25 Year NRCS Type 1A Rainfall Distribution**




The rainfall depths for these design storms were based on a rainfall data analysis conducted for the City of Albany's Stormwater Master Plan in November 2011. This analysis was based on GIS data compiled for the Oregon Department of Transportation and the Federal Highway Administration. Table 4-1 lists the precipitation depths for each design storm used in the model.

**Table 4-1 Design Storm Depths**

| 24-Hour Storm Return Period *years* | Rainfall Depth *inches* |
|---|---|
| 2 | 2.47 |
| 10 | 3.37 |
| 25 | 3.94 |
| 50 | 4.38 |
| 100 | 4.83 |

### 4.1.3 Hydrologic Data

This section includes a summary of subcatchment delineations and model input parameters used to define the hydrologic characteristics of the subcatchments. Table 4-2 identifies and describes model attributes associated with the subcatchments.

**Table 4-2 Subcatchment Model Attributes**

| Attribute | Description |
|---|---|
| Name | The storm drain element identified as the inlet node |
| Area | Area of the subcatchment in acres |
| Width | Characteristic width of the overland flow path for sheet flow in feet |
| Slope | Average slope of the subcatchment in feet per foot |
| % Impervious | Average percent of land area that is directly connected impervious area |
| % Grass | Average percent of land area that is open space or grass cover |
| % Trees | Average percent of land area that is tree cover |
| Grass Infil. | Infiltration reference for grass cover |
| Tree Infil. | Infiltration reference for tree cover |

Green-Ampt infiltration methodology was used to model runoff characteristics. XPSWMM uses an infiltration reference to calculate the infiltration for each subcatchment. This method is documented in the *EPA Storm Water Management Model Reference Manual Volume I – Hydrology (Revised).*

The infiltration references are based on the underlying soil type and land cover type. Table 4-3 shows the reference files used in this analysis and their associated hydrology parameters. References are named based on hydrologic soil group, relative value of saturated hydraulic conductivity, and cover type. Underlying soils for the study areas are illustrated in Figure 2-3.

**Table 4-3 Infiltration Reference Files**

| Infiltration Reference Name | Manning's 'n' | | Depression Storage, inches | | %Zero Detention | Saturated Hydraulic Conductivity (Ksat), in/hr | Initial Moisture Deficit | Average Capillary Suction, inches |
|---|---|---|---|---|---|---|---|---|
| | Impervious Area | Pervious Area | Impervious Area | Pervious Area | | | | |
| B_High_Grass | 0.014 | 0.09 | 0.03 | 0.4 | 50 | 0.55 | 0.33 | 4.27 |
| B_Low_Grass | 0.014 | 0.09 | 0.03 | 0.4 | 50 | 0.35 | 0.31 | 5.25 |
| B_Low_Trees | 0.014 | 0.12 | 0.03 | 0.4 | 50 | 0.35 | 0.31 | 5.25 |
| C_High_Grass | 0.014 | 0.09 | 0.03 | 0.4 | 50 | 0.3 | 0.31 | 5.58 |
| C_High_Trees | 0.014 | 0.12 | 0.03 | 0.4 | 50 | 0.3 | 0.31 | 5.58 |
| C_Mid_Grass | 0.014 | 0.09 | 0.03 | 0.4 | 50 | 0.25 | 0.3 | 5.98 |
| C_Mid_Trees | 0.014 | 0.12 | 0.03 | 0.4 | 50 | 0.25 | 0.3 | 5.98 |
| C_Low_Grass | 0.014 | 0.09 | 0.03 | 0.4 | 50 | 0.2 | 0.29 | 6.46 |
| C_Low_Trees | 0.014 | 0.12 | 0.03 | 0.4 | 50 | 0.2 | 0.29 | 6.46 |
| D_High_Grass | 0.014 | 0.09 | 0.03 | 0.4 | 50 | 0.15 | 0.29 | 7.08 |
| D_High_Trees | 0.014 | 0.12 | 0.03 | 0.4 | 50 | 0.15 | 0.29 | 7.08 |
| D_Mid_Grass | 0.014 | 0.09 | 0.03 | 0.4 | 50 | 0.05 | 0.25 | 9.47 |
| D_Mid_Trees | 0.014 | 0.12 | 0.03 | 0.4 | 50 | 0.05 | 0.25 | 9.47 |
| D_Low_Grass | 0.014 | 0.09 | 0.03 | 0.4 | 50 | 0.01 | 0.2 | 12.96 |
| D_Low_Trees | 0.014 | 0.12 | 0.03 | 0.4 | 50 | 0.01 | 0.2 | 12.96 |

For the existing conditions model, the percentage of impervious surface was estimated using the City of Millersburg's 2010 impervious surface shapefiles from City of Albany's GIS system and Millersburg's tax lot shapefiles from Linn County's GIS system. Tax lots that had been developed since 2010 were given an impervious percentage based on the average impervious percentage for similar development types. For the future conditions model, the percent impervious was assigned based on the assumed impervious percentages for each land use type from the City's zoning map (See Table 2-3).

Appendix B, Table B-1, provides model parameters and peak flows for each subcatchment and modeled design storm. Table B-2 provides model parameters and runoff volumes for each subcatchment and modeled design storm.

### 4.1.4 <u>Hydraulic Data</u>

This section describes the model input parameters used to characterize the hydraulic characteristics of the system.

System hydraulics were based on as-built data provided by the survey, LiDAR data from DOGAMI, and ground survey conducted as part of this project. Part of the ground survey effort went to validating invert and rim elevations and system geometry. Hydraulic components developed from this data included conduits and junctions. A description of the hydraulic components is provided in the following sections.

#### *4.1.4.1 Model Nodes*

Model nodes include stormwater manholes, catch basins, ditch inlets, and other relevant connection points or locations where a conduit change occurs. Model nodes have the attributes as listed in Table 4-4.

**Table 4-4 Model Node Attributes**

| Attribute | Description |
|---|---|
| ID | Unique identifier |
| Invert Elevation | Invert elevation of the node in feet |
| Rim Elevation | Rim elevation of the node in feet |

Appendix B, Table B-1, provides model parameters and peak flows for each modeled node.

#### *4.1.4.2 Model Conduits*

Model conduits include pipes, culverts, bridges, and open channels. Model conduits have the model attributes as shown in Table 4-5.

**Table 4-5 Model Conduit Attributes**

| Attribute | Description |
|---|---|
| ID | GIS Unique ID (when applicable) |
| Length | Length between upstream and downtream nodes in feet |
| Roughness | Manning's Roughness Coefficient dependant on conduit material |
| Cross-Section | Circular, trapezoidal, rectangular, or natural |
| Upstream IE | Upstream invert elevation in feet |
| Downstream IE | Downstream invert elevation in feet |
| Diameter/Height | Diameter (if circular) or height of conduit section in feet |
| Width | Width (if rectangular) or bottom width (if rectangular) of conduit section in feet |

Modeled hydraulic results for each conduit are outlined in Table B-2 in Appendix B.

#### *4.1.4.3 Model Storage*

Several in-line detention facilities were modeled as part of the Master Plan effort. These facilities were modeled based on as-built information and include a storage volume and control structure. Three types of detention facilities were modeled:

1. Detention Ponds
2. Detention Swales
3. Detention Pipes

Detention ponds are above-ground structures with flat (zero slope) bottoms. These facilities were modeled using stage-storage curves at nodes. Detention swales are above-ground structures like ponds, but have a sloped profile. These facilities were modeled using trapezoidal conduits. Detention pipes are underground facilities which include a large pipe or other structure. These facilities were modeled using a conduit of equivalent dimensions. Table 4-6 lists the modeled detention facilities and their modeled storage volume. This volume was determined for stages below the facility's overflow.

**Table 4-6 Model Storage Summary**

| ID | Facility Type | Storage Volume, cubic feet |
|---|---|---|
| 22-00010 | Pipe | 1,237 |
| 22-00050 | Pipe | 1,262 |
| 22-00070 | Pipe | 2,300 |
| 02-00070 | Pipe | 2,356 |
| 05-00380 | Pond | 38,059 |
| 03-00070 | Pond | 22,311 |
| 03-00200 | Pond | 52,171 |
| 03-00490 | Pond | 31,471 |
| 07-00170 | Pond | 34,510 |
| 10-01260 | Pond | 674,975 |
| 13-00180 | Pond | 89,769 |
| 12-00080 | Pond | 7,802 |
| 15-00080 | Pond | 54,784 |
| Swale 1-B | Swale | 436 |
| Swale 1-A-2 | Swale | 37 |
| Swale 1-A-1 | Swale | 340 |

#### *4.1.4.4 Model Outfalls*

The study area includes 3 channel model outfalls and 1 pipe model outfall. Model outfalls represent the ends of the model network and act as downstream boundary conditions. Model outfalls have the same attributes as model nodes but stage is calculated by the normal depth of flow in the upstream conduit.

## 4.2 Model Results

XPSWMM 2018.1 (version 19.1.57.12673) was used to simulate the 2-year, 10-year, 25-year, 50-year, and 100-year design storms for the current and future conditions.

Results of the hydrologic/hydraulic (H/H) model simulations are tabulated in Appendix B (Table B-1 for hydrologic peak flow results and Table B-2 for hydraulic results). For reporting purposes, the hydrologic results reflect all simulated design storms, and the hydraulic results tables reflect the 10-year flows, which were used to identify capacity deficiencies in most areas of the City. Hydraulic results for other storm events are available in the electronic project files.

The hydrologic results table (Table B-1) is sorted by basin and subcatchment, and includes the subcatchments name, subcatchment area, average slope, width, infiltration reference name, impervious area, and associated design flow. The hydraulics results table (Table B-2) is sorted by system basin and conduit, and includes the conduit name, upstream and downstream node ID, length, size, invert and rim elevations, capacity, and existing and future 10-year peak flows and water surface elevations.

### 4.2.1 Evaluation Criteria

The future and existing storm drainage network was evaluated for capacity based on flood risk. Flooding was defined as any surcharge over the rim elevation of a manhole or above the bank elevation of open channels. Areas with modeled flooding for 10-year and 25-year events were identified for CIP evaluation.

### 4.2.2 Model Validation

Preliminary modeling results were reviewed with City staff during a project meeting and compared to known flooding problems reported by the City's maintenance crews. Anecdotal accounts of flooding were generally consistent with the locations where flooding occurs in the modeled system. In some cases, flooding was reported due to sediment/debris build-up or other field conditions (e.g. a grading problem that prevents adequate collection of site runoff into the stormwater system) that are not reflected in the hydraulic model.

These problems were documented for CIP development, but did not require a change in the hydraulic model.

Discussions with City staff led to several minor adjustments to the modeled drainage system. Most notably, flooding issues reported north of Millersburg Drive between Morningstar Road and Crooks Creek resulted in additional ground survey being conducted. This additional data was used to better model that area.

Due to the size of the upstream hydrology, modeled flows were compared to USGS regression equations for equivalent storm events. These equations were developed by the USGS in cooperation with the Oregon Water Resources Department to estimate peak flows for rural, unregulated streams in western Oregon. The study details for these equations can be found in the USGS *Scientific Investigations Report 2005-5116* by Richard M. Cooper. Table 4-7 outlines the modeled peak flow rates of the two largest upstream basins for the design storm events and compares them to the USGS regression equations.

**Table 4-7 USGS Regression Flow Comparison**

| Design Storm | Modeled Peak Flow, cfs | Estimated Peak Flow, cfs | Delta |
|---|---|---|---|
| **Basin CC-N-00-035** | | | |
| 10-Year | 33.30 | 33.11 | 0.6% |
| 25-Year | 40.02 | 42.18 | -5.1% |
| 50-Year | 45.28 | 49.23 | -8.0% |
| 100-Year | 51.05 | 56.46 | -9.6% |
| **Basin CC-N-02-009** | | | |
| 10-Year | 14.64 | 13.90 | 5.3% |
| 25-Year | 17.63 | 17.81 | -1.0% |
| 50-Year | 20.45 | 20.88 | -2.1% |
| 100-Year | 23.99 | 24.06 | -0.3% |

Peak flows remain within 10 percent of the regression flows with a minimum of 0.3 percent difference depending on design storm. According to USGS Scientific Investigations Report 2005-5116 *Estimation of Peak Discharges for Rural, Unregulated Streams in Western Oregon*, this places the modeled hydrology within a reasonable range for the purposes of this analysis.

### 4.2.3 Flooding Issues Identified in Modeling

Based on the hydraulic model results summarized in Table B-2, conduits experiencing backwater conditions that resulted in flooding of the upstream structure were identified. Figure 4-2 and Figure 4-3 illustrate predicted flooding for existing and future land use conditions.

## 4.3 Identified Capacity Issues

The model results were reviewed with City staff and presented at a public open house on June 23, 2018. City staff provided comment and discussion about each identified modeled flooding area. Comment and discussion was also provided by residents during the open house. Table 4-8 summarizes the identified existing and future deficiencies, including reported issues identified in Section 2.7 and flooding issues identified as part of the modeling effort.

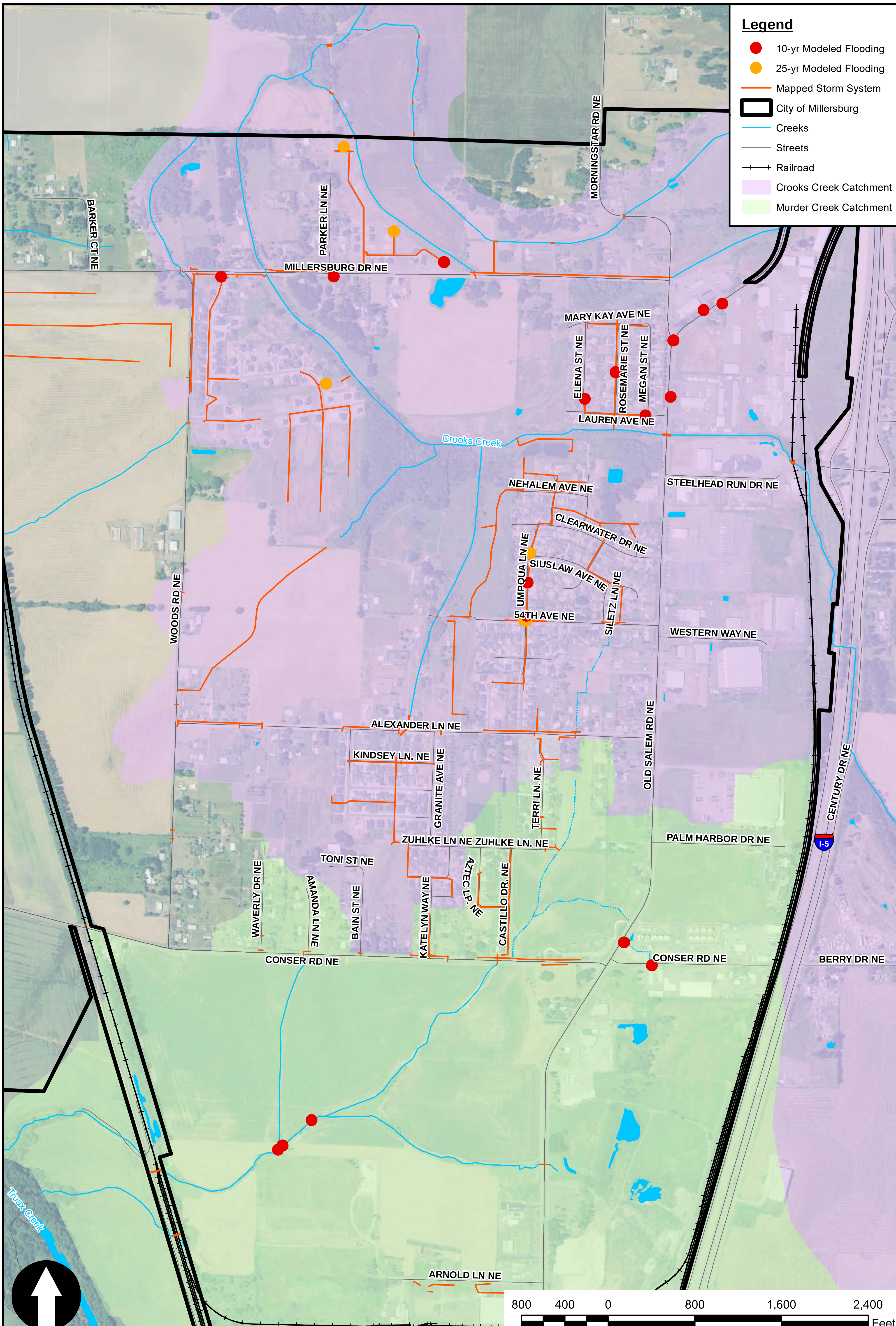



**FIGURE 4-2 PREDICTED FLOODING: EXISTING LAND USE**
**10-YR & 25-YR DESIGN STORMS**

CITY OF MILLERSBURG STORMWATER MASTER PLAN
MILLERSBURG, OREGON

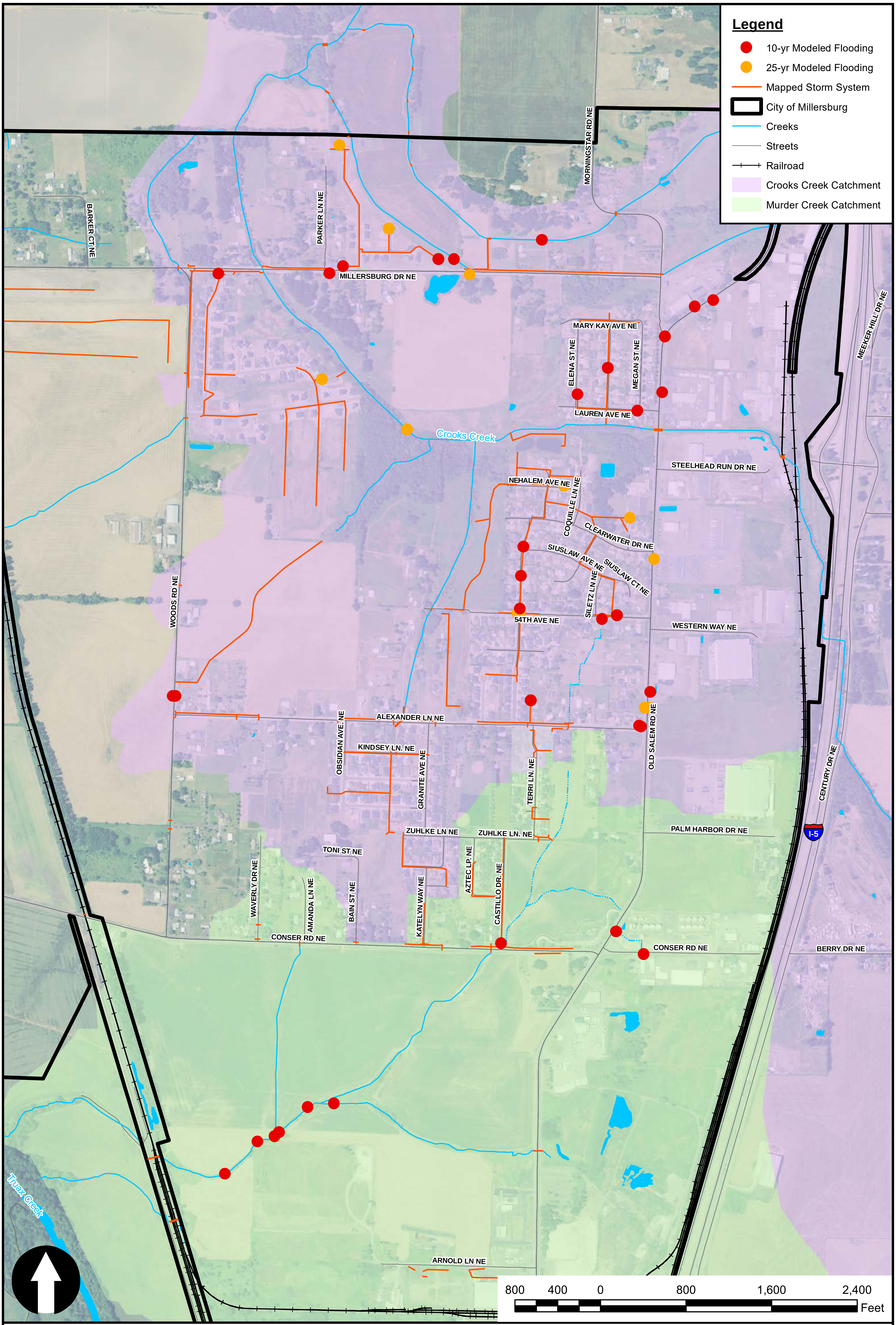



**FIGURE 4-3 PREDICTED FLOODING: FUTURE LAND USE**
**10-YR & 25-YR DESIGN STORMS**

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

| Table 4-8 - Existing and Future Deficiencies<br>MODELED DEFICIENCIES | | |
|---|---|---|
| **Location** | **Problem Description** | **Contributing Drainage Area, acres** |
| **Crooks Creek** | | |
| Hoffman Estates Development | Currently a reach of 12" stormwater pipe that runs through Noel Lane. Modeled flooding occurs during the existing and future 10-year events due to undersized pipes and backwater from the downstream detention facility. | 10.8 |
| Becker Ridge Development | Pond overflow structures are either lower than upstream manhole rim elevations or inadequately sized for peak flow, causing flooding during the existing and future 10-year events. | 54.8 |
| Millersburg Drive between Crooks Creek and Parker Lane | Currently a reach of 12" stormwater pipe that runs through Millersburg Drive. Modeled flooding occurs during the existing and future 10-year events due to the pipe being undersized. | 14.2 |
| Morningstar Estates Development | Currently an 8" pipe acts as a control for stormwater discharge. Modeled flooding occurs during the existing and future 10-year events in the streets as there is no emergency overflow for the system. | 22.6 |
| Umpqua Lane between Clearwater Drive and 54th Avenue | Currently an underground pipe detention system controls flows discharging to the downstream storm system with an overflow discharging to the same system. The downstream system has insufficient capacity to convey the detained flows and flooding occurs in the street during the exisitng and future 10-year events. | 17.9 |
| Old Salem Road North of Lauren Avenue | Currently a 15" stormwater pipe that runs through Old Salem Road. Modeled flooding occurs during the existing and future 10-year events due to undersized pipes. | 32.5 |
| Woods Road north of Alexander Lane | Currently a 12" stormwater pipe that runs from Woods Road to a drainageway to Crooks Creek. The existing pipe is not sufficient to convey future flows and causes flooding along Woods Road during the future 10-year event. | 25.3 |
| Old Salem Road at Alexander Lane and Clearwater Drive | Currently, 1,560 linear feet of pipe in Old Salem Road is not adequately sized to convey future flows and causes flooding at these locations during the future 10-year event. | 108.2 |
| **Murder Creek** | | |
| Conser Road east of Old Salem Road | Currently a 12" stormwater pipe that runs through Old Salem Road. Modeled flooding occurs during the existing and future 10-year events due to an undersized pipe. | 27.3 |
| **REPORTED DEFICIENCIES** | | |
| **Location** | **Problem Description** | **Contributing Drainage Area, acres** |
| Knox Butte Avenue | Lack of public stormwater infrastructure. | 7 |
| Kathryn Street | Public stormwater infrastructure discharges to a private storm sewer. | 5 |

# 5 Programmatic Recommendations

This section provides a summary of recommendations to address existing storm system capacity deficiencies, future storm system needs, future regulatory objectives and water quality objectives.

This section includes programmatic recommendations for maintenance activities, as well as revisions to stormwater management standards and city code to protect natural conveyance system. The programmatic recommendations also include one-time projects that are needed to implement the stormwater management program.

Section 5.1 evaluates the City current maintenance program and system condition, and provides a recommended maintenance schedule to meet the City's goals. Section 5.2 evaluated the City's current stormwater related requirements and provides a list of programmatic recommendations. Section 5.3 provides a summary of the programmatic recommendations made in Sections 5.1 and 5.2.

Most of the City's storm system is relatively new, therefore this report did not investigate the age of the system or the systematic process of replacing old infrastructure.

## 5.1 Maintenance Recommendations

The City of Millersburg has never implemented a proactive, regular maintenance program for its stormwater system. The current program is reactionary; maintenance issues are addressed when they become known. The following covers maintenance recommendations for stormwater infrastructure, creeks, and drainage ways. Recommended inspection and maintenance frequencies are summarized in Table 5-1.

### 5.1.1 Stormwater Infrastructure

During this project, a sampling of locations was visually inspected and assessed for sediment build up and potential damage. Roughly 10% of the City's infrastructure was visually inspected at random. The City of Millersburg's stormwater infrastructure was generally observed to be in good condition, structurally sound, and with little evidence of sediment deposit in the built-out and established areas. The City is encouraged to move toward a proactive, preventative maintenance approach to protect the existing system and minimize long-term costs. Over time, as repairs and maintenance occur as needed when identified through routine inspections, the potential for emergency maintenance responses will be reduced. With a fully functional preventative maintenance program, the long-term costs associated with future repairs, rehabilitation, and replacement will be minimized.

In addition to identifying maintenance needs, routine inspections can be used to meet illicit discharge screening requirements of the City's TMDL Implementation Plan. The recommended inspection plan is shown in Table 5-1.

### 5.1.2 Creeks and Drainage Ways

The creeks and drainage ways in the City of Millersburg are largely natural with dense riparian vegetation that are prone to collecting sediment, debris, and other blockages that restrict channel flow. Additionally, there are no active controls for invasive species or habitat management. A programmatic agreement with the Oregon Department of State Lands (DSL) for riparian vegetation and sediment management would allow the City to provide the maintenance needed to reduce flood risk due to creek blockages and manage the health of the riparian habitat. It's recommended that visual inspection be conducted annually, with debris, sediment, and vegetation clearing as needed.

**Table 5-1 Inspection and Maintenance Frequencies**

| Structure | Quantity | | Percent Inspected (per year) | Inspection Type | Inspection Frequency (per year) | Percent Requiring Maintenance (per year) |
|---|---|---|---|---|---|---|
| Catch Basins | 330 | | 20% | Visual | 1 | 5% |
| Manholes | 169 | | 20% | Visual | 1 | 20% |
| Pipe | 8.9 | miles | 20% | Video | 1 | 20% |
| Surface Detention | 11 | | 100% | Visual | 2 | 100% |
| Underground Detention | 4 | | 100% | Visual | 2 | As Required |
| Water Quality Facilities | 2 | | 100% | Visual | 2 | 100% |
| Creek | 7.7 | miles | 100% | Visual | 1 | As Required |
| Drainage Ways | 2.6 | miles | 100% | Visual | 1 | As Required |

## 5.2 Program Recommendations

### 5.2.1 Stormwater Design Manual

Current City Land Use Development Code allows the City to review, approve and inspect proposed drainage systems for new development at its discretion. Although the City code allows this, the code itself is not comprehensive and it is recommended that a stormwater design manual be developed to help guide future development design to accomplish the City's goals.

Issues to include in the stormwater design manual:

- Emergency overflows need to be identified and adequately designed for all new development. We recommend that these overflows be designed for the 100-year flows discharge to a location downstream that could accommodate the overflow.
- Sufficient freeboard in detention ponds to pass larger storms without causing flooding upstream of the structure or overtopping the detention/retention facility
- Conveyance analysis must take into account backwater effects from downstream facilities/channels/infrastructure.
- Require new development to mitigate increased runoff. Jurisdictions have different approaches to addressing this issue and a further discussion is included under section 5.1.2.2 below. In order to be consistent with local practices and adopted construction standards it is recommended that Millersburg adopt requirements similar to the City of Albany's requirements:
  - City of Albany: detain post-developed runoff from the 2-year, 5-year, 10-year, and 25-year, 24-your storm to pre-developed quantities. For project areas greater than 100 acres or covers multiple drainage sub-basins then the 50-year, 24-hour storm is also to be detained to pre-developed peak volumes.
- Require water quality treatment for the first 1-inch of rainfall. This volume is required by many communities in Oregon and corresponds to capturing and treating 80% of annual runoff.
- Erosion control permitting and inspection for Single Family Residential Projects.

- The size of buffers around creeks and wetlands is usually covered under the City Code, however this should be addressed as part of changes to the stormwater standards. Buffers along with examples are discussed below under Section 5.1.2.3.

The City currently requires new development to accommodate potential run-off upstream of the site. This design must accommodate run-off assuming conditions of maximum potential watershed development permitted by the Comprehensive Plan. It also must consider run-off from areas outside the UGB. This, in combination with flow mitigation requirements, will ensure existing infrastructure will remain adequate to accommodate stormwater flows as the City continues to grow. Modeled flow rates entering the City have been included in Table 5-2.

**Table 5-2 Upstream Boundary Flows**

| Location | Model Node | Modeled Flows (cfs) | | | |
|---|---|---|---|---|---|
| | | 10-year | 25-year | 50-year | 100-year |
| Drainage north of Morningstar Rd | CC-N-01-023 | 16.54 | 20.21 | 23.76 | 27.87 |
| Crooks Creek tributary at Morningstar Rd and Millersburg Dr | CC-N-02-017 | 31.18 | 37.57 | 43.55 | 51.02 |
| Crooks Creek main channel at I-5 | CC-N-00-035 | 36.17 | 43.53 | 49.3 | 55.59 |

### 5.2.2 Water Quality

The City currently does not have a stormwater quality requirement for new development. Stormwater quality projects were not identified as part of this Master Plan, however stormwater treatment requirements for new development are recommended and will improve water quality and help the City meet its TMDL requirements. This master plan recommends implementing requirements for new development and redevelopment but has not recommended a retrofit program of existing conditions.

Low Impact Design (LID) approaches have been shown to meet many of these requirements for heavy metals, bacteria, phosphorous, nitrates, and other pollutants. Additionally, LID facilities are often publicly visible and help with public outreach and education about water quality. LID approaches include stormwater planters, bio-swales, and rain gardens which treat collected stormwater through media filtration and biological uptake from planted vegetation. LID approaches should be encouraged for private development and some public facilities.

Because of the limited maintenance staff at the City we encourage stormwater facilities for all non-residential developments be kept in private ownership and maintained by the property owners. For residential development we recommend regional facilities that fall under the maintenance of a home owners association (HOA). A development condition should include the ability of the City to inspect the facilities and hire a private firm to provide maintenance and charge the HOA if required. It is recommended that the City of Millersburg take a similar approach to that of the City of Albany which is outlined below.

**City of Albany -** The City of Albany requires that a post-construction water quality permit be obtained for all new development and/or redevelopment on parcels equal to or greater than one acre, including all phases of development. Albany exempts some development from this requirement including: development constructing less than 3 single-family or duplex dwelling on an existing lot or lots of record, development that creates and/or replaces less than 8,100 sq-ft of impervious surface, the development is being constructed under a valid land use approval submitted prior to January 1, 2015, and at the discretion of the Director due to impracticality of construction in which case a fee-in-lieu is paid by the developer. Construction and design requirements for the permit are outlined in the City of Albany's engineering standards. Albany's engineering standards require vegetated stormwater quality facilities that provide filtration of stormwater through soil and plant material, with manufactured options approved on a case-by-case basis when vegetated facilities are not feasible. These vegetated facilities are sized based on the amount of impervious surface in the contributed drainage area using sizing factors based on facility type.

These factors were developed by the City of Albany using the 1-inch 24-hour rain event which corresponds to 80% of the average annual runoff volume. Albany also allows for impervious area reduction credits for pervious pavements, green roofs, and tree protection.

### 5.2.3 Riparian Buffers

The City currently requires a minimum setback of 50 feet from the top of bank for all fish-bearing streams and year-round flowing streams. All other intermittent drainage ways and watercourses have a required minimum setback that includes the vegetative fringe, top of bank, or a minimum of 15 feet from the centerline of the drainage way whichever is greater. Additional setbacks are required per floodplain requirements and significant wetland/riparian area requirements.

Riparian buffers serve to protect channels and waterways from encroaching development, and also give space for tree canopy cover to develop. Riparian tree canopies act in shading waterways which reduces ambient stream heating and contributes to meeting the temperature TMDL for the Upper Willamette sub-basin. Additionally, buffers allow for city access to maintain drainage ways to ensure adequate function and health.

The following is a summary of riparian buffer requirements for the cities of Albany, Corvallis, Eugene, and Salem:

**City of Albany -** No relevant code was found upon initial research. Albany's planning commission has designated areas around their major channels as zone OS – Open Space and have set restrictions in that capacity.

**City of Corvallis -** The City of Corvallis requires riparian areas to be protected with a buffer measured from the top of bank that restricts development. These buffers are determined based on the drainage basin of each stream and range in width from 50 feet for basins draining less than 20 acres to 120 feet for the Willamette River, Mary's River, and their channels. In addition to these buffers, Corvallis requires that an easement be placed offset from the channel in a width depending on the buffer protection level. These easement offsets range from the drainage channel width plus 25 feet to the drainage channel width plus 75 feet. In cases where the 0.2 foot Floodway is larger than the measured requirements, the Floodway is used instead.

**City of Eugene** - The City of Eugene requires a conservation setback measured from the top of bank based on given category outlined in their Goal 5 Water Resources Conservation Plan. These categories are labeled A through E and have setback widths ranging from 100 feet to 20 feet with Category E streams having no setback requirement. Eugene also requires setbacks for wetlands in categorized at A, B, or C with A needing 50 feet, B needing 25 feet, and C not requiring a setback.

**City of Salem -** No relevant code was found upon initial research. Salem's city code requires the identification of significant wetlands but defers to Oregon Division of State Lands for direction on what is allowable.

It's recommended that the City of Millersburg adopt a 50-foot buffer measured from the top of bank for all fish-bearing streams, and a 20-foot buffer from top of bank for all other streams and drainage ways.

### 5.2.4 Erosion Control

The City of Millersburg currently requires erosion control measures to be in place as part of the City's grading permit, and through Oregon DEQ's 1200-C permits. Although there are few issues with sediment in the stormwater system in established parts of the City, the City has experienced issues with sediment and debris build-up during and following single-family residential construction. Existing mechanisms for erosion control requirements currently do not cover this type of construction.

**City of Portland -** The City of Portland's Bureau of Development Services handles single-family residential erosion control requirements within the building permit review. Developers who are applying for a Single

Family Residential (SFR) building permit and meet the following conditions may fill out the Simple Site Erosion Control Requirements Form in lieu of a full erosion control plan. This requires basic erosion control measures and allows the City to enforce erosion control with a rigid permit process.

It is recommended that the City of Millersburg adopt a similar approach to Single Family Residential erosion control plans as the City of Portland by including erosion control requirements as part of a building permit for these projects, but allow developers applying for the permit to sign an understanding acknowledging that they will be required to implement erosion control BMPs as part of the permit approval.

#### 5.2.5 Stormwater System Inspections

The City of Millersburg currently requires developers to TV newly constructed storm lines prior to paving. Routine inspection of the stormwater system helps to detect any issues that may occur including infrastructure failure or illicit discharge. Inspection also helps inform maintenance decisions and development of a cost-effective maintenance plan.

It's recommended that the City conduct TV investigations of all stormwater pipes at the end of a developer's 1-year maintenance period, requiring a bond from the developer for any cleaning required of the infrastructure including pipes and detention structures.

## 5.3 Recommended Program Change Summary

**Maintenance and Inspection**

We recommend that the City develop proactive and preventative inspection to ensure continued function of the City's existing stormwater infrastructure.

Inspection Schedule is per Table 5-1 of this report.

We recommend that the City develop a programmatic agreement with DSL for riparian vegetation and sediment maintenance for all streams and drainage ways within the City.

We recommend starting an inspection program and tracking the inspection to meet NPDES program requirements.

As part of the Erosion Control Program increased inspection will be required on projects under construction.

**Update Stormwater Design Standards**

It's recommended that the City update the current stormwater design standards to guide future development. The updated standards should address the following items which were discuss in Section 5 of this report:

- Emergency overflow design.
- Design for backwater effects.
- Mitigation of increased runoff so that new development and redevelopment detain post-development flow to keep a natural flow condition.
- Stream buffers
  - We recommend retaining the 50 foot buffer measured from the top of bank for all fish-bearing streams as well as requiring a 20 foot buffer measured from the top of bank for all other streams and drainage ways.
- Easements
  - We recommend requiring a minimum of the channel width plus 12 feet for maintenance and access easements along streams and other drainage ways.

- Water quality requirements.
    - We recommend requiring the treatment of the 1-inch which corresponds to 80% of the annual rainfall volume.
    - We recommend dictating design by engineering standards that give preference for LID approaches with mechanical options approved at the City's discretion.

# 6 Capital Improvement Projects

This section identifies the projects designed to address the drainage issue areas identified in Table 4-8 and Section 2.7. Issue areas include flooding issues identified through the XPSWMM modeling effort (See Section 4), as well as the reported issues discussed in Section 2.7. To the maximum extent feasible, CIPs were developed as integrated solutions to address multiple objectives, or to address multiple flooding issues with a single, comprehensive project.

## 6.1 Project Identification

CIP locations were identified by reviewing the model results presented in Table 4-8 and the reported problem areas discussed in Section 2.7. Field visits to reported and modeled issue areas were also used to evaluate surrounding conditions, potential solutions, and to identify issue areas that could be consolidated into a single project approach.

The XPSWMM model was utilized to evaluate potential solutions for identified flooding issues. Potential solutions included upsizing of existing pipes, expansion of stormwater infrastructure, and/or re-evaluation of existing detention systems. In some cases, flooding issues are related to insufficient overflow mechanisms in existing detention systems. The construction of additional overflow structures is a cost-effective means of addressing these issues in cases where downstream flow constrictions are not present. In cases where the downstream system is not sufficient to convey the overflow, an upsizing of the downstream system or re-routing the overflow is required.

## 6.2 Unit Cost Estimates

Unit cost information for construction elements of the CIPs were compiled using bid tabulations from recent local construction projects. Preliminary CIP cost estimate are based on the unit cost information for construction elements plus 25 percent contingency, and 25 percent engineering and administration. Land acquisition costs are not included in the estimates.

Project unit costs and detailed cost estimates for each CIP are located in Appendix C. CIPs with multiple components contain a detailed cost estimate for each project component.

## 6.3 CIP Sizing and Conceptual Design

This section includes a summary of the CIP sizing and conceptual design criteria based on the type of system improvement proposed. System improvements include piping improvements and channel improvements.

**Pipe Conveyance -** New conveyance pipes were sized to convey the 25-year future conditions flow rate.

**Channel Conveyance -** New open channel improvements were designed to maintain a minimum of 1 foot of freeboard for the 25-year future conditions flow rate. The flooding impacts were evaluated for the 100-year future conditions flow rate to determine if out-of-channel ponding presented a risk to structures or travel lanes. If no risk was found the ponding was considered acceptable.

## 6.4 CIP Project Summary

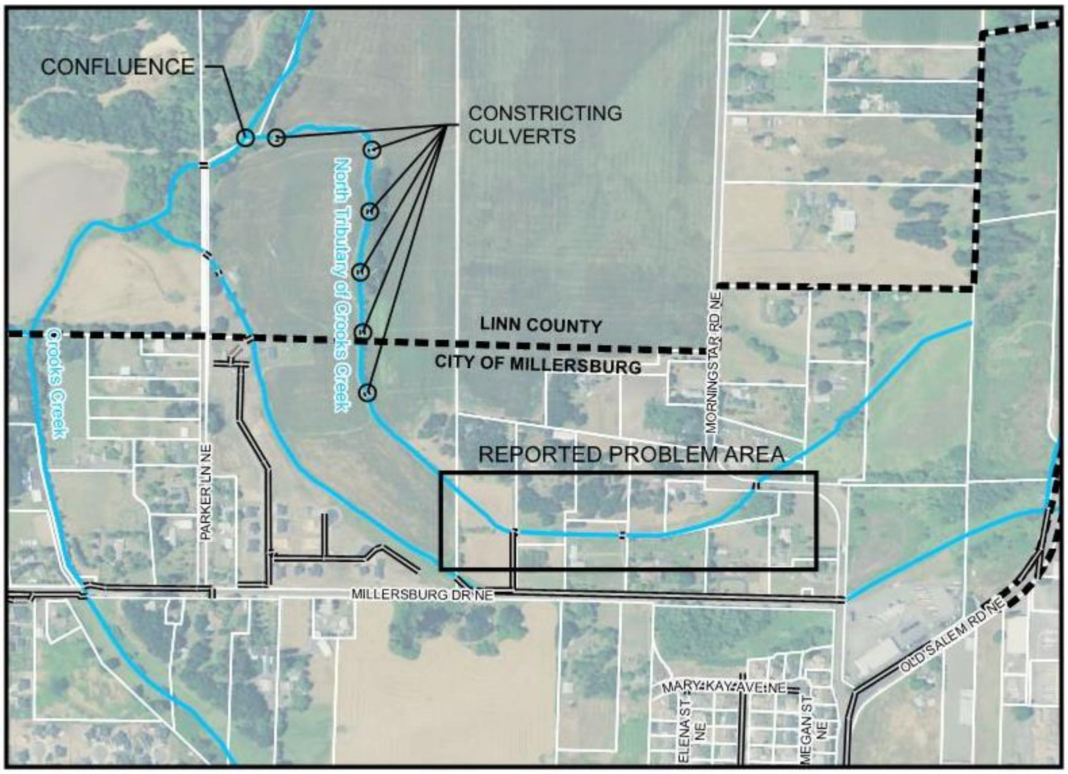
This section describes each recommended CIP and includes a problem description, cost summary, and project description for each CIP. The CIPs are presented by location. The key map provided in Appendix C shows the location of each of the proposed CIPs. Detailed CIP cost sheets are also provided in Appendix C and include an additional conceptual design map detailing the project extents.

### North Tributary of Crooks Creek Improvements

*Description*

The City has received multiple reports of issues occurring along a drainage way tributary to Crooks Creek. This drainage way is located north of Millersburg Drive and runs west from Morningstar Road through private property and eventually discharges to Crooks Creek roughly a half-mile north of Millersburg Drive. Several private culverts exist along the drainage way between Morningstar Road and the confluence with Crooks Creek. Additionally, two 24-inch diameter pipes connect this drainage way to another drainage way to the south that conveys stormwater discharging from the box culvert that runs under Millersburg Drive and also discharges to the main channel of Crooks Creek. Figure 6-1 highlights the reported problem area.

**Figure 6-1 North Tributary of Crooks Creek**




Survey conducted as part of the Master Plan process showed that the drainage way through this area does not keep a consistent grade and, on average, only has a positive grade of roughly 0.1%. The drainage way in general does not exhibit significant fall and maintains an average slope of 0.13% between Morningstar Road and Crooks Creek. These conditions are less than ideal for drainage and can lead to prolonged periods of inundation that can last several hours to several days after a significant event.

*Recommendation*

Two alternatives were explored to solve the issues at this location. Both alternatives consist of regrading the existing channel to provide as much positive drainage as possible to the system as well as removing the existing hydraulic connection – by way of two 24-inch pipe culverts – between the adjacent drainage ways. The recommended alternative maintains the existing channel alignment and requires that roughly 3,050 linear feet of channel be regraded to provide a 0.2% channel slope.

The project would require permitting through Oregon DSL. The project could be considered exempt by administrative rule depending on whether the channel is considered a drainage/irrigation ditch or an intermittent/perennial stream. The project would be exempt in the case of the channel being a ditch as the project would be restoring serviceability and would be classified as maintenance. Otherwise, an Individual Removal-Fill Permit would be required.

The other alternative was eliminated due to potential impacts to surrounding properties which would require further study. The estimate includes costs for required private culvert improvements.

*Project Estimated Cost* *$186,000*

**Hoffman Estates Stormwater Capacity Increase**

*Description*

The existing stormwater system in the Hoffman Estates development consists of stormwater lines in Shayla Drive, Noel Lane, Kamila Drive, and Dixie Court that drain to an onsite stormwater pond north of Shayla Drive. The stormwater pond controls flows discharging to an adjacent drainage way that runs along the east side of the development. The model shows that the existing system surcharges and floods at the upstream peripheral structures during storm events up to and including the 2-year event. This is due to a combination of inadequate freeboard and backwater effects at the detention pond, as well as inadequate pipe sizing and adverse pipe slopes.

The likelihood of reported issues in this area are low as the flooding locations are in areas that are not publically accessible. Potential property damage associated with this flooding is likely minimal. This project has been included to present a solution if a flooding issue arises at this location.

*Recommendation*

It's recommended that an additional overflow be constructed in the existing detention pond as the existing overflow lacks capacity to bypass flows in excess of the 10-year storm without overtopping the pond. Additionally, it's recommended that two 15-inch pipes in Noel Lane be upsized to 18-inch pipes to eliminate the constriction that those pipes create.

*Project Estimated Cost* *$156,890*

**Becker Ridge Detention Ponds Modification**

*Description*

The model analysis shows that the as-built emergency overflow designs for two of the three detention ponds present in the Becker Ridge development do not adequately prevent flooding in the adjacent or upstream roadways.

This is due to either the overflow elevation being higher than the rim elevations of upstream structures, or a lack of adequate capacity to maintain flood stages below upstream rim elevations.

*Recommendation*

The installation of secondary emergency overflow structures in the ponds will ensure the system has the capacity to pass design flows up to the 25-year storm without flooding the roadway.

*Project Estimated Cost* *$17,980*

### Morningstar Estates Outfall Modification

*Description*

The existing storm system in the Morningstar Estates development is designed with a singular outlet pipe that acts as a flow restriction with collected stormwater backing up into the pipe system and an onsite detention pond. No emergency overflow currently exists. The model analysis shows flooding in Rosemarie Street and Lauren Ave during a 10-yr 24-hr storm event.

As stated previously, no emergency overflow for the storm system currently exists, and in the event of the system exceeding capacity the excess stormwater has no escape route and ponds in the roadways with the possibility of causing damage to adjacent property. Additionally, backwater in Crooks Creek downstream of the outlet pipe reduces the allowable flow out of the system which further restricts the flow.

*Recommendation*

The system needs an emergency overflow that allows the conveyance of large storms while reducing the risk to life and property. Replacing the existing outlet pipe with one that can pass large storms in exceedance to the 10-year storm and installing a control structure upstream with an emergency overflow will maintain the designed detention capacity while allowing an escape route for high flows. However, the existing pipe is currently located in a 15-foot storm easement and aerial photos show that houses built in the adjacent lots are located very close to the easement lines. Therefore, it is recommended that an overflow pipe be routed to the west in Lauren Avenue and south along the west end of the Morningstar Estates subdivision to discharge to Crooks Creek. This route would require a new easement and would result in approximately 375 additional feet of pipe.

*Project Estimated Cost* *$203,725*

### Umpqua Lane Detention Pipes Modification

*Description*

As part of the North Park Estates development, the stormwater system in Umpqua Lane was connected to the existing system at 54$^{th}$ Avenue. To limit flow rates in the downstream system, three detention pipes and a control structure were built as part of the development prior to the connection. The control structure includes a 60-inch weir as the emergency overflow, which discharges to the same existing pipe as the main flow. The model analysis shows that during a 10-yr 24-hr storm, the downstream system surcharges with the existing emergency overflow discharging to a stormwater system that cannot handle the additional flow. This may cause flooding in Umpqua Lane and negates the function of the emergency overflow.

*Recommendation*

Disconnect the emergency overflow from its current discharge point and construct a new overflow route. The new route will discharge west of Umpqua Lane along 54$^{th}$ Avenue to a drainage way tributary to Crooks Creek. This alternative would allow for a safe escape route while allowing low flows to continue north along Umpqua Lane.

*Project Estimated Cost* *$109,910*

### Woods Road Drainage Capacity Increase

*Description*

The model analysis shows potential flooding issues at Woods Road north of Alexander Lane in the Build-Out condition. This is caused by capacity issues in the existing stormwater pipe that was constructed to convey flow from Woods Road and Alexander Lane to Crooks Creek. This system was designed to convey existing flows, and the added flow from potential future development exceeds the pipe capacity.

*Recommendation*

Increase capacity in this stormwater pipe by replacing the existing 12-inch pipe with an 18-inch pipe to eliminate the potential future flooding issues.

*Project Estimated Cost* *$559,004*

### Crooks Creek Sedimentation Concerns

*Description*

The City and residents have expressed concern with sediment build-up in Crooks Creek between Old Salem Road and Millersburg Drive. Concerns have been centered on the potential increase of flood risk if sediment build-up decreases the channel cross section as the City continues to develop. Programmatic recommendations have been included to address removal of sediment from the creek channel as needed to maintain its conveyance function. A way to reduce the amount of sediment that can accumulate in the channel is to construct a sediment collection facility.

Crooks Creek has a tributary area upstream of the City of Millersburg of roughly 2 square miles dominated by agricultural use. Additionally, soils throughout the watershed are dominantly silt loams which have a reasonable erosion potential (roughly 4 tons/acre/year based on the USGS Soil Survey). A profile of Crooks Creek shows grades ranging from 0.5% to 0.05% between Berry Drive and Millersburg Drive. The reaches with the shallowest slope lie between I-5 and the Union Pacific Railroad, and between Old Salem Road and Millersburg Drive. Areas of shallow slope generally have greater potential for sediment accumulation.

*Recommendation*

Constructing a facility to trap and collect sediment prior to Old Salem Road may be an option to handle sediment concerns. An effective way to accomplish this would be to construct a pond or settling pool to slow down the water entering the facility long enough for sediment to fall out of suspension and settle at the bottom with maintenance being periodic dredging. A facility of this nature would require a detailed study identifying the nature of the transported sediment entering the City as well as collection of other site-specific data crucial to the design of such a facility. Studies of this nature range in cost depending on the scope of work.

*Study Estimated Cost Range* *$30,000 - $70,000 (Scope Dependent)*

### Transportation System Plan Stormwater Improvements

*Description*

The City of Millersburg currently has plans to expand its current transportation system to accommodate a future build-out condition. This CIP gives a total cost estimate for the stormwater component of each proposed expansion or improvement. See Appendix C for further details.

*Total Estimated Cost* *$2,082,500*

### Kathryn Street & Knox Butte Ave Storm Improvements

*Description*

Knox Butte Avenue currently lacks stormwater infrastructure and Kathryn Street has a public stormwater pipe that discharges to a private system. No existing storm system is otherwise accessible in the area.

*Recommendation*

Well logs in the area show that the underlying soils are likely gravels. This opens opportunities for infiltration systems to manage stormwater. Street-side vegetated infiltration planters offer a means to treat and manage stormwater for the City right-of-way. These planters can range in size from 4% to 9% of the total basin area, with sizing dependent on the underlying soil infiltration rate.

*Project Estimated Cost* *$217,500*

### Old Salem Road (Linn County) Projects

*Description*

The model analysis shows flooding in the existing condition along Old Salem Road north of Lauren Avenue and at Conser Road for the 10-year and 25-year storm events. In the future build-out condition, this flooding extends to Alexander Lane and Clearwater Drive.

*Recommendation*

Increase the capacity in the stormwater system of Old Salem Road by replacing 2,515 linear feet of pipe with adequately sized pipe. 955 linear feet to be replaced to address existing flooding, and 1,560 to address build-out condition flooding.

*Project Estimated Cost* *$370,801 (Existing Conditions)*

*$707,491 (Build-Out Conditions)*

## 6.5 NPDES and TMDL Programs

### Total Maximum Daily Load (TMDL) for the Willamette River

Millersburg is currently identified as a political jurisdiction in the Upper Willamette Subbasin in Chapter 10 of the Willamette River TMDL Study. The Study identifies the TMDL Parameters of Bacteria, Dissolved Oxygen, Temperature, Mercury and Turbidity and the parameters to be addressed within this river reach. If the city fully implements the control measures of the NPDES MS4 Program recommended below most of the parameters will be addressed in the stormwater program. The only parameter that will need further consideration is temperature.

For the parameter of temperature, this study recommends that the buffer areas be allowed to grow into mature shade trees and City access easements for creeks and drainage ways be required on the north side of the creeks. It also recommends that vegetation on the banks be allowed to grow but the main flow channel be maintained to provide conveyance. Detention ponds should be wetlands with vegetation and not open water bodies that are allowed to heat up due to solar radiation.

### Municipal Separate Storm Sewer System (MS4)

The City of Millersburg has been identified in the Proposed Oregon DEQ General Permit for the National Pollutant discharge Elimination System (NPDES) Municipal Separate Storm Sewer System (MS4) Discharge Permit for Phase II Communities. This report will not cover the entire MS4 program or why the City of Millersburg has been identified as a Phase II community. This report will explain how this program and general permit relate to the City's Stormwater program and how the recommendations from this master Plan will help the City meet the conditions of the permit.

The six control measures of the Phase II permit are:

- **Education and Outreach**: the June 23, 2018 Public Open House and the October 23, 2018 Council work session both provide input for meeting this measure. Other items that help meet this are flyers that can be handed out about water quality and how to improve it.
- **Public Involvement and Participation**: Once again the master plan effort counts towards this measure. The City should work with other communities like Albany to provide outreach brochures, provide water quality stormwater talks to local schools and teach contractors and home owners the importance of water quality in their daily activities.
- **Illicit Discharge Detection and Elimination**: The City currently meets many of the items required by this minimum measure. The master plan provided a map of the storm system. The city has an active program to require contractors to video installed pipe to determine if illicit cross connections were made during construction. With the increased inspection recommended as part of the storm maintenance program in Table 5-1 of this report the city should meet many of the requirements of this measure.
- **Construction Site Runoff**: This plan is recommending more robust erosion and sediment control requirements. This is accomplished through permitting, inspection and the ability to shut down construction sites if erosion controls are not being implemented correctly. This will not only help protect streams, it will also reduce the amount of sediment being deposited in the storm system and therefore reduce long-term maintenance costs.
- **Post-Construction Site Runoff**: The permit requires adopting a retention standard and alternative compliance which includes water quality treatment. The stormwater master plan is recommending an update of the stormwater standards to address water quality treatment of the first 1-inch of runoff and to provide detention of and flow control to existing conditions. The permit also emphasizes a prioritization of Low Impact Development (LID) techniques. LID strategies should be included in the stormwater design standards
- **Pollution Prevention and Good Housekeeping for Municipal Operations**: This measure includes an O&M program for the stormwater system including inspection, maintenance, cleaning and tracking of the activities. This report is recommending inspection of 20% of catch basins annually and cleaning as necessary.

The permit includes a robust tracking of all the City's stormwater activities and the reporting of this information to the Oregon DEQ on an annual basis. For many communities this tracking of daily activities can be demanding and a shift from current practices. It is recommended that the City develop spreadsheets to track these activities and keep them updated to aid in the annual reporting effort.

## 6.6 Recommended Capital Project Summary

Table 6-1 outlines the recommended Capital Improvement Projects with a total cost summary and project priority. Project identification sheets for each of these projects are shown in Appendix C.

**Table 6-1 CIP Recommendation Summary**

| Project | Priority | Total Cost |
|---|---|---|
| North Tributary of Crooks Creek Improvements | High | $ 186,000 |
| Morningstar Estates Outfall Modification | Medium | $ 203,725 |
| Becker Ridge Detention Ponds Modification | Medium | $ 17,980 |
| Transportation System Plan Stormwater Improvements | Low | $ 2,082,500 |
| Woods Road Drainage Capacity Increase | Low | $ 559,004 |
| Old Salem Road (Linn County) Build-Out Capacity Improvements | Low | $ 707,491 |
| Old Salem Road (Linn County) Existing Capacity Improvements | Low | $ 370,801 |
| Kathryn St & Knox Butte Ave Storm Improvements | Low | $ 217,500 |
| Hoffman Estates Capacity Increase | Low | $ 156,890 |
| Umpqua Lane Detention Pipes Modification | Low | $ 109,910 |
| Crooks Creek Sedimentation Concerns | Low | $ 70,000 |

City of Millersburg
Stormwater Master Plan

# APPENDIX A

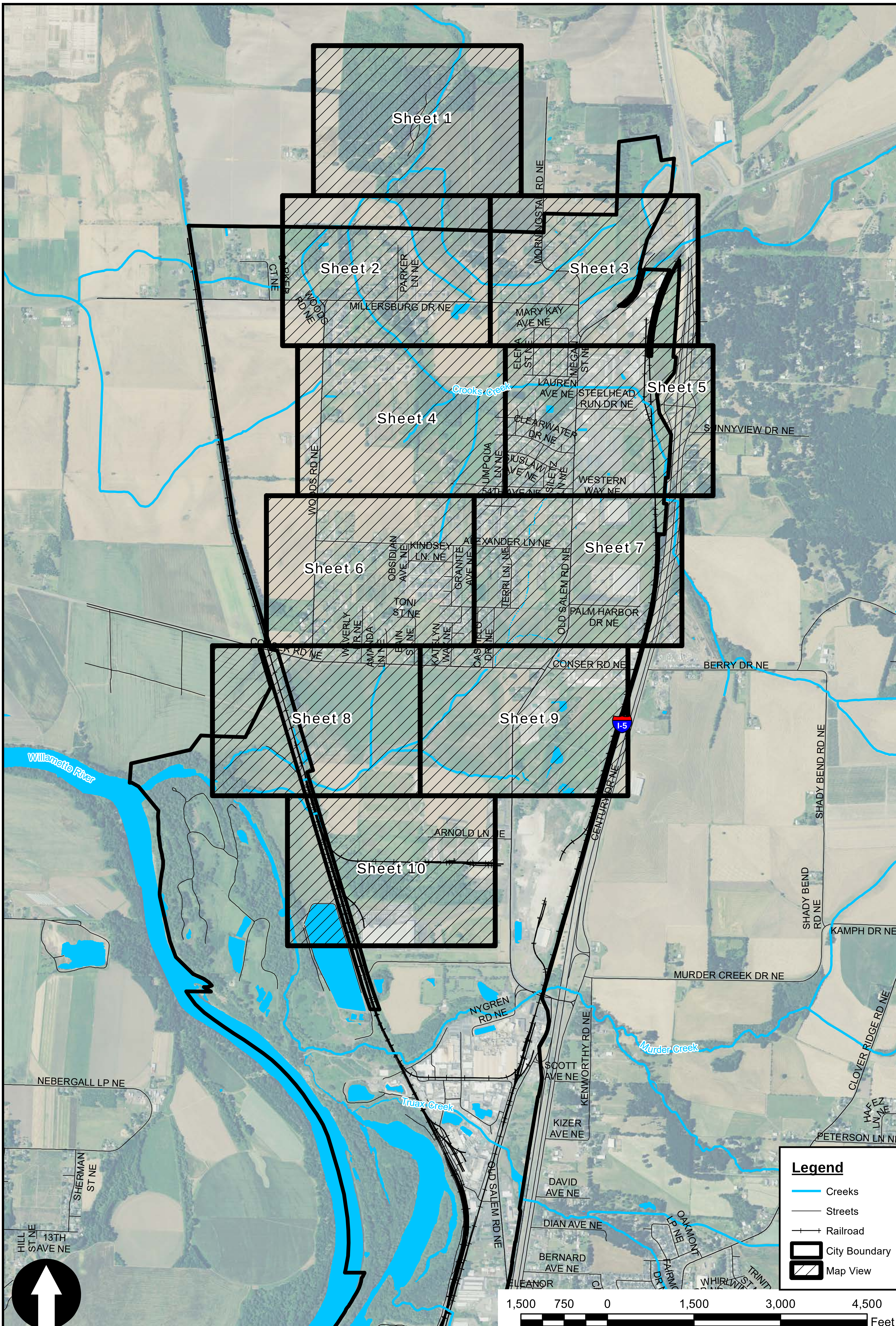
## MODELED DRAINAGE SYSTEM MAPS

# Appendix A
# Modeled Drainage System Maps

> Key Map

> XPSWMM Model Map Sheets

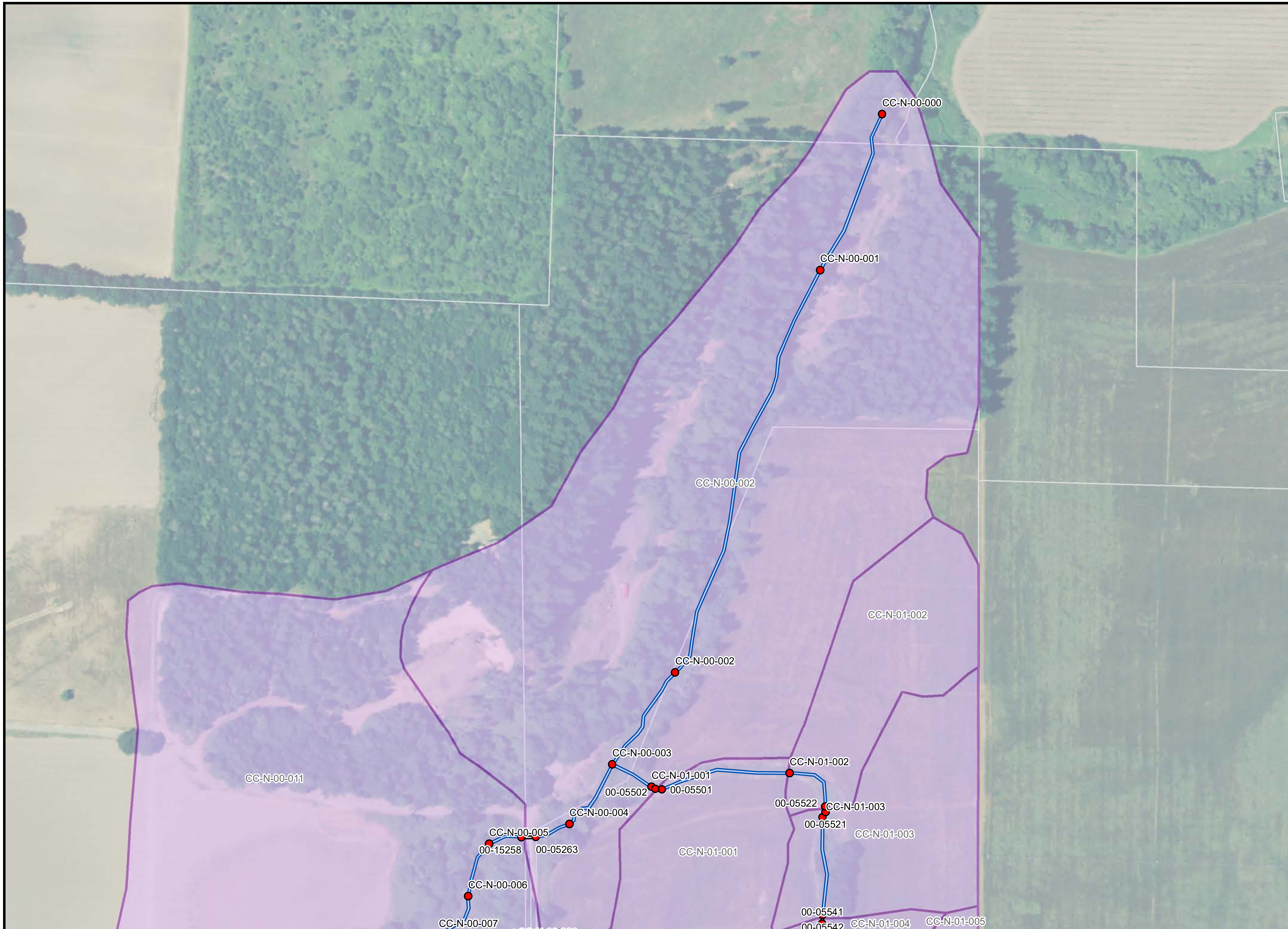
- Sheet 1
- Sheet 2
- Sheet 3
- Sheet 4
- Sheet 5
- Sheet 6
- Sheet 7
- Sheet 8
- Sheet 9
- Sheet 10




## XPSWMM MODEL SYSTEM MAP
## KEY MAP

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON




**Legend**

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

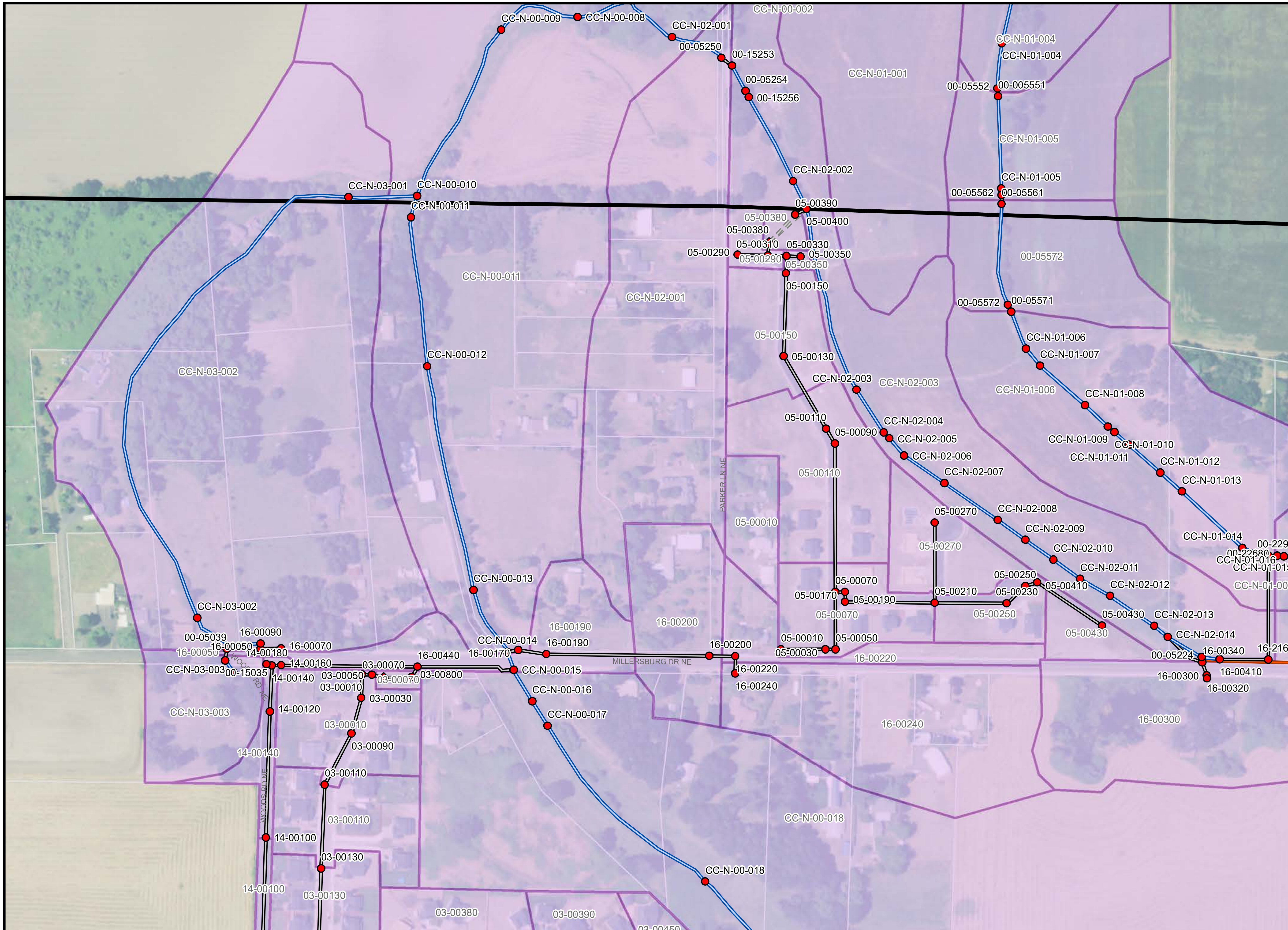
# XPSWMM MODEL SYSTEM MAP

**SHEET 1**

0 125 250 Feet

Cardno

City of Millersburg
A Community Linking Agriculture and Industry




## Legend

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

# XPSWMM MODEL SYSTEM MAP

## SHEET 2

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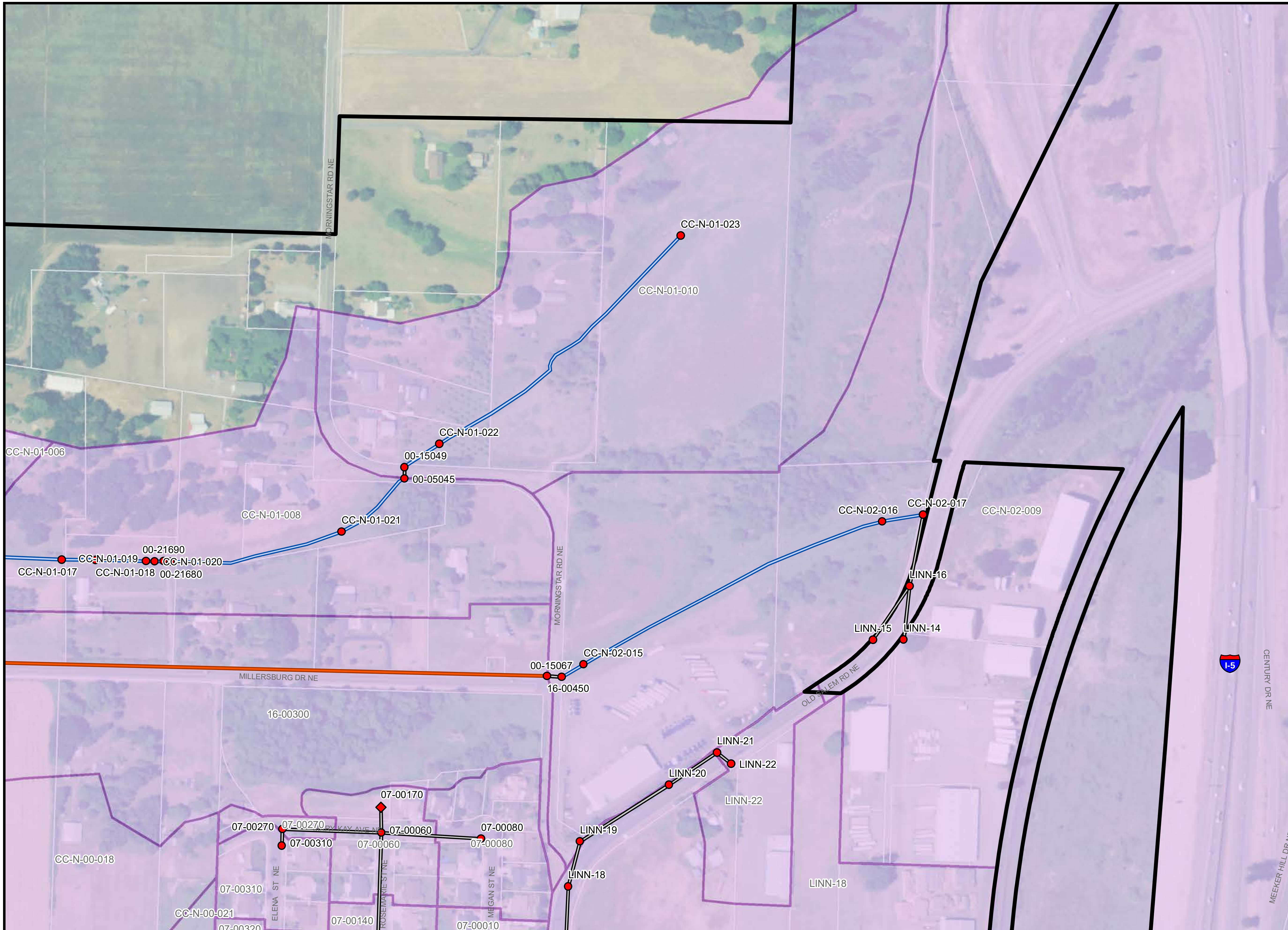
CITY OF Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




## Legend

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

# XPSWMM MODEL SYSTEM MAP

**SHEET 3**

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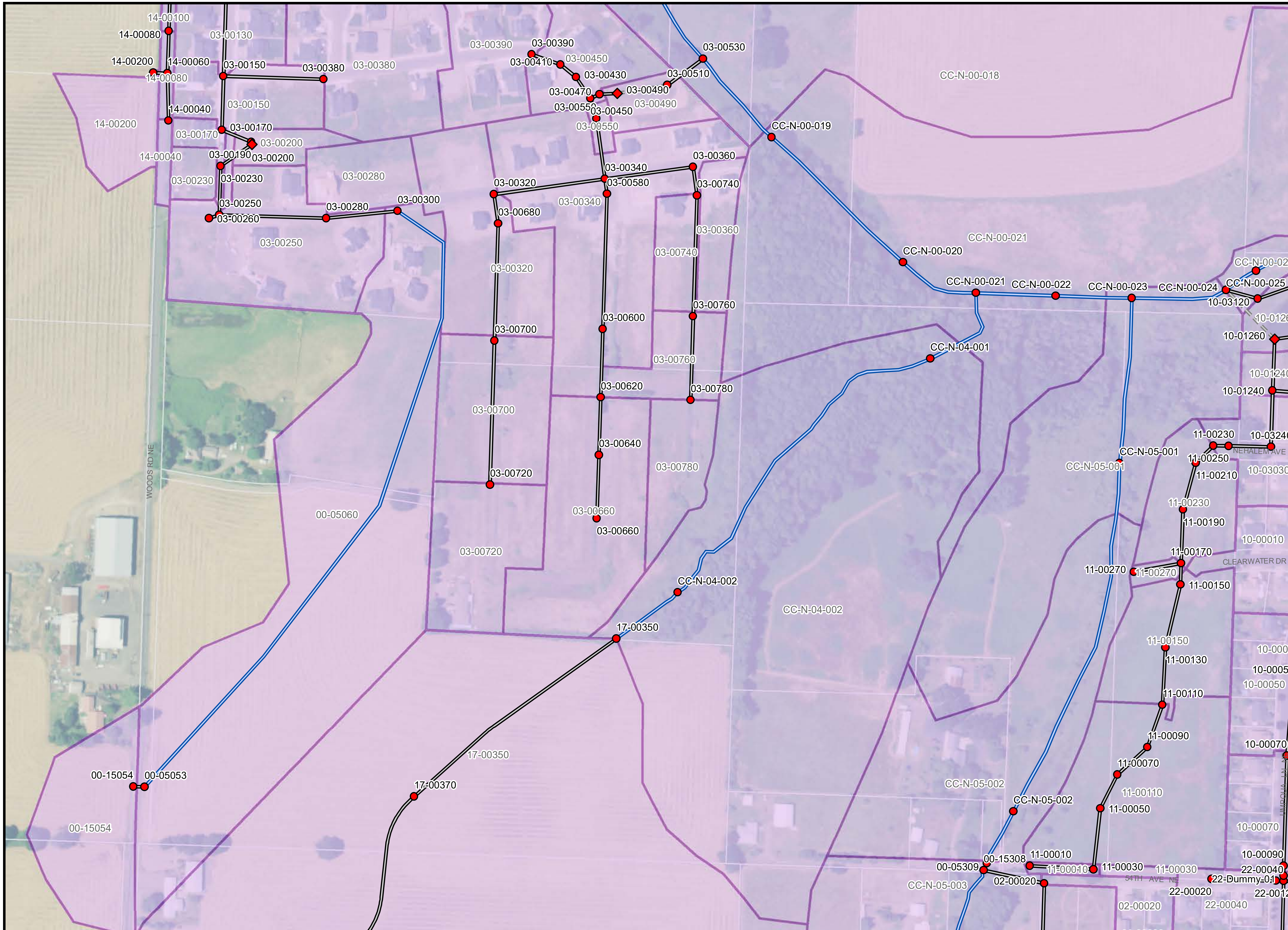
City of Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




## Legend

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

# XPSWMM MODEL SYSTEM MAP

## SHEET 4

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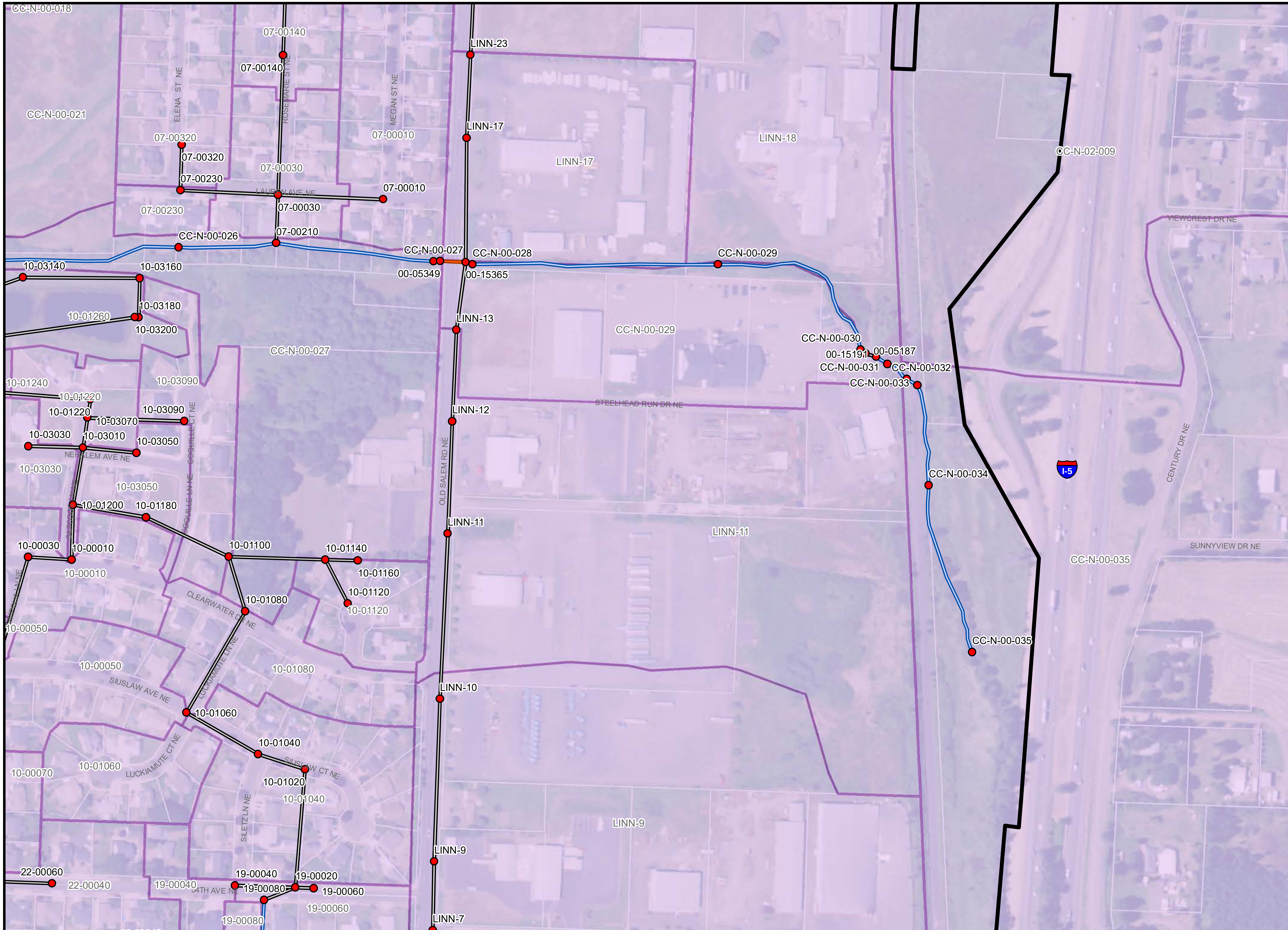
CITY OF Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




## Legend

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

# XPSWMM MODEL SYSTEM MAP

**SHEET 5**

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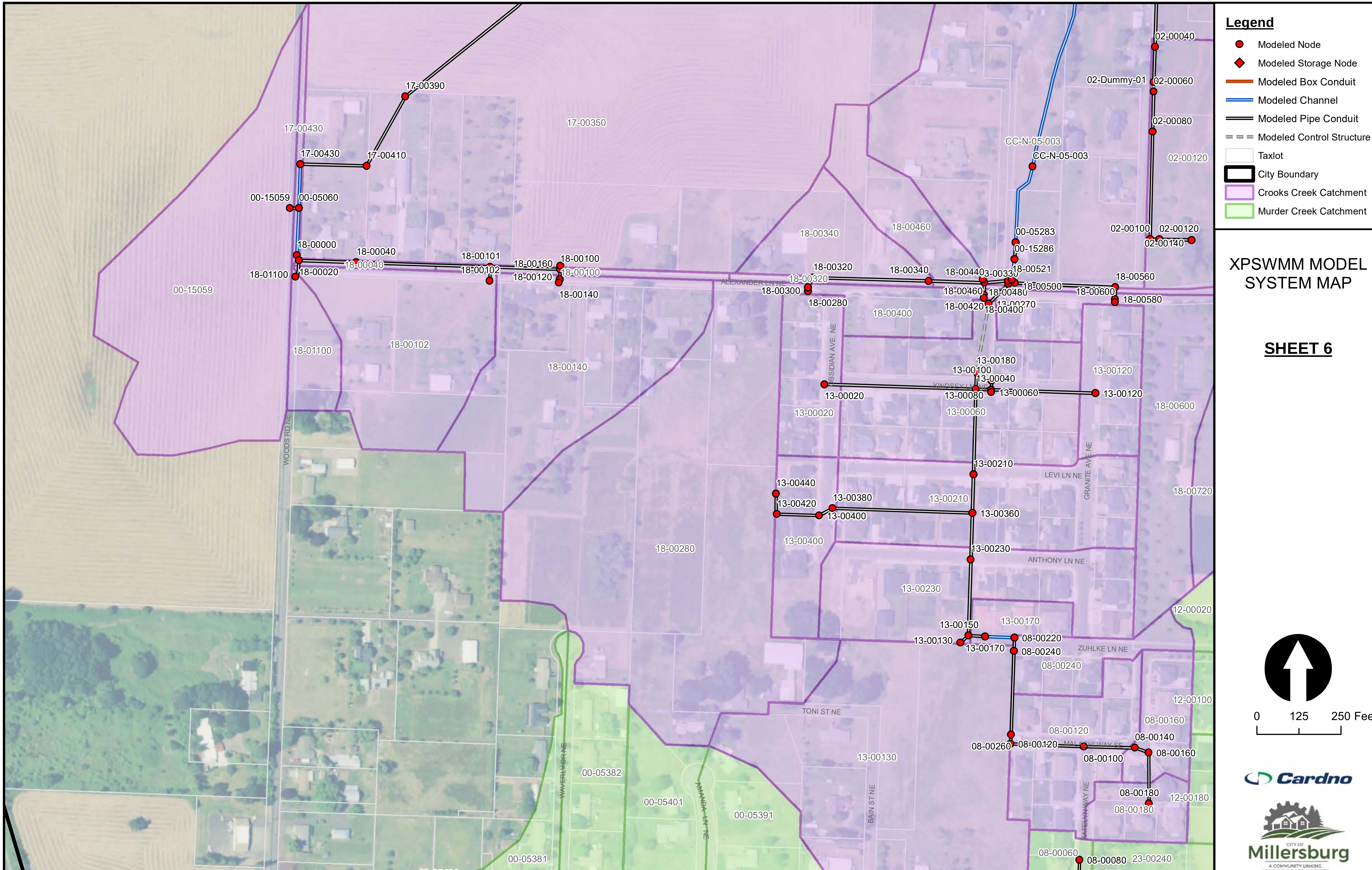
City of Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY


Legend
Modeled Node
Modeled Storage Node
Modeled Box Conduit
Modeled Channel
Modeled Pipe Conduit
Modeled Control Structure
Taxlot
City Boundary
Crooks Creek Catchment
Murder Creek Catchment
XPSWMM MODEL SYSTEM MAP
SHEET 6
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250 Feet
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City of Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY
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02-00080
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02-00100
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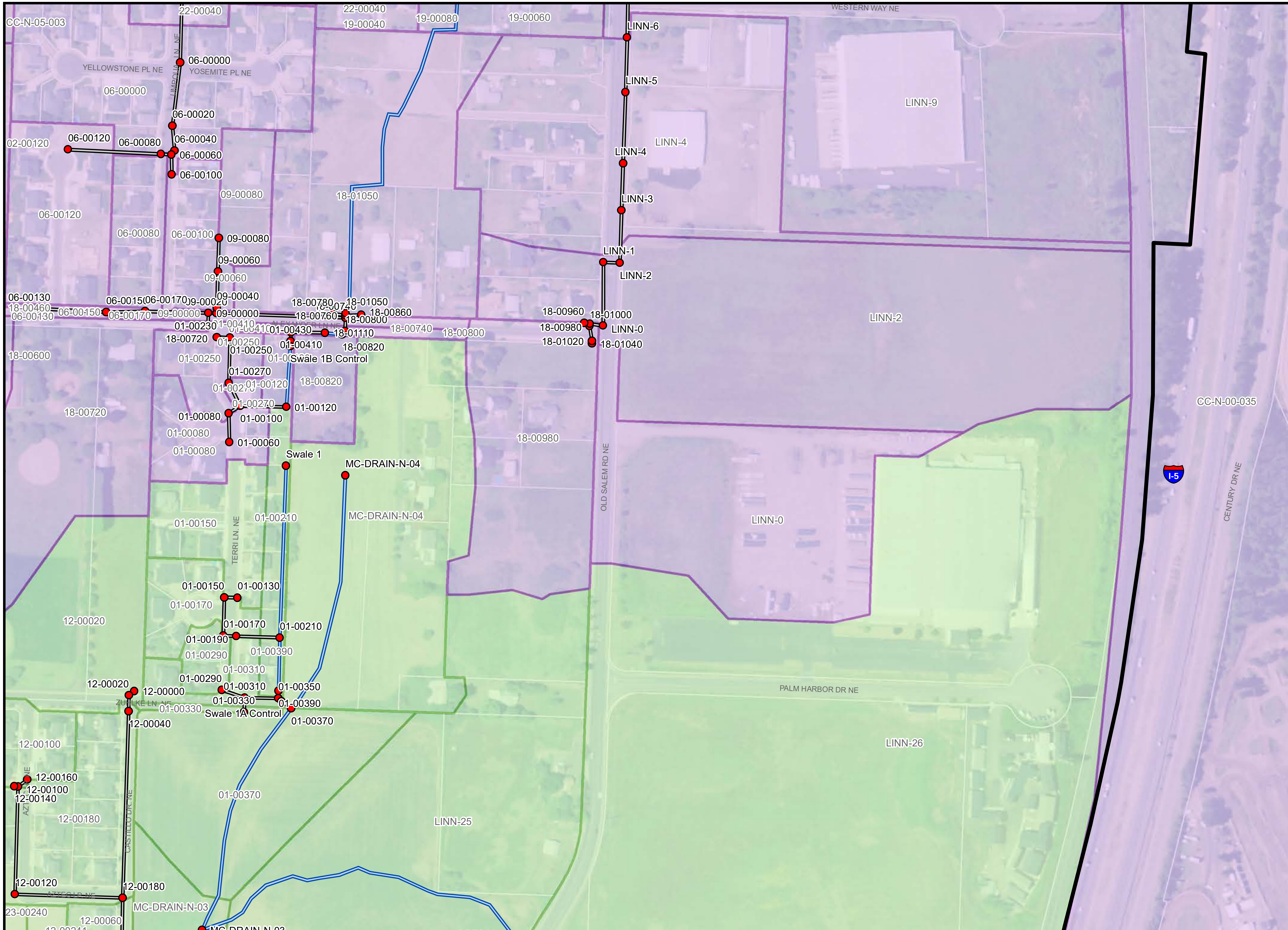
18-00720
12-00020
12-00100
08-00160
12-00180
00-05382
00-05401
00-05391
00-05381
00-05421
ALEXANDER LN NE
OBSIDIAN AVE. NE
KINDSEY LN NE
LEVI LN NE
GRANITE AVE NE
ANTHONY LN NE
ZUHLKE LN NE
TONI ST NE
WOODS RD NE
WAVERLY DR NE
AMANDA LN NE
BAIN ST NE
KATELYNWAY NE




## Legend

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

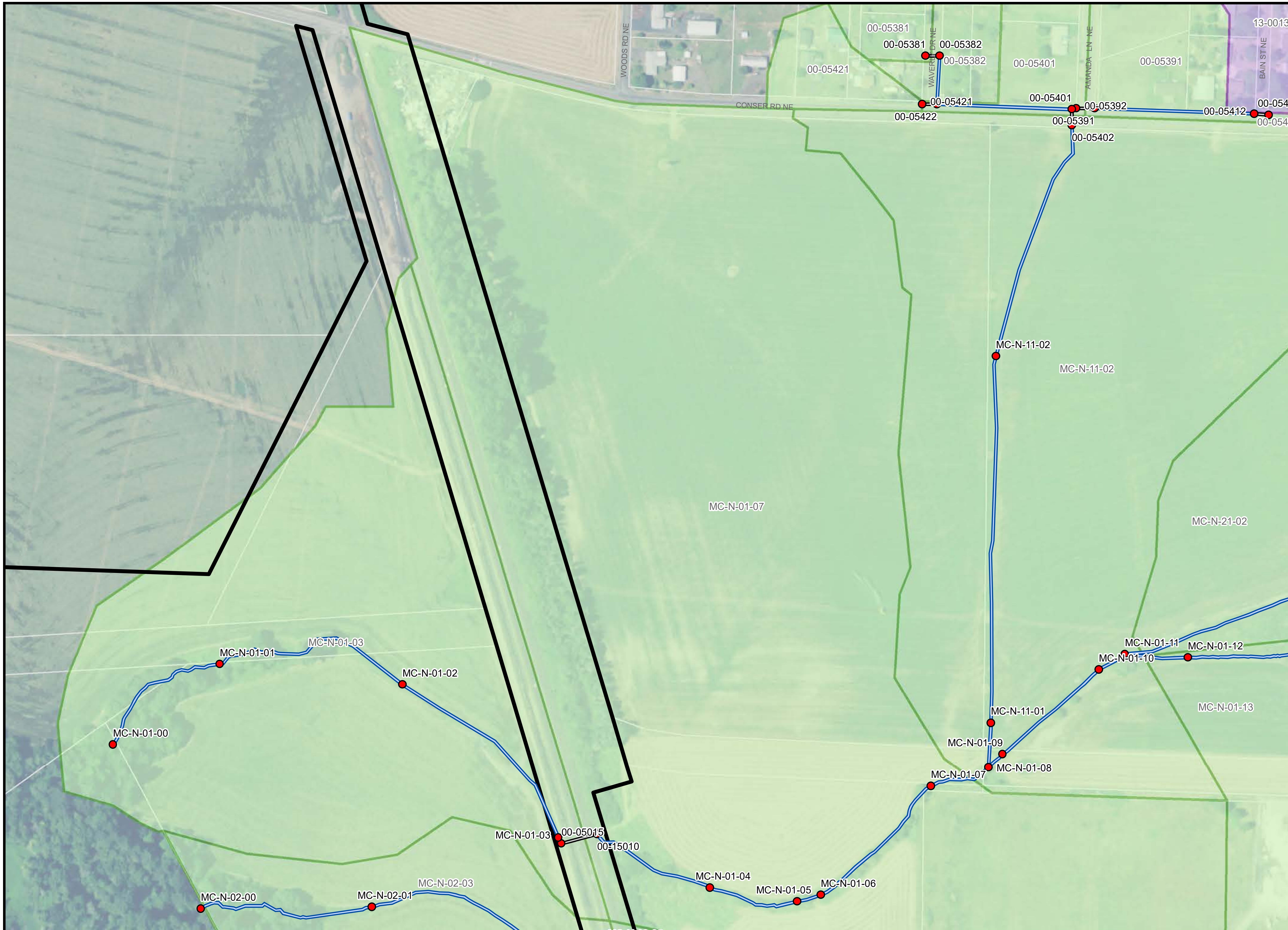
# XPSWMM MODEL SYSTEM MAP

## SHEET 7

0 125 250 Feet

Cardno

CITY OF Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




**Legend**

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

# XPSWMM MODEL SYSTEM MAP

## SHEET 8

0 125 250 Feet

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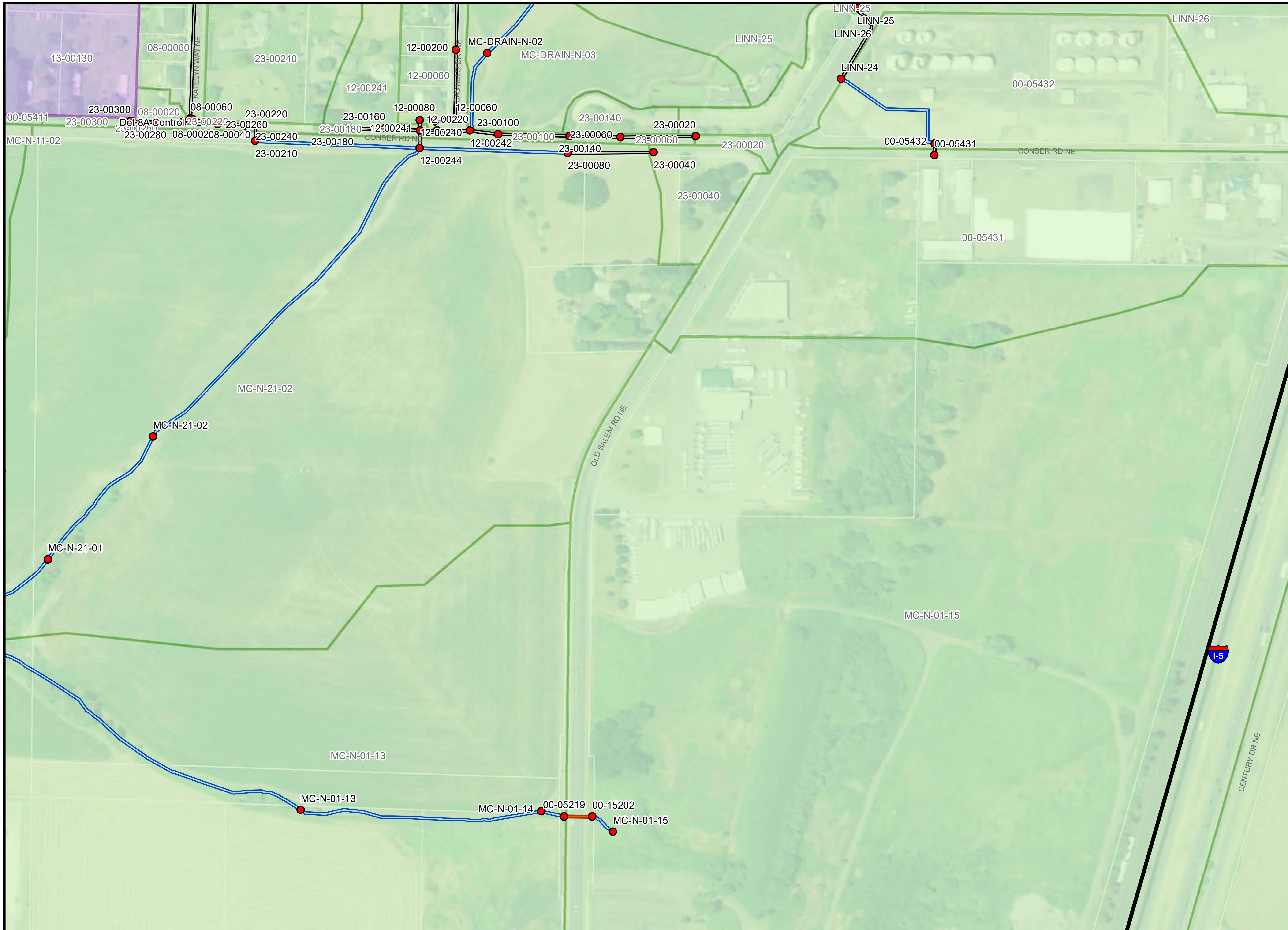
CITY OF Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




**Legend**

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

XPSWMM MODEL SYSTEM MAP

**SHEET 9**

0 125 250 Feet

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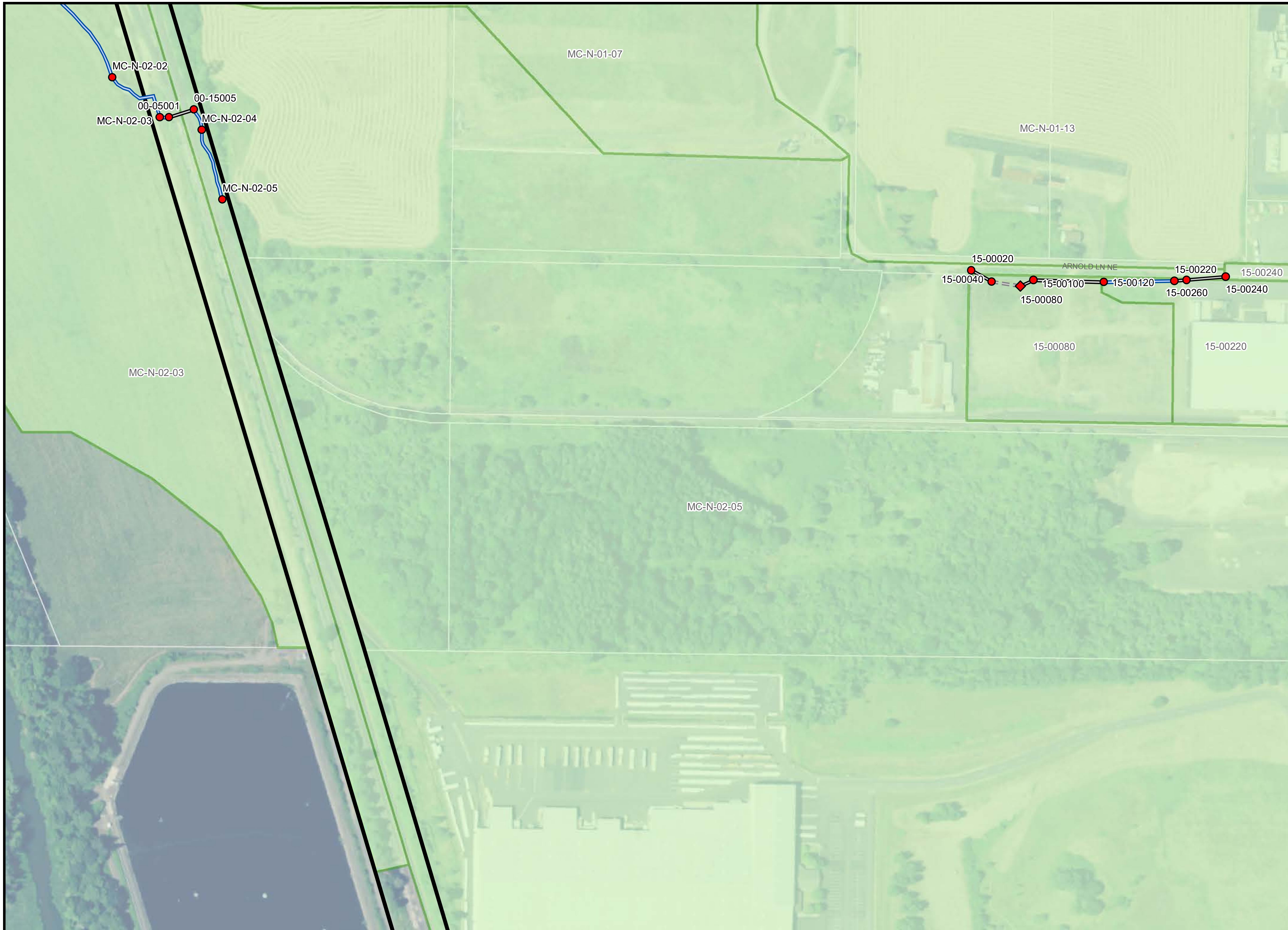
CITY OF Millersburg

A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




**Legend**

- Modeled Node
- Modeled Storage Node
- Modeled Box Conduit
- Modeled Channel
- Modeled Pipe Conduit
- Modeled Control Structure
- Taxlot
- City Boundary
- Crooks Creek Catchment
- Murder Creek Catchment

XPSWMM MODEL SYSTEM MAP

**SHEET 10**

0 125 250 Feet

Cardno

City of Millersburg

A COMMUNITY LINKING AGRICULTURE AND INDUSTRY

# APPENDIX B

## HYDROLOGIC AND HYDRAULIC INPUTS/RESULTS TABLES

# Appendix B
# Hydrologic and Hydraulic Inputs/Results Tables

- Table B-1 Hydrologic Input Data and Peak Flow Results
- Table B-2 Hydraulic Model Parameters and Results
- Table B-2 Hydraulic Model Parameters and Results Sorted by Upstream Node

**Table B-1 - Hydrologic Input and Peak Flow Results**

| Subcatchment Name | Area (acres) | Average Slope (%) | Width (feet) | Infiltration Reference | Tree Cover (%) | Impervious Area (%) | | | Subcatchment Peak Flow (cfs) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Existing Land Use | | | | Future Land Use | | | | Increase | | | |
| | | | | | | Existing Land Use | Future Land Use | Increase | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm |
| **CROOKS CREEK** | | | | | | | | | | | | | | | | | | | | |
| 00-05060 | 15.80 | 0.2 | 53 | D_High | 0.00 | 4.33 | 40.31 | 35.98 | 0.34 | 0.48 | 0.61 | 0.69 | 1.67 | 2.48 | 3.07 | 3.50 | 1.33 | 2.00 | 2.46 | 2.81 |
| 00-05572 | 3.86 | 0.2 | 477 | C_Low | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.03 | 0.28 | 0.54 | 0.00 | 0.03 | 0.28 | 0.54 | 0.00 | 0.00 | 0.00 | 0.00 |
| 00-15054 | 3.12 | 0 | 82 | D_Mid | 4.59 | 6.48 | 40.01 | 33.52 | 0.11 | 0.15 | 0.19 | 0.24 | 0.49 | 0.71 | 0.87 | 1.01 | 0.38 | 0.56 | 0.67 | 0.77 |
| 00-15059 | 10.44 | 0 | 32 | C_High | 0.00 | 2.19 | 61.46 | 59.27 | 0.11 | 0.15 | 0.18 | 0.21 | 0.93 | 1.42 | 1.76 | 2.03 | 0.82 | 1.27 | 1.58 | 1.83 |
| 01-00080 | 1.50 | 0.3 | 81.27 | C_High | 0.00 | 50.67 | 54.73 | 4.06 | 0.41 | 0.57 | 0.67 | 0.74 | 0.43 | 0.60 | 0.71 | 0.80 | 0.03 | 0.04 | 0.05 | 0.05 |
| 01-00120 | 0.40 | 2.4 | 105.19 | B_Low | 0.00 | 25.00 | 50.00 | 25.00 | 0.06 | 0.08 | 0.10 | 0.11 | 0.12 | 0.16 | 0.19 | 0.21 | 0.06 | 0.08 | 0.10 | 0.11 |
| 01-00250 | 1.23 | 1 | 231.21 | B_Low | 0.00 | 50.41 | 55.08 | 4.67 | 0.37 | 0.50 | 0.59 | 0.65 | 0.40 | 0.55 | 0.64 | 0.71 | 0.03 | 0.05 | 0.05 | 0.06 |
| 01-00270 | 0.17 | 0.9 | 37.73 | B_Low | 0.00 | 70.59 | 70.59 | 0.00 | 0.07 | 0.10 | 0.11 | 0.13 | 0.07 | 0.10 | 0.11 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| 01-00410 | 0.11 | 1.8 | 45.16 | B_Low | 0.00 | 63.64 | 63.64 | 0.00 | 0.04 | 0.06 | 0.07 | 0.07 | 0.04 | 0.06 | 0.07 | 0.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| 02-00020 | 0.74 | 0.7 | 179 | B_Low | 0.00 | 45.32 | 57.39 | 12.08 | 0.20 | 0.27 | 0.32 | 0.35 | 0.25 | 0.34 | 0.40 | 0.44 | 0.05 | 0.07 | 0.08 | 0.09 |
| 02-00120 | 3.56 | 1.4 | 329 | B_Low | 0.00 | 45.23 | 45.23 | 0.00 | 0.94 | 1.29 | 1.51 | 1.68 | 0.94 | 1.29 | 1.51 | 1.68 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00010 | 2.53 | 0.6 | 332 | B_Low | 0.00 | 45.23 | 45.23 | 0.00 | 0.67 | 0.92 | 1.07 | 1.19 | 0.67 | 0.92 | 1.07 | 1.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00070 | 0.15 | 0.4 | 81 | B_Low | 0.00 | 0.00 | 40.00 | 40.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.05 | 0.06 | 0.06 | 0.04 | 0.05 | 0.06 | 0.06 |
| 03-00110 | 2.33 | 1.1 | 319 | B_Low | 0.00 | 45.26 | 45.26 | 0.00 | 0.62 | 0.85 | 0.99 | 1.11 | 0.62 | 0.85 | 0.99 | 1.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00130 | 2.84 | 0.9 | 352 | B_Low | 0.00 | 45.22 | 45.22 | 0.00 | 0.75 | 1.03 | 1.21 | 1.34 | 0.75 | 1.03 | 1.21 | 1.34 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00150 | 1.76 | 0.9 | 277 | B_Low | 0.00 | 45.25 | 45.25 | 0.00 | 0.47 | 0.64 | 0.75 | 0.84 | 0.47 | 0.64 | 0.75 | 0.84 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00170 | 0.34 | 1.2 | 121 | B_Low | 0.00 | 45.24 | 45.24 | 0.00 | 0.09 | 0.12 | 0.15 | 0.16 | 0.09 | 0.12 | 0.15 | 0.16 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00200 | 0.59 | 2.1 | 160 | B_Low | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00230 | 0.43 | 1.5 | 136 | B_Low | 0.00 | 0.00 | 40.14 | 40.14 | 0.00 | 0.00 | 0.00 | 0.00 | 0.10 | 0.14 | 0.16 | 0.18 | 0.10 | 0.14 | 0.16 | 0.18 |
| 03-00250 | 4.24 | 0.7 | 179 | B_Low | 0.00 | 45.24 | 45.24 | 0.00 | 1.05 | 1.45 | 1.72 | 1.92 | 1.05 | 1.45 | 1.72 | 1.92 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00280 | 1.28 | 0.3 | 236 | B_Low | 0.00 | 45.23 | 45.23 | 0.00 | 0.34 | 0.46 | 0.54 | 0.61 | 0.34 | 0.46 | 0.54 | 0.61 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00320 | 3.46 | 0.5 | 115 | C_High | 0.00 | 45.23 | 45.23 | 0.00 | 0.83 | 1.15 | 1.36 | 1.52 | 0.83 | 1.15 | 1.36 | 1.52 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00340 | 6.49 | 0.6 | 50 | C_Low | 0.48 | 45.23 | 45.23 | 0.00 | 1.16 | 1.69 | 2.05 | 2.36 | 1.16 | 1.69 | 2.05 | 2.36 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00360 | 0.96 | 0.3 | 18 | C_High | 0.42 | 45.25 | 45.25 | 0.00 | 0.20 | 0.29 | 0.34 | 0.39 | 0.20 | 0.29 | 0.34 | 0.39 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00380 | 4.60 | 0.4 | 83 | B_Low | 0.00 | 45.24 | 45.24 | 0.00 | 0.98 | 1.39 | 1.66 | 1.87 | 0.98 | 1.39 | 1.66 | 1.87 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00390 | 2.77 | 0.5 | 347 | B_Low | 0.00 | 45.21 | 45.21 | 0.00 | 0.73 | 1.00 | 1.17 | 1.31 | 0.73 | 1.00 | 1.17 | 1.31 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00450 | 2.16 | 0.4 | 306 | C_High | 0.00 | 45.20 | 45.20 | 0.00 | 0.57 | 0.78 | 0.91 | 1.02 | 0.57 | 0.78 | 0.91 | 1.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00490 | 0.81 | 1.1 | 188 | C_Mid | 0.00 | 45.26 | 45.26 | 0.00 | 0.22 | 0.30 | 0.35 | 0.40 | 0.22 | 0.30 | 0.35 | 0.40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00550 | 0.19 | 0.9 | 91 | B_Low | 0.00 | 54.45 | 54.45 | 0.00 | 0.06 | 0.09 | 0.10 | 0.11 | 0.06 | 0.09 | 0.10 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00660 | 4.47 | 1.2 | 137 | D_Low | 0.00 | 45.23 | 45.23 | 0.00 | 1.13 | 2.15 | 2.88 | 3.40 | 1.13 | 2.15 | 2.88 | 3.40 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00700 | 2.96 | 1.7 | 359 | D_Mid | 0.00 | 45.24 | 45.24 | 0.00 | 0.79 | 1.08 | 1.46 | 2.05 | 0.79 | 1.08 | 1.46 | 2.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00720 | 2.58 | 0.6 | 335 | D_Low | 0.00 | 45.25 | 45.25 | 0.00 | 0.71 | 1.61 | 2.06 | 2.35 | 0.71 | 1.61 | 2.06 | 2.35 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00740 | 0.90 | 0.9 | 198 | C_High | 0.00 | 45.27 | 45.27 | 0.00 | 0.24 | 0.33 | 0.39 | 0.43 | 0.24 | 0.33 | 0.39 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00760 | 1.37 | 0.5 | 245 | D_Mid | 0.00 | 45.27 | 45.27 | 0.00 | 0.37 | 0.50 | 0.66 | 0.91 | 0.37 | 0.50 | 0.66 | 0.91 | 0.00 | 0.00 | 0.00 | 0.00 |
| 03-00780 | 1.47 | 1 | 253 | D_High | 0.00 | 45.23 | 45.23 | 0.00 | 0.39 | 0.54 | 0.90 | 1.02 | 0.39 | 0.54 | 0.90 | 1.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00010 | 1.18 | 0.2 | 226 | D_Low | 0.00 | 46.98 | 46.98 | 0.00 | 0.33 | 0.71 | 0.92 | 1.05 | 0.33 | 0.71 | 0.92 | 1.05 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00070 | 2.14 | 0.2 | 305 | D_Low | 0.00 | 45.24 | 45.24 | 0.00 | 0.58 | 1.24 | 1.62 | 1.87 | 0.58 | 1.24 | 1.62 | 1.87 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00110 | 3.67 | 0.9 | 202 | D_Low | 0.00 | 45.22 | 45.22 | 0.00 | 0.97 | 1.98 | 2.63 | 3.06 | 0.97 | 1.98 | 2.63 | 3.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00150 | 2.19 | 1.2 | 309 | D_Low | 0.00 | 45.25 | 45.25 | 0.00 | 0.63 | 1.47 | 1.84 | 2.08 | 0.63 | 1.47 | 1.84 | 2.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00250 | 1.12 | 0.6 | 221 | D_Low | 0.00 | 45.24 | 45.24 | 0.00 | 0.32 | 0.76 | 0.94 | 1.07 | 0.32 | 0.76 | 0.94 | 1.07 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00270 | 1.84 | 1.2 | 283 | D_Low | 0.00 | 45.24 | 45.24 | 0.00 | 0.53 | 1.25 | 1.56 | 1.77 | 0.53 | 1.25 | 1.56 | 1.77 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00290 | 0.45 | 0.2 | 140 | D_Low | 0.00 | 45.13 | 45.13 | 0.00 | 0.13 | 0.30 | 0.38 | 0.43 | 0.13 | 0.30 | 0.38 | 0.43 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00350 | 0.09 | 0.8 | 64 | D_Low | 0.00 | 44.68 | 44.68 | 0.00 | 0.03 | 0.07 | 0.09 | 0.10 | 0.03 | 0.07 | 0.09 | 0.10 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00380 | 0.31 | 0.3 | 115 | D_Low | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.17 | 0.23 | 0.27 | 0.05 | 0.17 | 0.23 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| 05-00430 | 0.86 | 1 | 194 | D_Low | 0.00 | 45.19 | 45.19 | 0.00 | 0.26 | 0.61 | 0.75 | 0.85 | 0.26 | 0.61 | 0.75 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 |
| 06-00000 | 6.86 | 0.5 | 117 | B_Low | 0.00 | 55.70 | 55.70 | 0.00 | 1.69 | 2.43 | 2.91 | 3.28 | 1.69 | 2.43 | 2.91 | 3.28 | 0.00 | 0.00 | 0.00 | 0.00 |
| 06-00080 | 1.49 | 1.1 | 255 | B_Low | 0.00 | 45.20 | 46.21 | 1.01 | 0.40 | 0.54 | 0.64 | 0.71 | 0.41 | 0.56 | 0.65 | 0.73 | 0.01 | 0.01 | 0.01 | 0.02 |
| 06-00100 | 1.42 | 0.7 | 248 | B_Low | 0.00 | 45.20 | 50.00 | 4.80 | 0.38 | 0.52 | 0.60 | 0.67 | 0.42 | 0.57 | 0.67 | 0.74 | 0.04 | 0.05 | 0.06 | 0.07 |
| 06-00120 | 3.34 | 0.3 | 58 | B_Low | 0.00 | 45.24 | 50.00 | 4.76 | 0.67 | 0.96 | 1.14 | 1.29 | 0.72 | 1.03 | 1.24 | 1.40 | 0.05 | 0.08 | 0.09 | 0.11 |
| 06-00130 | 0.07 | 0.1 | 54 | B_Low | 0.00 | 30.30 | 30.30 | 0.00 | 0.01 | 0.02 | 0.02 | 0.02 | 0.01 | 0.02 | 0.02 | 0.02 | 0.00 | 0.00 | 0.00 | 0.00 |
| 06-00150 | 0.15 | 2.1 | 80 | B_Low | 0.00 | 21.77 | 36.73 | 14.97 | 0.02 | 0.03 | 0.03 | 0.03 | 0.03 | 0.04 | 0.05 | 0.06 | 0.01 | 0.02 | 0.02 | 0.02 |
| 06-00170 | 0.08 | 1.3 | 59 | B_Low | 0.00 | 36.25 | 47.50 | 11.25 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.03 | 0.04 | 0.04 | 0.01 | 0.01 | 0.01 | 0.01 |
| 07-00010 | 5.19 | 0.5 | 165 | D_Low | 0.00 | 45.22 | 48.02 | 2.79 | 1.25 | 2.23 | 2.98 | 3.55 | 1.31 | 2.32 | 3.08 | 3.65 | 0.06 | 0.09 | 0.10 | 0.10 |
| 07-00030 | 3.06 | 0.5 | 133 | D_Low | 0.00 | 54.70 | 62.65 | 7.95 | 0.91 | 1.63 | 2.13 | 2.48 | 1.02 | 1.77 | 2.26 | 2.61 | 0.11 | 0.14 | 0.14 | 0.13 |
| 07-00060 | 2.18 | 0.2 | 308 | D_Mid | 0.00 | 39.72 | 39.99 | 0.27 | 0.50 | 0.69 | 0.87 | 1.15 | 0.50 | 0.69 | 0.87 | 1.15 | 0.00 | 0.01 | 0.01 | 0.01 |
| 07-00080 | 2.74 | 0.2 | 49 | D_Low | 1.10 | 45.43 | 50.31 | 4.88 | 0.55 | 0.92 | 1.20 | 1.43 | 0.59 | 0.98 | 1.27 | 1.50 | 0.04 | 0.06 | 0.07 | 0.08 |

| Table B-1 - Hydrologic Input and Peak Flow Results | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Impervious Area (%) | | | Subcatchment Peak Flow (cfs) | | | | | | | | | | | |
| | | | | | | | | | Existing Land Use | | | | Future Land Use | | | | Increase | | | |
| Subcatchment Name | Area (acres) | Average Slope (%) | Width (feet) | Infiltration Reference | Tree Cover (%) | Existing Land Use | Future Land Use | Increase | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm |
| 07-00140 | 2.38 | 0.4 | 322 | D_Low | 0.00 | 46.69 | 51.75 | 5.05 | 0.67 | 1.47 | 1.89 | 2.15 | 0.74 | 1.53 | 1.93 | 2.20 | 0.07 | 0.06 | 0.05 | 0.04 |
| 07-00230 | 0.83 | 1 | 190 | D_Low | 0.00 | 65.38 | 65.38 | 0.00 | 0.34 | 0.63 | 0.76 | 0.85 | 0.34 | 0.63 | 0.76 | 0.85 | 0.00 | 0.00 | 0.00 | 0.00 |
| 07-00270 | 0.43 | 0.1 | 137 | D_Low | 0.00 | 64.58 | 64.58 | 0.00 | 0.17 | 0.31 | 0.38 | 0.42 | 0.17 | 0.31 | 0.38 | 0.42 | 0.00 | 0.00 | 0.00 | 0.00 |
| 07-00310 | 1.83 | 0.2 | 282 | D_Mid | 0.00 | 46.89 | 51.37 | 4.48 | 0.49 | 0.68 | 0.84 | 1.07 | 0.53 | 0.74 | 0.91 | 1.15 | 0.04 | 0.06 | 0.07 | 0.08 |
| 07-00320 | 3.94 | 0.3 | 66 | D_High | 0.00 | 43.66 | 48.86 | 5.20 | 0.77 | 1.10 | 1.38 | 1.56 | 0.83 | 1.20 | 1.50 | 1.70 | 0.07 | 0.10 | 0.12 | 0.14 |
| 08-00120 | 3.21 | 1 | 164 | B_Low | 0.00 | 45.24 | 50.22 | 4.98 | 0.82 | 1.14 | 1.34 | 1.49 | 0.90 | 1.25 | 1.47 | 1.65 | 0.08 | 0.12 | 0.14 | 0.16 |
| 08-00160 | 1.46 | 0.1 | 252 | B_Low | 0.00 | 45.26 | 53.78 | 8.52 | 0.36 | 0.50 | 0.60 | 0.67 | 0.43 | 0.59 | 0.70 | 0.78 | 0.06 | 0.09 | 0.10 | 0.11 |
| 08-00180 | 1.23 | 0.1 | 231 | B_Low | 0.00 | 45.19 | 50.82 | 5.63 | 0.31 | 0.43 | 0.50 | 0.56 | 0.34 | 0.48 | 0.56 | 0.63 | 0.04 | 0.05 | 0.06 | 0.06 |
| 08-00240 | 1.54 | 0.1 | 259 | B_Low | 0.00 | 45.25 | 51.76 | 6.50 | 0.40 | 0.55 | 0.65 | 0.72 | 0.45 | 0.62 | 0.73 | 0.82 | 0.05 | 0.07 | 0.09 | 0.10 |
| 09-00000 | 0.08 | 2.6 | 60 | B_Low | 0.00 | 48.19 | 60.24 | 12.05 | 0.02 | 0.03 | 0.04 | 0.04 | 0.03 | 0.04 | 0.05 | 0.05 | 0.01 | 0.01 | 0.01 | 0.01 |
| 09-00060 | 0.15 | 0.7 | 80 | B_Low | 0.00 | 27.89 | 54.42 | 26.53 | 0.02 | 0.03 | 0.04 | 0.04 | 0.05 | 0.07 | 0.08 | 0.09 | 0.02 | 0.03 | 0.04 | 0.04 |
| 09-00080 | 1.26 | 0.9 | 234 | B_Low | 0.00 | 14.89 | 55.10 | 40.21 | 0.11 | 0.15 | 0.18 | 0.20 | 0.41 | 0.56 | 0.65 | 0.73 | 0.30 | 0.41 | 0.47 | 0.53 |
| 10-00010 | 4.56 | 0.6 | 88 | B_Low | 0.00 | 50.61 | 50.61 | 0.00 | 1.11 | 1.58 | 1.88 | 2.11 | 1.11 | 1.58 | 1.88 | 2.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10-00050 | 4.90 | 1.6 | 192 | B_Low | 0.00 | 47.78 | 47.78 | 0.00 | 1.31 | 1.82 | 2.14 | 2.39 | 1.31 | 1.82 | 2.14 | 2.39 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10-00070 | 2.32 | 2.2 | 318 | B_Low | 0.00 | 47.04 | 49.89 | 2.85 | 0.64 | 0.88 | 1.03 | 1.15 | 0.68 | 0.93 | 1.09 | 1.22 | 0.04 | 0.05 | 0.06 | 0.07 |
| 10-01040 | 6.51 | 1.4 | 233 | B_Low | 0.00 | 43.83 | 48.22 | 4.40 | 1.58 | 2.20 | 2.60 | 2.90 | 1.73 | 2.41 | 2.84 | 3.17 | 0.15 | 0.20 | 0.24 | 0.27 |
| 10-01060 | 2.69 | 1.8 | 342 | B_Low | 0.00 | 40.48 | 48.94 | 8.45 | 0.64 | 0.88 | 1.03 | 1.15 | 0.77 | 1.06 | 1.24 | 1.38 | 0.13 | 0.18 | 0.21 | 0.24 |
| 10-01080 | 3.71 | 1.5 | 45 | B_Low | 0.65 | 49.14 | 53.89 | 4.75 | 0.88 | 1.25 | 1.48 | 1.67 | 0.94 | 1.34 | 1.60 | 1.80 | 0.07 | 0.10 | 0.12 | 0.14 |
| 10-01120 | 2.21 | 0.8 | 70 | B_Low | 3.17 | 38.01 | 49.73 | 11.72 | 0.46 | 0.64 | 0.75 | 0.84 | 0.58 | 0.82 | 0.96 | 1.07 | 0.13 | 0.18 | 0.21 | 0.24 |
| 10-01220 | 1.86 | 0.2 | 284 | C_High | 0.00 | 45.23 | 48.84 | 3.61 | 0.48 | 0.67 | 0.78 | 0.87 | 0.52 | 0.72 | 0.84 | 0.94 | 0.04 | 0.05 | 0.06 | 0.07 |
| 10-01240 | 0.52 | 1.6 | 43 | D_Low | 8.08 | 0.00 | 40.00 | 40.00 | 0.06 | 0.22 | 0.33 | 0.39 | 0.14 | 0.32 | 0.42 | 0.47 | 0.07 | 0.11 | 0.09 | 0.08 |
| 10-01260 | 2.94 | 0.5 | 4 | D_Low | 0.00 | 0.37 | 0.37 | 0.00 | 0.04 | 0.10 | 0.15 | 0.19 | 0.04 | 0.10 | 0.15 | 0.19 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10-03030 | 2.56 | 0.6 | 74 | C_High | 2.69 | 45.24 | 45.24 | 0.00 | 0.61 | 0.85 | 1.00 | 1.12 | 0.61 | 0.85 | 1.00 | 1.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10-03050 | 1.87 | 1.3 | 285 | B_Low | 0.00 | 45.23 | 45.23 | 0.00 | 0.50 | 0.68 | 0.80 | 0.89 | 0.50 | 0.68 | 0.80 | 0.89 | 0.00 | 0.00 | 0.00 | 0.00 |
| 10-03090 | 2.99 | 0.8 | 76 | C_Mid | 2.44 | 45.22 | 45.22 | 0.00 | 0.71 | 0.99 | 1.17 | 1.33 | 0.71 | 0.99 | 1.17 | 1.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11-00010 | 0.15 | 2.6 | 81 | B_Low | 0.00 | 33.77 | 39.74 | 5.96 | 0.03 | 0.04 | 0.05 | 0.05 | 0.04 | 0.05 | 0.06 | 0.06 | 0.01 | 0.01 | 0.01 | 0.01 |
| 11-00030 | 0.16 | 0.9 | 83 | B_Low | 0.00 | 53.16 | 53.16 | 0.00 | 0.05 | 0.07 | 0.08 | 0.09 | 0.05 | 0.07 | 0.08 | 0.09 | 0.00 | 0.00 | 0.00 | 0.00 |
| 11-00110 | 4.85 | 0.5 | 79 | B_Low | 0.00 | 0.00 | 51.19 | 51.19 | 0.00 | 0.00 | 0.00 | 0.00 | 1.14 | 1.62 | 1.94 | 2.18 | 1.14 | 1.62 | 1.94 | 2.18 |
| 11-00150 | 2.60 | 0.6 | 336 | B_Low | 0.00 | 0.00 | 39.98 | 39.98 | 0.00 | 0.00 | 0.00 | 0.00 | 0.61 | 0.83 | 0.98 | 1.09 | 0.61 | 0.83 | 0.98 | 1.08 |
| 11-00230 | 1.87 | 0.6 | 17 | B_Low | 0.37 | 0.00 | 54.71 | 54.71 | 0.00 | 0.00 | 0.00 | 0.00 | 0.40 | 0.58 | 0.70 | 0.79 | 0.40 | 0.58 | 0.70 | 0.79 |
| 11-00270 | 0.18 | 1.5 | 90 | B_Low | 0.00 | 0.00 | 45.65 | 45.65 | 0.00 | 0.00 | 0.00 | 0.00 | 0.05 | 0.07 | 0.08 | 0.09 | 0.05 | 0.07 | 0.08 | 0.09 |
| 13-00020 | 2.02 | 0.9 | 297 | B_Low | 0.00 | 45.26 | 56.18 | 10.92 | 0.54 | 0.74 | 0.86 | 0.96 | 0.67 | 0.91 | 1.07 | 1.19 | 0.13 | 0.18 | 0.21 | 0.23 |
| 13-00060 | 6.17 | 0.6 | 159 | B_Low | 0.00 | 45.24 | 53.66 | 8.42 | 1.44 | 2.02 | 2.39 | 2.68 | 1.66 | 2.35 | 2.79 | 3.12 | 0.22 | 0.33 | 0.39 | 0.44 |
| 13-00120 | 1.87 | 1.3 | 286 | B_Low | 0.00 | 45.25 | 57.20 | 11.95 | 0.50 | 0.68 | 0.80 | 0.89 | 0.63 | 0.86 | 1.01 | 1.12 | 0.13 | 0.18 | 0.21 | 0.23 |
| 13-00130 | 14.97 | 0.1 | 50 | C_High | 0.00 | 11.29 | 50.44 | 39.15 | 0.62 | 0.90 | 1.08 | 1.23 | 1.62 | 2.44 | 2.98 | 3.41 | 1.00 | 1.54 | 1.90 | 2.19 |
| 13-00170 | 0.80 | 1.6 | 187 | B_Low | 0.00 | 45.31 | 45.31 | 0.00 | 0.22 | 0.29 | 0.34 | 0.38 | 0.22 | 0.29 | 0.34 | 0.38 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13-00210 | 5.27 | 0.6 | 180 | B_Low | 0.00 | 45.24 | 52.39 | 7.15 | 1.27 | 1.77 | 2.09 | 2.33 | 1.69 | 2.37 | 2.81 | 3.15 | 0.42 | 0.60 | 0.72 | 0.82 |
| 13-00230 | 5.12 | 0.9 | 166 | B_Low | 0.00 | 45.23 | 45.23 | 0.00 | 1.25 | 1.74 | 2.05 | 2.30 | 1.25 | 1.74 | 2.05 | 2.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| 13-00400 | 2.03 | 0.8 | 233 | B_Low | 0.00 | 45.23 | 45.23 | 0.00 | 0.53 | 0.73 | 0.86 | 0.96 | 0.53 | 0.73 | 0.86 | 0.96 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14-00040 | 0.22 | 0 | 98 | B_Low | 0.00 | 51.14 | 51.14 | 0.00 | 0.06 | 0.09 | 0.10 | 0.12 | 0.06 | 0.09 | 0.10 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14-00080 | 0.23 | 0 | 99 | B_Low | 0.00 | 50.22 | 50.22 | 0.00 | 0.07 | 0.09 | 0.11 | 0.12 | 0.07 | 0.09 | 0.11 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14-00100 | 0.33 | 0.1 | 120 | B_Low | 0.00 | 49.85 | 50.15 | 0.30 | 0.10 | 0.13 | 0.15 | 0.17 | 0.10 | 0.13 | 0.15 | 0.17 | 0.00 | 0.00 | 0.00 | 0.00 |
| 14-00140 | 0.75 | 0.2 | 181 | B_Low | 0.00 | 37.58 | 39.97 | 2.39 | 0.17 | 0.23 | 0.27 | 0.30 | 0.18 | 0.24 | 0.28 | 0.32 | 0.01 | 0.01 | 0.02 | 0.02 |
| 14-00200 | 1.50 | 0.5 | 256 | B_Low | 0.00 | 0.00 | 51.17 | 51.17 | 0.00 | 0.00 | 0.00 | 0.00 | 0.45 | 0.62 | 0.72 | 0.80 | 0.45 | 0.62 | 0.72 | 0.80 |
| 16-00050 | 0.07 | 0.8 | 53 | B_Low | 0.00 | 86.15 | 86.15 | 0.00 | 0.03 | 0.05 | 0.05 | 0.06 | 0.03 | 0.05 | 0.05 | 0.06 | 0.00 | 0.00 | 0.00 | 0.00 |
| 16-00190 | 2.89 | 0.8 | 39 | C_Mid | 0.62 | 49.50 | 49.50 | 0.00 | 0.66 | 0.94 | 1.13 | 1.28 | 0.66 | 0.94 | 1.13 | 1.28 | 0.00 | 0.00 | 0.00 | 0.00 |
| 16-00200 | 3.04 | 0.4 | 108 | D_Low | 6.58 | 25.19 | 53.67 | 28.48 | 0.44 | 0.90 | 1.29 | 1.59 | 0.85 | 1.46 | 1.91 | 2.24 | 0.41 | 0.56 | 0.62 | 0.65 |
| 16-00220 | 1.63 | 0.4 | 267 | D_Low | 0.00 | 38.76 | 55.05 | 16.29 | 0.39 | 0.98 | 1.28 | 1.46 | 0.54 | 1.10 | 1.37 | 1.56 | 0.15 | 0.13 | 0.10 | 0.10 |
| 16-00240 | 6.66 | 0.5 | 34 | D_Low | 0.30 | 23.36 | 86.91 | 63.55 | 0.65 | 1.07 | 1.40 | 1.68 | 1.62 | 2.50 | 3.11 | 3.59 | 0.97 | 1.44 | 1.71 | 1.91 |
| 16-00300 | 23.80 | 0.4 | 66 | D_High | 29.90 | 17.01 | 47.29 | 30.28 | 1.46 | 2.29 | 2.97 | 3.50 | 2.89 | 4.49 | 5.69 | 6.60 | 1.44 | 2.20 | 2.72 | 3.11 |
| 17-00350 | 50.53 | 0.1 | 665 | C_Mid | 0.00 | 3.14 | 47.46 | 44.32 | 0.91 | 1.26 | 1.48 | 1.65 | 8.77 | 12.78 | 15.41 | 17.53 | 7.86 | 11.52 | 13.94 | 15.88 |
| 17-00430 | 0.36 | 0.8 | 125 | C_Low | 0.00 | 61.45 | 71.51 | 10.06 | 0.13 | 0.18 | 0.22 | 0.29 | 0.15 | 0.21 | 0.25 | 0.32 | 0.02 | 0.03 | 0.03 | 0.02 |
| 18-00040 | 0.21 | 1.4 | 96 | B_Low | 0.00 | 59.72 | 59.72 | 0.00 | 0.08 | 0.10 | 0.12 | 0.13 | 0.08 | 0.10 | 0.12 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| 18-00100 | 0.45 | 0.2 | 141 | B_Low | 0.00 | 49.78 | 49.78 | 0.00 | 0.13 | 0.18 | 0.21 | 0.24 | 0.13 | 0.18 | 0.21 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 |
| 18-00102 | 5.29 | 0.5 | 19 | B_Low | 0.00 | 13.83 | 35.62 | 21.79 | 0.31 | 0.45 | 0.54 | 0.61 | 0.62 | 0.90 | 1.08 | 1.23 | 0.30 | 0.45 | 0.54 | 0.62 |
| 18-00140 | 7.39 | 0.1 | 26 | B_Low | 0.00 | 18.95 | 50.96 | 32.01 | 0.38 | 0.56 | 0.68 | 0.78 | 0.68 | 1.03 | 1.26 | 1.44 | 0.30 | 0.46 | 0.58 | 0.67 |
| 18-00280 | 17.39 | 0.1 | 59 | B_Low | 0.00 | 6.60 | 50.13 | 43.53 | 0.46 | 0.66 | 0.79 | 0.90 | 1.68 | 2.53 | 3.10 | 3.56 | 1.23 | 1.87 | 2.31 | 2.66 |

| Table B-1 - Hydrologic Input and Peak Flow Results | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Subcatchment Name | Area (acres) | Average Slope (%) | Width (feet) | Infiltration Reference | Tree Cover (%) | Impervious Area (%) | | | Subcatchment Peak Flow (cfs) | | | | | | | | | | | |
| | | | | | | | | | Existing Land Use | | | | Future Land Use | | | | Increase | | | |
| | | | | | | Existing Land Use | Future Land Use | Increase | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm |
| 18-00320 | 0.13 | 0.4 | 76 | B_Low | 0.00 | 56.82 | 56.82 | 0.00 | 0.04 | 0.06 | 0.07 | 0.08 | 0.04 | 0.06 | 0.07 | 0.08 | 0.00 | 0.00 | 0.00 | 0.00 |
| 18-00340 | 2.32 | 0.9 | 318 | B_Low | 0.00 | 17.97 | 49.55 | 31.58 | 0.25 | 0.34 | 0.40 | 0.44 | 0.67 | 0.92 | 1.08 | 1.20 | 0.43 | 0.58 | 0.68 | 0.76 |
| 18-00400 | 2.42 | 0.9 | 325 | B_Low | 0.00 | 45.23 | 52.66 | 7.43 | 0.64 | 0.88 | 1.03 | 1.15 | 0.75 | 1.02 | 1.20 | 1.33 | 0.10 | 0.14 | 0.17 | 0.19 |
| 18-00460 | 2.37 | 1.4 | 321 | B_Low | 0.00 | 15.63 | 30.49 | 14.86 | 0.22 | 0.30 | 0.35 | 0.39 | 0.43 | 0.59 | 0.69 | 0.76 | 0.21 | 0.28 | 0.33 | 0.37 |
| 18-00600 | 4.19 | 0.2 | 22 | B_Low | 0.00 | 43.16 | 51.24 | 8.08 | 0.52 | 0.77 | 0.93 | 1.06 | 0.58 | 0.86 | 1.04 | 1.19 | 0.06 | 0.09 | 0.11 | 0.13 |
| 18-00720 | 6.51 | 0.1 | 31 | B_Low | 0.00 | 17.50 | 33.21 | 15.71 | 0.40 | 0.59 | 0.71 | 0.81 | 0.63 | 0.92 | 1.12 | 1.27 | 0.22 | 0.33 | 0.41 | 0.46 |
| 18-00740 | 0.52 | 0.1 | 150 | B_Low | 0.00 | 49.61 | 50.00 | 0.39 | 0.15 | 0.20 | 0.24 | 0.27 | 0.15 | 0.21 | 0.24 | 0.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| 18-00800 | 0.31 | 0.1 | 116 | B_Low | 0.00 | 60.13 | 60.13 | 0.00 | 0.11 | 0.15 | 0.18 | 0.20 | 0.11 | 0.15 | 0.18 | 0.20 | 0.00 | 0.00 | 0.00 | 0.00 |
| 18-00820 | 1.20 | 0.6 | 229 | B_Low | 0.00 | 16.07 | 49.96 | 33.89 | 0.12 | 0.16 | 0.18 | 0.20 | 0.35 | 0.48 | 0.57 | 0.63 | 0.24 | 0.33 | 0.38 | 0.43 |
| 18-00980 | 6.10 | 0.1 | 27 | B_Low | 0.00 | 12.35 | 49.96 | 37.61 | 0.29 | 0.43 | 0.51 | 0.58 | 0.75 | 1.12 | 1.36 | 1.55 | 0.46 | 0.69 | 0.85 | 0.97 |
| 18-01050 | 9.71 | 1 | 267 | B_Low | 0.00 | 18.02 | 52.22 | 34.20 | 1.01 | 1.39 | 1.63 | 1.82 | 2.67 | 3.73 | 4.41 | 4.93 | 1.66 | 2.34 | 2.78 | 3.11 |
| 18-01100 | 1.18 | 0.5 | 226 | B_Low | 0.00 | 19.37 | 52.00 | 32.63 | 0.14 | 0.19 | 0.22 | 0.24 | 0.36 | 0.49 | 0.58 | 0.64 | 0.22 | 0.31 | 0.36 | 0.40 |
| 19-00040 | 1.57 | 1.8 | 261 | B_Low | 0.00 | 54.28 | 56.90 | 2.62 | 0.50 | 0.69 | 0.80 | 0.90 | 0.52 | 0.72 | 0.84 | 0.94 | 0.02 | 0.03 | 0.04 | 0.04 |
| 19-00060 | 2.42 | 1.2 | 325 | B_Low | 0.00 | 43.42 | 47.67 | 4.25 | 0.62 | 0.85 | 0.99 | 1.11 | 0.68 | 0.93 | 1.09 | 1.21 | 0.06 | 0.08 | 0.10 | 0.11 |
| 19-00080 | 0.44 | 1 | 138 | B_Low | 0.00 | 35.99 | 54.90 | 18.91 | 0.09 | 0.13 | 0.15 | 0.17 | 0.14 | 0.20 | 0.23 | 0.26 | 0.05 | 0.07 | 0.08 | 0.09 |
| 22-00040 | 4.80 | 0.5 | 88 | B_Low | 0.00 | 53.03 | 53.03 | 0.00 | 1.19 | 1.69 | 2.02 | 2.27 | 1.19 | 1.69 | 2.02 | 2.27 | 0.00 | 0.00 | 0.00 | 0.00 |
| CC-N-00-002 | 41.24 | 4.6 | 106 | C_High | 77.15 | 0.53 | 4.86 | 4.33 | 0.13 | 0.26 | 1.01 | 1.76 | 1.13 | 1.57 | 1.91 | 2.40 | 1.00 | 1.30 | 0.90 | 0.64 |
| CC-N-00-011 | 46.40 | 2.2 | 118 | C_Mid | 42.18 | 2.29 | 40.00 | 37.71 | 0.61 | 0.85 | 1.04 | 1.70 | 6.58 | 9.61 | 11.68 | 13.50 | 5.96 | 8.76 | 10.64 | 11.80 |
| CC-N-00-018 | 44.21 | 0.7 | 70 | D_Mid | 14.82 | 3.42 | 40.00 | 36.58 | 0.76 | 1.07 | 1.32 | 1.62 | 4.40 | 6.54 | 8.08 | 9.40 | 3.64 | 5.47 | 6.76 | 7.79 |
| CC-N-00-021 | 27.65 | 1.2 | 134 | D_Mid | 29.80 | 0.00 | 68.59 | 68.59 | 0.00 | 0.19 | 0.91 | 1.70 | 6.34 | 9.23 | 11.31 | 13.21 | 6.34 | 9.04 | 10.40 | 11.51 |
| CC-N-00-027 | 14.96 | 0.6 | 105 | D_Mid | 50.53 | 9.73 | 30.24 | 20.51 | 0.77 | 1.09 | 1.44 | 1.75 | 1.94 | 2.81 | 3.52 | 4.11 | 1.17 | 1.72 | 2.08 | 2.36 |
| CC-N-00-029 | 9.76 | 0.6 | 158 | D_Low | 0.00 | 15.55 | 71.04 | 55.49 | 0.86 | 1.79 | 2.64 | 3.36 | 3.01 | 4.85 | 6.17 | 7.17 | 2.15 | 3.06 | 3.53 | 3.81 |
| CC-N-00-035 | 1235.47 | 1 | 820 | C_High | 24.36 | 4.61 | 5.16 | 0.55 | 23.01 | 33.30 | 40.02 | 45.28 | 24.94 | 36.17 | 43.53 | 49.30 | 1.93 | 2.88 | 3.51 | 4.02 |
| CC-N-01-001 | 11.60 | 0.4 | 500 | C_High | 1.16 | 0.45 | 35.20 | 34.75 | 0.07 | 0.14 | 0.17 | 0.21 | 2.27 | 3.18 | 3.75 | 4.20 | 2.21 | 3.03 | 3.58 | 3.99 |
| CC-N-01-002 | 5.24 | 0.3 | 179 | C_High | 0.00 | 0.00 | 50.05 | 50.05 | 0.00 | 0.00 | 0.00 | 0.05 | 1.32 | 1.86 | 2.21 | 2.48 | 1.32 | 1.86 | 2.21 | 2.43 |
| CC-N-01-003 | 5.87 | 0.2 | 378 | C_High | 6.44 | 0.00 | 0.00 | 0.00 | 0.06 | 0.23 | 0.30 | 0.34 | 0.06 | 0.23 | 0.30 | 0.34 | 0.00 | 0.00 | 0.00 | 0.00 |
| CC-N-01-004 | 2.38 | 0.2 | 512 | C_Mid | 18.02 | 0.00 | 0.00 | 0.00 | 0.08 | 0.28 | 0.35 | 0.44 | 0.08 | 0.28 | 0.35 | 0.44 | 0.00 | 0.00 | 0.00 | 0.00 |
| CC-N-01-005 | 4.78 | 0.2 | 525 | C_Low | 3.91 | 0.00 | 0.00 | 0.00 | 0.04 | 0.13 | 0.36 | 0.67 | 0.04 | 0.13 | 0.36 | 0.67 | 0.00 | 0.00 | 0.00 | 0.00 |
| CC-N-01-009 | 10.63 | 0.5 | 1970 | D_Mid | 16.72 | 4.81 | 5.00 | 0.20 | 0.51 | 1.61 | 2.75 | 4.65 | 0.51 | 1.63 | 2.77 | 4.67 | 0.01 | 0.01 | 0.02 | 0.02 |
| CC-N-01-021 | 16.43 | 0.4 | 2400 | D_Mid | 24.64 | 12.86 | 49.31 | 36.45 | 1.43 | 4.05 | 6.04 | 8.69 | 4.80 | 8.02 | 10.15 | 12.83 | 3.37 | 3.96 | 4.11 | 4.14 |
| CC-N-01-023 | 39.22 | 0.4 | 1064 | D_Mid | 8.98 | 3.16 | 57.79 | 54.63 | 0.81 | 2.55 | 3.93 | 5.74 | 11.08 | 16.54 | 20.21 | 23.76 | 10.27 | 13.99 | 16.28 | 18.02 |
| CC-N-02-001 | 11.14 | 0.4 | 156 | C_Low | 4.51 | 10.59 | 40.31 | 29.72 | 0.65 | 0.90 | 1.12 | 1.44 | 2.02 | 2.89 | 3.52 | 4.15 | 1.37 | 1.99 | 2.40 | 2.71 |
| CC-N-02-007 | 12.45 | 0.3 | 2170 | D_Low | 0.24 | 1.25 | 32.47 | 31.22 | 1.41 | 4.70 | 7.27 | 8.89 | 2.55 | 6.92 | 9.28 | 10.73 | 1.15 | 2.22 | 2.01 | 1.84 |
| CC-N-02-017 | 769.41 | 0.4 | 720 | C_Low | 32.06 | 3.03 | 6.54 | 3.51 | 10.19 | 14.64 | 17.63 | 20.45 | 21.67 | 31.18 | 37.57 | 43.55 | 11.48 | 16.55 | 19.94 | 23.10 |
| CC-N-03-002 | 25.65 | 0.4 | 79 | C_High | 34.27 | 5.67 | 15.83 | 10.16 | 0.71 | 1.01 | 1.20 | 1.35 | 1.54 | 2.24 | 2.70 | 3.06 | 0.83 | 1.23 | 1.50 | 1.71 |
| CC-N-03-003 | 2.44 | 0.2 | 326 | B_Low | 0.00 | 5.08 | 44.02 | 38.94 | 0.07 | 0.10 | 0.12 | 0.13 | 0.61 | 0.85 | 1.00 | 1.11 | 0.54 | 0.75 | 0.88 | 0.98 |
| CC-N-04-002 | 23.91 | 1 | 114 | B_Low | 37.04 | 1.36 | 40.00 | 38.64 | 0.19 | 0.26 | 0.31 | 0.34 | 3.64 | 5.29 | 6.38 | 7.23 | 3.45 | 5.03 | 6.07 | 6.88 |
| CC-N-05-001 | 10.31 | 1.5 | 65 | C_High | 35.53 | 1.19 | 40.01 | 38.81 | 0.07 | 0.10 | 0.15 | 0.32 | 1.80 | 2.58 | 3.10 | 3.57 | 1.72 | 2.48 | 2.96 | 3.25 |
| CC-N-05-002 | 8.08 | 1.7 | 161 | B_Low | 6.84 | 6.94 | 40.00 | 33.06 | 0.33 | 0.45 | 0.53 | 0.59 | 1.74 | 2.42 | 2.85 | 3.19 | 1.41 | 1.97 | 2.32 | 2.60 |
| CC-N-05-003 | 17.71 | 1.2 | 447 | B_Low | 0.00 | 12.64 | 49.00 | 36.36 | 1.31 | 1.79 | 2.10 | 2.34 | 4.60 | 6.42 | 7.58 | 8.47 | 3.30 | 4.63 | 5.48 | 6.14 |
| LINN-0 | 9.24 | 0.1 | 34 | B_Low | 0.00 | 63.23 | 63.23 | 0.00 | 1.09 | 1.64 | 2.01 | 2.30 | 1.09 | 1.64 | 2.01 | 2.30 | 0.00 | 0.00 | 0.00 | 0.00 |
| LINN-11 | 25.49 | 1.1 | 334 | D_High | 0.00 | 50.31 | 70.75 | 20.45 | 6.06 | 8.68 | 10.91 | 12.32 | 7.88 | 11.37 | 14.16 | 16.03 | 1.82 | 2.70 | 3.26 | 3.71 |
| LINN-17 | 8.99 | 0.6 | 258 | D_Mid | 0.00 | 86.11 | 86.11 | 0.00 | 3.64 | 5.19 | 6.31 | 7.33 | 3.64 | 5.19 | 6.31 | 7.33 | 0.00 | 0.00 | 0.00 | 0.00 |
| LINN-18 | 20.63 | 0.4 | 221 | D_Mid | 0.00 | 39.91 | 72.44 | 32.54 | 3.44 | 4.97 | 6.05 | 7.05 | 5.25 | 7.67 | 9.34 | 10.82 | 1.81 | 2.70 | 3.29 | 3.77 |
| LINN-2 | 18.13 | 0.6 | 282 | B_Low | 0.00 | 4.52 | 59.89 | 55.37 | 0.48 | 0.66 | 0.77 | 0.86 | 4.78 | 6.86 | 8.21 | 9.26 | 4.30 | 6.20 | 7.44 | 8.41 |
| LINN-22 | 2.85 | 0.1 | 352 | D_Low | 0.00 | 66.26 | 66.26 | 0.00 | 1.05 | 1.83 | 2.29 | 2.61 | 1.05 | 1.83 | 2.29 | 2.61 | 0.00 | 0.00 | 0.00 | 0.00 |
| LINN-4 | 12.50 | 0.7 | 184 | B_Low | 0.00 | 42.04 | 70.85 | 28.80 | 2.50 | 3.56 | 4.24 | 4.77 | 3.72 | 5.37 | 6.44 | 7.28 | 1.23 | 1.82 | 2.21 | 2.52 |
| LINN-9 | 36.76 | 0.9 | 435 | B_Low | 0.00 | 54.00 | 70.48 | 16.48 | 8.75 | 12.57 | 15.04 | 16.97 | 10.66 | 15.41 | 18.50 | 20.92 | 1.91 | 2.84 | 3.46 | 3.96 |

| Table B-1 - Hydrologic Input and Peak Flow Results | | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Impervious Area (%) | | | Subcatchment Peak Flow (cfs) | | | | | | | | | | | |
| | | | | | | | | | Existing Land Use | | | | Future Land Use | | | | Increase | | | |
| Subcatchment Name | Area (acres) | Average Slope (%) | Width (feet) | Infiltration Reference | Tree Cover (%) | Existing Land Use | Future Land Use | Increase | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm | 2-yr, 24-hr Design Storm | 10-yr, 24-hr Design Storm | 25-yr, 24-hr Design Storm | 50-yr, 24-hr Design Storm |
| MURDER CREEK | | | | | | | | | | | | | | | | | | | | |
| 00-05381 | 2.02 | 0.8 | 256.26 | C_High | 0.00 | 27.72 | 51.34 | 23.62 | 0.33 | 0.45 | 0.53 | 0.59 | 0.60 | 0.83 | 0.97 | 1.08 | 0.28 | 0.38 | 0.44 | 0.49 |
| 00-05382 | 4.06 | 0.6 | 176.11 | C_Mid | 0.00 | 21.67 | 50.14 | 28.46 | 0.51 | 0.70 | 0.82 | 0.91 | 1.10 | 1.53 | 1.80 | 2.03 | 0.59 | 0.83 | 0.98 | 1.12 |
| 00-05391 | 5.13 | 1.4 | 489.32 | D_High | 0.00 | 19.49 | 49.92 | 30.43 | 0.59 | 0.84 | 1.76 | 2.03 | 1.50 | 2.05 | 3.09 | 3.49 | 0.90 | 1.21 | 1.33 | 1.46 |
| 00-05401 | 4.17 | 1.6 | 344.29 | C_High | 0.00 | 17.27 | 49.99 | 32.72 | 0.43 | 0.58 | 0.68 | 0.76 | 1.22 | 1.67 | 1.96 | 2.18 | 0.79 | 1.09 | 1.27 | 1.42 |
| 00-05411 | 0.13 | 0.7 | 37.5 | D_Low | 0.00 | 50.00 | 50.00 | 0.00 | 0.04 | 0.09 | 0.11 | 0.12 | 0.04 | 0.09 | 0.11 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| 00-05421 | 1.77 | 0.4 | 178.38 | B_Low | 0.00 | 35.03 | 51.78 | 16.75 | 0.36 | 0.49 | 0.58 | 0.65 | 0.52 | 0.72 | 0.85 | 0.94 | 0.16 | 0.22 | 0.27 | 0.30 |
| 00-05431 | 17.87 | 0.4 | 724.28 | B_Low | 0.00 | 52.15 | 75.41 | 23.26 | 4.86 | 6.81 | 8.05 | 9.01 | 6.60 | 9.36 | 11.12 | 12.49 | 1.74 | 2.54 | 3.07 | 3.48 |
| 00-05432 | 9.38 | 0.7 | 470.6 | B_Low | 0.00 | 45.20 | 68.12 | 22.92 | 2.34 | 3.26 | 3.85 | 4.30 | 3.42 | 4.76 | 5.61 | 6.27 | 1.07 | 1.50 | 1.76 | 1.97 |
| 01-00150 | 2.03 | 0.7 | 154.2 | C_Low | 0.00 | 50.74 | 54.08 | 3.35 | 0.58 | 0.81 | 0.95 | 1.18 | 0.62 | 0.86 | 1.02 | 1.25 | 0.04 | 0.05 | 0.06 | 0.07 |
| 01-00170 | 1.37 | 2.3 | 291.96 | C_High | 0.00 | 50.36 | 55.97 | 5.60 | 0.41 | 0.56 | 0.66 | 0.73 | 0.46 | 0.62 | 0.73 | 0.81 | 0.05 | 0.06 | 0.07 | 0.08 |
| 01-00210 | 0.96 | 0.5 | 61.4 | D_Mid | 0.00 | 11.46 | 50.00 | 38.54 | 0.07 | 0.09 | 0.14 | 0.21 | 0.27 | 0.37 | 0.46 | 0.57 | 0.20 | 0.28 | 0.32 | 0.36 |
| 01-00290 | 0.55 | 1.6 | 123.57 | D_High | 0.00 | 50.91 | 54.56 | 3.65 | 0.17 | 0.23 | 0.39 | 0.44 | 0.18 | 0.25 | 0.40 | 0.45 | 0.01 | 0.01 | 0.01 | 0.01 |
| 01-00310 | 0.81 | 2.9 | 178.07 | C_Low | 0.00 | 54.32 | 63.41 | 9.09 | 0.26 | 0.36 | 0.45 | 0.64 | 0.30 | 0.42 | 0.51 | 0.69 | 0.04 | 0.06 | 0.06 | 0.05 |
| 01-00330 | 0.18 | 3 | 53.11 | C_Low | 0.00 | 0.00 | 50.00 | 50.00 | 0.00 | 0.01 | 0.04 | 0.08 | 0.05 | 0.07 | 0.10 | 0.14 | 0.05 | 0.06 | 0.06 | 0.06 |
| 01-00370 | 5.82 | 1.2 | 579.09 | C_Mid | 0.00 | 0.00 | 49.99 | 49.99 | 0.00 | 0.00 | 0.19 | 0.60 | 1.70 | 2.33 | 2.73 | 3.04 | 1.70 | 2.33 | 2.54 | 2.44 |
| 01-00390 | 0.25 | 4.2 | 92.71 | D_Mid | 0.00 | 24.00 | 50.00 | 26.00 | 0.04 | 0.05 | 0.13 | 0.20 | 0.08 | 0.10 | 0.18 | 0.23 | 0.04 | 0.05 | 0.05 | 0.03 |
| 08-00020 | 0.25 | 1.6 | 85.47 | B_Low | 0.00 | 24.00 | 44.90 | 20.90 | 0.04 | 0.05 | 0.06 | 0.06 | 0.07 | 0.09 | 0.11 | 0.12 | 0.03 | 0.04 | 0.05 | 0.05 |
| 08-00060 | 1.77 | 0.4 | 75.75 | B_Low | 0.00 | 50.28 | 56.88 | 6.60 | 0.47 | 0.66 | 0.78 | 0.87 | 0.53 | 0.74 | 0.87 | 0.97 | 0.06 | 0.08 | 0.10 | 0.11 |
| 12-00020 | 4.60 | 0.3 | 154.72 | B_Low | 0.00 | 11.30 | 36.59 | 25.28 | 0.30 | 0.41 | 0.49 | 0.54 | 0.87 | 1.22 | 1.45 | 1.62 | 0.57 | 0.81 | 0.96 | 1.08 |
| 12-00060 | 2.03 | 1.9 | 262.88 | C_High | 0.00 | 47.29 | 56.74 | 9.44 | 0.57 | 0.77 | 0.91 | 1.01 | 0.68 | 0.93 | 1.09 | 1.21 | 0.11 | 0.15 | 0.18 | 0.20 |
| 12-00100 | 1.34 | 0.5 | 87.63 | B_Low | 0.00 | 52.99 | 59.67 | 6.69 | 0.39 | 0.54 | 0.64 | 0.72 | 0.44 | 0.61 | 0.72 | 0.81 | 0.05 | 0.06 | 0.08 | 0.09 |
| 12-00180 | 4.14 | 1.6 | 472.12 | B_Low | 0.00 | 50.48 | 58.65 | 8.16 | 1.23 | 1.68 | 1.97 | 2.19 | 1.42 | 1.95 | 2.28 | 2.54 | 0.19 | 0.27 | 0.32 | 0.35 |
| 12-00241 | 1.62 | 2.8 | 231.26 | B_Low | 0.00 | 14.81 | 51.29 | 36.48 | 0.14 | 0.20 | 0.23 | 0.25 | 0.49 | 0.67 | 0.79 | 0.88 | 0.35 | 0.48 | 0.56 | 0.63 |
| 15-00080 | 5.00 | 0.4 | 174.41 | B_Low | 0.00 | 70.80 | 75.01 | 4.21 | 1.71 | 2.43 | 2.90 | 3.25 | 1.77 | 2.52 | 3.01 | 3.38 | 0.06 | 0.09 | 0.11 | 0.13 |
| 15-00240 | 0.45 | 1.5 | 69.91 | B_Low | 0.00 | 51.11 | 51.11 | 0.00 | 0.14 | 0.19 | 0.22 | 0.24 | 0.14 | 0.19 | 0.22 | 0.24 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23-00020 | 0.22 | 0.1 | 9.01 | B_Low | 0.00 | 81.82 | 83.18 | 1.36 | 0.07 | 0.11 | 0.13 | 0.15 | 0.08 | 0.11 | 0.14 | 0.15 | 0.00 | 0.01 | 0.01 | 0.01 |
| 23-00040 | 1.62 | 1.5 | 279.43 | B_Low | 0.00 | 27.78 | 45.72 | 17.94 | 0.27 | 0.37 | 0.43 | 0.48 | 0.44 | 0.60 | 0.70 | 0.78 | 0.17 | 0.23 | 0.28 | 0.31 |
| 23-00060 | 0.13 | 1.4 | 45.6 | B_Low | 0.00 | 92.31 | 92.31 | 0.00 | 0.07 | 0.10 | 0.11 | 0.13 | 0.07 | 0.10 | 0.11 | 0.13 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23-00100 | 0.11 | 1.5 | 35.8 | B_Low | 0.00 | 90.91 | 90.91 | 0.00 | 0.06 | 0.08 | 0.10 | 0.11 | 0.06 | 0.08 | 0.10 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23-00140 | 0.74 | 1.7 | 154.31 | B_Low | 0.00 | 44.59 | 44.59 | 0.00 | 0.20 | 0.27 | 0.31 | 0.35 | 0.20 | 0.27 | 0.31 | 0.35 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23-00180 | 0.18 | 0.8 | 30.11 | B_Low | 0.00 | 77.78 | 77.78 | 0.00 | 0.08 | 0.11 | 0.13 | 0.15 | 0.08 | 0.11 | 0.13 | 0.15 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23-00220 | 0.13 | 0.5 | 14.38 | B_Low | 0.00 | 84.62 | 84.62 | 0.00 | 0.06 | 0.09 | 0.10 | 0.11 | 0.06 | 0.09 | 0.10 | 0.11 | 0.00 | 0.00 | 0.00 | 0.00 |
| 23-00240 | 3.93 | 2 | 557.11 | B_Low | 0.00 | 11.70 | 50.00 | 38.30 | 0.27 | 0.38 | 0.44 | 0.49 | 1.16 | 1.58 | 1.86 | 2.07 | 0.88 | 1.21 | 1.42 | 1.58 |
| 23-00280 | 0.03 | 0.8 | 23.37 | B_Low | 0.00 | 100.00 | 100.00 | 0.00 | 0.02 | 0.02 | 0.03 | 0.03 | 0.02 | 0.02 | 0.02 | 0.03 | 0.00 | 0.00 | -0.01 | -0.01 |
| 23-00300 | 0.16 | 0.6 | 33.05 | D_High | 0.00 | 56.25 | 56.25 | 0.00 | 0.05 | 0.07 | 0.11 | 0.12 | 0.05 | 0.07 | 0.11 | 0.12 | 0.00 | 0.00 | 0.00 | 0.00 |
| LINN-25 | 15.53 | 0.7 | 711.53 | C_Mid | 0.00 | 3.16 | 38.26 | 35.10 | 0.29 | 0.40 | 0.47 | 1.00 | 3.32 | 4.62 | 5.44 | 6.07 | 3.03 | 4.22 | 4.97 | 5.08 |
| LINN-26 | 45.46 | 0.4 | 1359.18 | C_High | 0.00 | 34.56 | 66.62 | 32.06 | 8.30 | 11.60 | 13.70 | 15.31 | 14.28 | 20.34 | 24.25 | 27.28 | 5.97 | 8.74 | 10.55 | 11.97 |
| MC-DRAIN-N-03 | 5.51 | 1.4 | 485.08 | C_High | 0.00 | 1.63 | 24.03 | 22.40 | 0.05 | 0.07 | 0.09 | 0.23 | 0.78 | 1.07 | 1.26 | 1.40 | 0.73 | 1.00 | 1.17 | 1.16 |
| MC-DRAIN-N-04 | 10.31 | 0.5 | 481.74 | C_Mid | 0.00 | 7.37 | 50.00 | 42.63 | 0.45 | 0.61 | 0.72 | 0.82 | 2.78 | 3.87 | 4.55 | 5.15 | 2.33 | 3.25 | 3.83 | 4.33 |
| MC-N-01-03 | 30.60 | 0.8 | 1162.07 | C_Mid | 0.00 | 1.31 | 48.43 | 47.12 | 0.24 | 0.33 | 0.51 | 1.65 | 8.04 | 11.16 | 13.15 | 14.85 | 7.80 | 10.84 | 12.64 | 13.20 |
| MC-N-01-07 | 76.89 | 1.2 | 2547.08 | C_High | 9.17 | 0.90 | 66.27 | 65.38 | 0.41 | 0.56 | 0.66 | 1.89 | 26.94 | 37.65 | 44.44 | 49.69 | 26.53 | 37.09 | 43.79 | 47.80 |
| MC-N-01-13 | 64.75 | 0.9 | 1839.81 | C_High | 0.00 | 9.67 | 74.45 | 64.79 | 3.67 | 5.03 | 5.89 | 6.55 | 24.01 | 33.94 | 40.29 | 45.21 | 20.34 | 28.91 | 34.40 | 38.66 |
| MC-N-01-15 | 141.65 | 0.3 | 1063.83 | C_High | 2.17 | 36.03 | 71.48 | 35.45 | 19.22 | 27.95 | 33.68 | 38.18 | 31.50 | 46.13 | 55.72 | 63.28 | 12.29 | 18.18 | 22.04 | 25.09 |
| MC-N-02-03 | 36.61 | 0.4 | 756.13 | B_Low | 0.00 | 3.06 | 54.78 | 51.72 | 0.66 | 0.91 | 1.06 | 1.18 | 9.04 | 12.95 | 15.48 | 17.45 | 8.38 | 12.05 | 14.42 | 16.27 |
| MC-N-02-05 | 149.88 | 0.4 | 1057.14 | B_Low | 20.90 | 20.30 | 71.72 | 51.41 | 13.67 | 19.59 | 23.42 | 26.40 | 34.27 | 50.07 | 60.41 | 68.64 | 20.60 | 30.48 | 36.99 | 42.24 |
| MC-N-11-02 | 39.33 | 1.3 | 1326.13 | C_High | 0.00 | 1.42 | 74.40 | 72.98 | 0.33 | 0.46 | 0.53 | 0.85 | 15.38 | 21.52 | 25.42 | 28.43 | 15.04 | 21.06 | 24.88 | 27.58 |
| MC-N-21-02 | 57.95 | 1 | 1572.69 | C_High | 0.00 | 2.19 | 74.67 | 72.48 | 0.76 | 1.03 | 1.21 | 1.35 | 21.51 | 30.41 | 36.11 | 40.52 | 20.75 | 29.38 | 34.90 | 39.18 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| CROOKS CREEK | | | | | | | | | | | | | | | | |
| 00-05035 | 00-15035 | 00-05039 | 32.8 | 12" DIA | 1.9 | 204.3 | 203.7 | 207.9 | 207.9 | 204.4 | 203.9 | 204.8 | 204.1 | 4.9 | 0.1 | 0.8 |
| 00-05047 | 00-15049 | 00-05045 | 31.87 | 30" DIA | 0.3 | 203.3 | 203.3 | 208.6 | 208.6 | 204.3 | 204.3 | 204.9 | 204.8 | 20.6 | 0.5 | 3.8 |
| 00-05048 | 00-15049 | 00-05045 | 31.8 | 30" DIA | 0.5 | 203.3 | 203.1 | 208.6 | 208.6 | 204.3 | 204.3 | 204.9 | 204.8 | 30.0 | 0.7 | 4.3 |
| 00-05049 | 00-15049 | 00-05045 | 32.14 | 30" DIA | 0.1 | 203.2 | 203.2 | 208.6 | 208.6 | 204.3 | 204.3 | 204.9 | 204.8 | 10.2 | 0.6 | 4.1 |
| 00-05054 | 00-15054 | 00-05053 | 26.66 | 12" DIA | 1.9 | 235.5 | 235.0 | 237.7 | 237.7 | 235.7 | 235.0 | 235.8 | 235.1 | 5.0 | 0.2 | 0.7 |
| 00-05059 | 00-15059 | 00-05060 | 26.66 | 12" DIA | 0.5 | 233.5 | 233.3 | 235.9 | 235.9 | 233.6 | 233.6 | 235.9 | 235.9 | 2.6 | 0.2 | 1.4 |
| 00-05067 | 00-15067 | 16-00450 | 41.03 | 24" DIA | 1 | 204.7 | 204.3 | 208.8 | 208.8 | 206.0 | 204.9 | 206.8 | 205.4 | 22.6 | 6.8 | 13.6 |
| 00-05068 | 00-15067 | 16-00450 | 41.13 | 24" DIA | 1 | 204.7 | 204.3 | 208.8 | 208.8 | 206.0 | 204.9 | 206.8 | 205.4 | 22.3 | 6.9 | 13.7 |
| 00-05190 | 00-15191 | 00-05187 | 30.23 | 84" DIA | 2.3 | 210.4 | 209.7 | 220.9 | 220.9 | 214.6 | 214.5 | 214.6 | 214.6 | 621.7 | 27.9 | 29.7 |
| 00-05191 | 00-15191 | 00-05187 | 31.46 | 84" DIA | 1.5 | 210.1 | 209.6 | 220.9 | 220.9 | 214.6 | 214.5 | 214.6 | 214.6 | 435.9 | -12.2 | -12.4 |
| 00-05192 | 00-15191 | 00-05187 | 31.53 | 84" DIA | 0.4 | 209.7 | 209.5 | 220.9 | 220.9 | 214.6 | 214.5 | 214.6 | 214.6 | 197.9 | -12.1 | -12.1 |
| 00-05252 | 00-15253 | 00-05250 | 35.64 | 36" DIA | 0.1 | 196.6 | 196.6 | 201.6 | 201.7 | 198.3 | 198.0 | 198.8 | 198.4 | 25.0 | 11.1 | 18.1 |
| 00-05253 | 00-15253 | 00-05250 | 35.64 | 36" DIA | 0.1 | 196.7 | 196.7 | 201.6 | 201.7 | 198.3 | 198.0 | 198.8 | 198.4 | 25.0 | 9.9 | 16.7 |
| 00-05256 | 00-15256 | 00-05254 | 19.72 | 51" H, 66" BOX | 1.5 | 197.2 | 197.0 | 202.3 | 202.3 | 198.8 | 198.7 | 199.3 | 199.1 | 313.9 | 21.0 | 34.8 |
| 00-05257 | 00-15258 | 00-05263 | 39.94 | 48" DIA | 0.3 | 191.1 | 191.0 | 196.7 | 196.7 | 194.5 | 194.4 | 195.4 | 195.2 | 71.9 | 24.4 | 40.6 |
| 00-05258 | 00-15258 | 00-05263 | 39.94 | 48" DIA | 0.5 | 191.0 | 190.8 | 196.7 | 196.7 | 194.5 | 194.4 | 195.4 | 195.2 | 99.1 | 25.4 | 41.2 |
| 00-05260 | 00-15258 | 00-05263 | 39.92 | 48" DIA | 0.6 | 191.3 | 191.1 | 196.7 | 196.7 | 194.5 | 194.4 | 195.4 | 195.2 | 113.7 | 23.8 | 40.0 |
| 00-05262 | 00-15258 | 00-05263 | 39.97 | 48" DIA | 0.2 | 191.0 | 190.9 | 196.7 | 196.7 | 194.5 | 194.4 | 195.4 | 195.2 | 64.3 | 24.6 | 40.7 |
| 00-05286 | 00-15286 | 00-05283 | 50.42 | 24" DIA | 2.4 | 231.9 | 230.7 | 234.5 | 234.5 | 232.7 | 231.6 | 233.0 | 231.8 | 34.8 | 4.6 | 5.9 |
| 00-05287 | 00-15286 | 00-05283 | 50.57 | 24" DIA | 0.9 | 231.3 | 230.8 | 234.5 | 234.5 | 232.7 | 231.6 | 233.0 | 231.8 | 21.6 | 7.7 | 10.6 |
| 00-05308 | 00-15308 | 00-05309 | 21.41 | 24" DIA | 1.4 | 223.9 | 223.6 | 226.9 | 226.9 | 225.7 | 224.7 | 226.3 | 224.9 | 27.2 | 11.3 | 18.3 |
| 00-05365 | 00-15365 | 00-05349 | 70.5 | 58" H, 120" BOX | 1.2 | 205.2 | 204.3 | 213.5 | 213.5 | 207.8 | 207.8 | 208.3 | 208.2 | 851.5 | 31.3 | 39.6 |
| 00-05370 | 00-15365 | 00-05349 | 70.61 | 58" H, 120" BOX | 1.23 | 205.2 | 204.3 | 213.5 | 213.5 | 207.8 | 207.8 | 208.3 | 208.2 | 850.8 | 31.3 | 39.6 |
| 00-05500 | 00-05501 | 00-05502 | 18.13 | 15" DIA | 0.55 | 193.9 | 193.8 | 196.5 | 196.5 | 194.8 | 194.8 | 195.1 | 195.0 | 4.8 | 0.6 | 1.6 |
| 00-05510 | 00-05501 | 00-05502 | 17.35 | 12" DIA | 1.15 | 194.0 | 193.8 | 196.5 | 196.5 | 194.8 | 194.8 | 195.1 | 195.0 | 3.8 | 0.4 | 1.0 |
| 00-05520 | 00-05521 | 00-05522 | 14.43 | 12" DIA | -1.39 | 199.1 | 199.3 | 201.7 | 201.7 | 199.4 | 199.2 | 199.6 | 199.4 | 4.2 | 0.0 | 0.4 |
| 00-05530 | 00-05521 | 00-05522 | 14.83 | 15" DIA | -0.67 | 198.8 | 198.9 | 201.7 | 201.7 | 199.4 | 199.2 | 199.6 | 199.4 | 5.3 | 1.0 | 1.8 |
| 00-05540 | 00-05541 | 00-05542 | 24.71 | 12" DIA | 1.21 | 200.3 | 200.0 | 202.1 | 202.1 | 200.9 | 200.4 | 201.4 | 200.5 | 3.9 | 1.0 | 2.2 |
| 00-05550 | 00-005551 | 00-05552 | 21.45 | 12" DIA | -1.86 | 200.4 | 200.8 | 202.8 | 202.8 | 201.5 | 201.4 | 201.9 | 201.6 | 4.9 | 0.9 | 2.2 |
| 00-05560 | 00-05561 | 00-05562 | 24.96 | 12" DIA | 0.4 | 201.5 | 201.4 | 203.3 | 203.3 | 202.3 | 202.2 | 202.6 | 202.4 | 2.3 | 0.9 | 2.1 |
| 00-05570 | 00-05571 | 00-05572 | 21.53 | 12" DIA | 0.7 | 201.6 | 201.5 | 203.4 | 203.4 | 202.3 | 202.3 | 202.6 | 202.6 | 3.0 | 0.9 | 1.3 |
| 00-21671 | 00-21680 | 00-21690 | 20.11 | 24" DIA | 0.5 | 203.6 | 203.5 | 206.0 | 206.0 | 204.2 | 203.7 | 204.7 | 204.1 | 16.0 | 1.6 | 4.4 |
| 00-21681 | 00-21680 | 00-21690 | 20.09 | 24" DIA | 1.29 | 203.7 | 203.4 | 206.0 | 206.0 | 204.2 | 203.7 | 204.7 | 204.1 | 25.7 | 1.9 | 4.2 |
| 00-22661 | 00-22680 | 00-22960 | 23.83 | 12" DIA | 0.8 | 202.2 | 202.0 | 204.6 | 204.6 | 202.2 | 202.2 | 203.0 | 203.0 | 3.0 | 0.0 | 1.1 |
| 00-22671 | 00-22680 | 00-22960 | 24.29 | 12" DIA | 0.82 | 202.4 | 202.2 | 204.6 | 204.6 | 202.2 | 202.2 | 203.0 | 203.0 | 3.0 | 0.0 | 0.9 |
| 00-22681 | 00-22680 | 00-22960 | 24.32 | 30" DIA | -1.77 | 200.8 | 201.2 | 204.6 | 204.6 | 202.2 | 202.2 | 203.0 | 203.0 | 50.6 | 3.5 | 7.4 |
| 01-00070 | 01-00060 | 01-00080 | 81.6 | 10" DIA | 0.5 | 238.5 | 238.1 | 242.6 | 242.2 | 238.6 | 238.6 | 238.6 | 238.6 | 1.6 | 0.0 | 0.0 |
| 01-00090 | 01-00080 | 01-00100 | 36.03 | 10" DIA | 0.5 | 238.1 | 237.9 | 242.2 | 242.2 | 238.6 | 238.5 | 238.6 | 238.6 | 1.6 | 0.6 | 0.6 |
| 01-00110 | 01-00100 | 01-00120 | 134 | 12" DIA | 0.5 | 237.9 | 237.3 | 242.2 | 242.2 | 238.5 | 238.3 | 238.6 | 238.4 | 2.5 | 1.1 | 1.2 |
| 01-00220 | 01-00230 | 01-00250 | 35.18 | 10" DIA | 0.4 | 238.7 | 238.5 | 241.2 | 241.2 | 238.9 | 238.9 | 238.9 | 238.9 | 1.4 | 0.0 | 0.0 |
| 01-00240 | 01-00250 | 01-00270 | 126.08 | 10" DIA | 0.3 | 238.5 | 238.2 | 241.2 | 241.8 | 238.9 | 238.6 | 238.9 | 238.7 | 1.2 | 0.5 | 0.5 |
| 01-00260 | 01-00270 | 01-00100 | 71.2 | 10" DIA | 0.3 | 238.2 | 237.9 | 241.8 | 242.2 | 238.6 | 238.5 | 238.7 | 238.6 | 1.2 | 0.6 | 0.6 |
| 01-00380 | 01-00430 | 01-00410 | 22.15 | 12" DIA | 0.5 | 236.4 | 236.3 | 239.0 | 239.0 | 236.8 | 236.7 | 236.9 | 236.7 | 2.5 | 1.1 | 1.2 |
| 02-00010 | 02-00020 | 00-15308 | 70 | 12" DIA | 0.4 | 226.1 | 225.8 | 229.6 | 226.9 | 226.5 | 225.7 | 226.5 | 226.3 | 2.3 | 0.8 | 0.9 |
| 02-00030 | 02-00040 | 02-00020 | 285.92 | 12" DIA | 0.8 | 228.5 | 226.2 | 235.9 | 229.6 | 228.8 | 226.5 | 228.8 | 226.5 | 3.2 | 0.6 | 0.6 |
| 02-00050 | 02-Dummy-01 | 02-00040 | 135.69 | 12" DIA | 0.8 | 229.7 | 228.6 | 239.1 | 235.9 | 230.0 | 228.8 | 230.0 | 228.8 | 3.2 | 0.6 | 0.6 |
| 02-00070 | 02-00080 | 02-00060 | 120 | 60" DIA | 0.3 | 230.1 | 229.8 | 238.7 | 239.1 | 233.5 | 233.5 | 233.5 | 233.5 | 142.7 | 0.9 | 0.9 |
| 02-00090 | 02-00100 | 02-00080 | 322 | 12" DIA | 0.6 | 236.3 | 234.2 | 240.6 | 238.7 | 236.7 | 233.5 | 236.7 | 233.5 | 2.8 | 1.3 | 1.3 |
| 02-00110 | 02-00120 | 02-00100 | 27.5 | 12" DIA | 0.1 | 237.6 | 237.3 | 240.9 | 240.6 | 238.0 | 236.7 | 238.0 | 236.7 | 3.5 | 1.3 | 1.3 |
| 02-00130 | 02-00140 | 02-00120 | 97.72 | 6" DIA | 2.3 | 240.5 | 238.3 | 243.5 | 240.9 | 240.5 | 238.0 | 240.5 | 238.0 | 0.8 | 0.0 | 0.0 |
| 03-00020 | 03-00030 | 03-00010 | 65 | 21" DIA | 0.3 | 204.0 | 203.8 | 208.3 | 207.9 | 207.9 | 207.9 | 207.9 | 207.9 | 8.3 | 4.2 | 4.3 |
| 03-00040 | 03-00010 | 03-00050 | 28 | 21" DIA | 1.3 | 203.8 | 203.4 | 207.9 | 208.2 | 207.9 | 207.9 | 207.9 | 207.9 | 20.3 | 5.1 | 5.2 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 03-00060 | 03-00050 | 03-00070 | 37 | 21" DIA | 0.4 | 203.4 | 203.2 | 208.2 | 208.2 | 207.9 | 207.9 | 207.9 | 207.9 | 10.4 | 5.1 | 5.2 |
| 03-00080 | 03-00090 | 03-00030 | 102.41 | 21" DIA | 0.3 | 204.3 | 204.0 | 208.8 | 208.3 | 207.9 | 207.9 | 208.0 | 207.9 | 8.4 | 4.2 | 4.3 |
| 03-00100 | 03-00110 | 03-00090 | 160.09 | 18" DIA | 0.3 | 204.8 | 204.3 | 209.2 | 208.8 | 208.0 | 207.9 | 208.0 | 208.0 | 5.6 | 4.2 | 4.3 |
| 03-00120 | 03-00130 | 03-00110 | 233.07 | 18" DIA | 0.3 | 205.4 | 204.8 | 210.6 | 209.2 | 208.1 | 208.0 | 208.1 | 208.0 | 5.6 | 3.4 | 3.5 |
| 03-00140 | 03-00150 | 03-00130 | 400 | 18" DIA | 0.3 | 206.6 | 205.4 | 212.6 | 210.6 | 208.1 | 208.1 | 208.2 | 208.1 | 5.8 | 2.6 | 2.7 |
| 03-00160 | 03-00170 | 03-00150 | 149.59 | 18" DIA | 0.4 | 207.2 | 206.6 | 213.3 | 212.6 | 208.1 | 208.1 | 208.3 | 208.2 | 6.7 | 0.8 | 0.9 |
| 03-00180 | 03-00190 | 03-00170 | 85.97 | 18" DIA | 0.4 | 208.0 | 207.2 | 215.0 | 213.3 | 208.3 | 208.1 | 208.3 | 208.3 | 10.1 | 0.7 | 0.8 |
| 03-00210 | 03-00230 | 03-00200 | 116.33 | 18" DIA | 0.5 | 208.7 | 208.1 | 213.7 | 215.0 | 210.3 | 210.3 | 211.0 | 211.0 | 7.4 | 1.9 | 2.4 |
| 03-00240 | 03-00250 | 03-00230 | 135.93 | 15" DIA | 0.3 | 209.4 | 208.9 | 214.0 | 213.7 | 210.3 | 210.3 | 211.1 | 211.0 | 3.7 | 2.0 | 2.3 |
| 03-00270 | 03-00260 | 03-00250 | 29.5 | 10" DIA | 1 | 210.1 | 209.8 | 214.3 | 214.0 | 210.3 | 210.3 | 211.1 | 211.1 | 2.2 | 0.0 | 0.0 |
| 03-00290 | 03-00280 | 03-00250 | 246.79 | 12" DIA | 0.4 | 210.8 | 209.6 | 215.3 | 214.0 | 211.1 | 210.3 | 211.2 | 211.1 | 2.4 | 0.5 | 0.9 |
| 03-00310 | 03-00300 | 03-00280 | 199.43 | 10" DIA | 0.7 | 212.5 | 211.0 | 216.4 | 215.3 | 212.6 | 211.1 | 212.8 | 211.2 | 1.9 | 0.1 | 0.6 |
| 03-00330 | 03-00320 | 03-00340 | 311.17 | 18" DIA | 0.4 | 209.9 | 208.7 | 215.7 | 214.2 | 212.0 | 212.0 | 212.0 | 212.0 | 6.7 | 3.5 | 3.5 |
| 03-00350 | 03-00360 | 03-00340 | 199.32 | 15" DIA | 0.7 | 210.4 | 208.8 | 216.0 | 214.2 | 212.0 | 212.0 | 212.0 | 212.0 | 5.9 | 1.6 | 1.6 |
| 03-00370 | 03-00380 | 03-00150 | 230.97 | 12" DIA | 0.3 | 208.4 | 207.6 | 213.3 | 212.6 | 209.0 | 208.1 | 209.0 | 208.2 | 2.1 | 1.4 | 1.4 |
| 03-00400 | 03-00390 | 03-00410 | 85.18 | 10" DIA | 0.4 | 209.2 | 208.9 | 213.9 | 213.5 | 211.9 | 211.9 | 211.9 | 211.9 | 1.4 | 1.0 | 1.0 |
| 03-00420 | 03-00410 | 03-00430 | 55.89 | 10" DIA | 0.4 | 208.8 | 208.6 | 213.5 | 213.3 | 211.9 | 211.9 | 211.9 | 211.9 | 1.4 | 1.0 | 1.0 |
| 03-00440 | 03-00430 | 03-00450 | 70.85 | 10" DIA | 0.4 | 208.5 | 208.2 | 213.3 | 213.0 | 211.9 | 211.9 | 211.9 | 211.9 | 1.4 | 1.0 | 1.0 |
| 03-00460 | 03-00450 | 03-00470 | 27.7 | 24" DIA | 2.1 | 208.1 | 207.5 | 213.0 | 213.3 | 211.9 | 211.8 | 211.9 | 211.8 | 32.7 | 10.1 | 10.1 |
| 03-00480 | 03-00470 | 03-00490 | 49.1 | 24" DIA | 0.7 | 207.9 | 207.5 | 213.3 | 213.3 | 211.8 | 211.8 | 211.8 | 211.8 | 21.2 | 10.1 | 10.1 |
| 03-00520 | 03-00510 | 03-00530 | 86 | 24" DIA | 0.5 | 206.5 | 206.0 | 213.3 | 212.0 | 207.2 | 203.0 | 207.2 | 203.6 | 17.3 | 5.0 | 5.0 |
| 03-00540 | 03-00550 | 03-00450 | 58.51 | 24" DIA | 0.3 | 208.4 | 208.2 | 213.2 | 213.0 | 211.9 | 211.9 | 211.9 | 211.9 | 13.2 | 8.6 | 8.6 |
| 03-00560 | 03-00340 | 03-00550 | 169.6 | 24" DIA | 0.2 | 208.8 | 208.4 | 214.2 | 213.2 | 212.0 | 211.9 | 212.0 | 211.9 | 11.1 | 8.5 | 8.5 |
| 03-00570 | 03-00580 | 03-00340 | 41.86 | 15" DIA | 1.36 | 209.4 | 208.8 | 214.1 | 214.2 | 212.0 | 212.0 | 212.0 | 212.0 | 7.5 | 2.0 | 2.0 |
| 03-00590 | 03-00600 | 03-00580 | 375.14 | 15" DIA | 0.3 | 210.5 | 209.4 | 215.9 | 214.1 | 212.1 | 212.0 | 212.1 | 212.0 | 3.5 | 2.0 | 2.0 |
| 03-00610 | 03-00620 | 03-00600 | 189.77 | 10" DIA | 3.8 | 218.2 | 210.9 | 223.4 | 215.9 | 218.6 | 212.1 | 218.6 | 212.1 | 4.3 | 2.1 | 2.1 |
| 03-00630 | 03-00640 | 03-00620 | 160.23 | 10" DIA | 3.7 | 224.1 | 218.2 | 229.5 | 223.4 | 224.5 | 218.6 | 224.5 | 218.6 | 4.2 | 2.1 | 2.1 |
| 03-00650 | 03-00660 | 03-00640 | 175.95 | 10" DIA | 0.9 | 225.7 | 224.1 | 230.8 | 229.5 | 226.7 | 224.5 | 226.7 | 224.5 | 2.1 | 2.1 | 2.1 |
| 03-00670 | 03-00680 | 03-00320 | 82.22 | 15" DIA | 0.5 | 210.5 | 210.0 | 216.1 | 215.7 | 212.1 | 212.0 | 212.1 | 212.0 | 4.6 | 2.5 | 2.5 |
| 03-00690 | 03-00700 | 03-00680 | 325.45 | 15" DIA | 0.7 | 212.7 | 210.5 | 218.3 | 216.1 | 213.3 | 212.1 | 213.3 | 212.1 | 5.3 | 2.6 | 2.6 |
| 03-00710 | 03-00720 | 03-00700 | 400 | 10" DIA | 3.5 | 227.2 | 213.1 | 231.1 | 218.3 | 227.6 | 213.3 | 227.6 | 213.3 | 4.1 | 1.6 | 1.6 |
| 03-00730 | 03-00740 | 03-00360 | 50.43 | 15" DIA | 1.4 | 211.2 | 210.5 | 216.4 | 216.0 | 212.0 | 212.0 | 212.0 | 212.0 | 7.6 | 1.4 | 1.4 |
| 03-00750 | 03-00760 | 03-00740 | 335.79 | 12" DIA | 0.4 | 212.8 | 211.4 | 217.9 | 216.4 | 213.3 | 212.0 | 213.3 | 212.0 | 2.3 | 1.0 | 1.0 |
| 03-00770 | 03-00780 | 03-00760 | 232.75 | 10" DIA | 0.9 | 215.1 | 213.0 | 219.8 | 217.9 | 215.4 | 213.3 | 215.4 | 213.3 | 2.1 | 0.5 | 0.5 |
| 03-00810 | 03-00800 | 16-00440 | 35.19 | 21" DIA | 0.3 | 203.0 | 202.9 | 208.2 | 207.8 | 203.5 | 200.4 | 203.5 | 201.0 | 8.5 | 1.6 | 1.6 |
| 05-00020 | 05-00010 | 05-00030 | 125 | 6" DIA | -0.32 | 205.1 | 205.5 | 206.0 | 207.9 | 206.3 | 206.2 | 206.3 | 206.2 | 0.3 | 0.3 | 0.3 |
| 05-00040 | 05-00030 | 05-00050 | 26.98 | 10" DIA | 5.3 | 205.4 | 204.0 | 207.9 | 207.5 | 206.2 | 206.2 | 206.2 | 206.2 | 5.0 | 0.4 | 0.4 |
| 05-00060 | 05-00050 | 05-00070 | 158.9 | 12" DIA | 0.2 | 203.3 | 203.0 | 207.5 | 208.4 | 206.2 | 206.2 | 206.2 | 206.2 | 1.7 | 0.4 | 0.4 |
| 05-00080 | 05-00070 | 05-00090 | 411.94 | 15" DIA | 0.2 | 202.9 | 202.2 | 208.4 | 207.2 | 206.2 | 205.6 | 206.2 | 205.6 | 2.8 | 2.8 | 2.8 |
| 05-00100 | 05-00090 | 05-00110 | 47.68 | 15" DIA | 0.2 | 202.2 | 202.2 | 207.2 | 207.1 | 205.6 | 205.5 | 205.6 | 205.5 | 1.6 | 2.8 | 2.8 |
| 05-00120 | 05-00110 | 05-00130 | 234.24 | 15" DIA | 0.2 | 202.0 | 201.5 | 207.1 | 206.5 | 205.5 | 204.3 | 205.5 | 204.3 | 3.1 | 4.6 | 4.6 |
| 05-00140 | 05-00130 | 05-00150 | 229.8 | 15" DIA | 0.2 | 201.4 | 201.0 | 206.5 | 204.7 | 204.3 | 203.7 | 204.3 | 203.7 | 2.8 | 4.6 | 4.6 |
| 05-00160 | 05-00150 | 05-00330 | 47.77 | 18" DIA | 0.2 | 200.9 | 200.8 | 204.7 | 205.4 | 203.7 | 203.6 | 203.7 | 203.6 | 5.0 | 6.1 | 6.1 |
| 05-00180 | 05-00170 | 05-00070 | 27.54 | 12" DIA | 0.2 | 203.1 | 203.1 | 207.9 | 208.4 | 206.3 | 206.2 | 206.3 | 206.2 | 1.5 | 1.8 | 1.7 |
| 05-00200 | 05-00210 | 05-00190 | 248.82 | 12" DIA | 0.2 | 203.7 | 203.2 | 210.1 | 207.7 | 206.8 | 206.3 | 206.8 | 206.3 | 1.6 | 1.8 | 1.8 |
| 05-00220 | 05-00230 | 05-00210 | 199.98 | 12" DIA | 0.2 | 204.1 | 203.8 | 208.8 | 210.1 | 206.8 | 206.8 | 206.8 | 206.8 | 1.6 | 1.0 | 1.0 |
| 05-00240 | 05-00250 | 05-00230 | 71.63 | 12" DIA | 0.2 | 204.4 | 204.2 | 208.0 | 208.8 | 206.8 | 206.8 | 206.8 | 206.8 | 1.7 | 1.1 | 1.1 |
| 05-00260 | 05-00270 | 05-00210 | 222.43 | 12" DIA | 0.2 | 204.1 | 203.8 | 207.8 | 210.1 | 207.1 | 206.8 | 207.1 | 206.8 | 1.4 | 1.2 | 1.2 |
| 05-00280 | 05-00290 | 05-00310 | 83.13 | 12" DIA | 0.2 | 200.8 | 200.6 | 204.7 | 205.2 | 203.6 | 203.6 | 203.6 | 203.6 | 1.7 | 0.3 | 0.3 |
| 05-00300 | 05-00330 | 05-00310 | 52.75 | 18" DIA | 0.23 | 200.7 | 200.6 | 205.4 | 205.2 | 203.6 | 203.6 | 203.6 | 203.6 | 5.0 | 6.1 | 6.1 |
| 05-00320 | 05-00350 | 05-00330 | 39.17 | 12" DIA | 0.2 | 200.8 | 200.8 | 204.9 | 205.4 | 203.6 | 203.6 | 203.6 | 203.6 | 1.5 | 0.1 | 0.1 |
| 05-00340 | 05-00310 | 05-00380 | 36 | 18" DIA | 0.1 | 200.6 | 200.6 | 205.2 | 204.4 | 203.6 | 203.6 | 203.6 | 203.6 | 2.5 | 6.4 | 6.4 |
| 05-00351 | 05-00390 | 05-00400 | 14 | 18" DIA | 0.2 | 200.6 | 200.5 | 204.4 | 206.4 | 201.2 | 200.0 | 201.2 | 200.5 | 7.4 | 2.9 | 2.8 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 05-00360 | 05-00410 | 05-00250 | 32.5 | 8" DIA | 0.4 | 204.6 | 204.4 | 207.8 | 208.0 | 206.8 | 206.8 | 206.8 | 206.8 | 0.8 | 0.5 | 0.5 |
| 05-00420 | 05-00430 | 05-00410 | 214 | 8" DIA | 0.4 | 205.3 | 204.6 | 206.5 | 207.8 | 206.5 | 206.8 | 206.5 | 206.8 | 0.7 | 0.5 | 0.5 |
| 05-00440 | 05-00190 | 05-00170 | 27.78 | 12" DIA | 0.2 | 203.2 | 203.1 | 207.7 | 207.9 | 206.3 | 206.3 | 206.3 | 206.3 | 2.1 | 1.7 | 1.8 |
| 06-00010 | 06-00020 | 06-00000 | 176 | 12" DIA | 1.1 | 232.3 | 230.6 | 237.5 | 236.3 | 234.3 | 234.0 | 234.5 | 234.1 | 3.5 | 1.9 | 2.1 |
| 06-00030 | 06-00040 | 06-00020 | 72 | 12" DIA | 0.3 | 232.7 | 232.3 | 238.3 | 237.5 | 234.4 | 234.3 | 234.7 | 234.5 | 2.5 | 1.9 | 2.1 |
| 06-00050 | 06-00060 | 06-00040 | 14 | 12" DIA | 0.3 | 235.0 | 235.0 | 238.2 | 238.3 | 235.7 | 234.4 | 235.7 | 234.7 | 0.1 | 2.0 | 2.1 |
| 06-00070 | 06-00100 | 06-00060 | 56 | 12" DIA | 0.6 | 235.4 | 235.0 | 238.3 | 238.2 | 235.7 | 235.7 | 235.7 | 235.7 | 2.7 | 0.5 | 0.6 |
| 06-00090 | 06-00080 | 06-00060 | 31 | 12" DIA | 0.7 | 235.2 | 235.0 | 237.8 | 238.2 | 235.8 | 235.7 | 235.8 | 235.7 | 2.9 | 1.5 | 1.6 |
| 06-00110 | 06-00120 | 06-00080 | 258.52 | 12" DIA | 1.76 | 239.8 | 235.3 | 243.8 | 237.8 | 240.1 | 235.8 | 240.2 | 235.8 | 4.7 | 1.0 | 1.0 |
| 06-00140 | 06-00130 | 06-00150 | 185.05 | 12" DIA | 1.2 | 243.6 | 241.4 | 247.6 | 244.9 | 243.6 | 241.5 | 243.6 | 241.5 | 3.9 | 0.0 | 0.0 |
| 06-00160 | 06-00150 | 06-00170 | 108.82 | 12" DIA | 0.6 | 241.4 | 240.2 | 244.9 | 243.7 | 241.5 | 240.3 | 241.5 | 240.4 | 3.7 | 0.0 | 0.1 |
| 06-00180 | 06-00170 | 09-00000 | 175.65 | 12" DIA | 0.6 | 240.2 | 239.4 | 243.7 | 242.4 | 240.3 | 238.5 | 240.4 | 238.6 | 2.4 | 0.1 | 0.1 |
| 07-00040 | 07-00010 | 07-00030 | 291.9 | 12" DIA | 0.3 | 206.5 | 205.8 | 210.0 | 209.6 | 210.0 | 209.4 | 210.0 | 209.4 | 1.8 | 2.0 | 1.9 |
| 07-00070 | 07-00080 | 07-00060 | 277.48 | 12" DIA | 0.3 | 207.5 | 206.8 | 210.9 | 210.6 | 209.6 | 209.4 | 209.6 | 209.4 | 1.8 | 0.9 | 1.0 |
| 07-00150 | 07-00060 | 07-00140 | 440 | 24" DIA | 0.1 | 206.7 | 206.2 | 210.6 | 209.4 | 209.4 | 209.4 | 209.4 | 209.4 | 7.5 | -4.8 | -4.6 |
| 07-00160 | 07-00170 | 07-00060 | 70.22 | 24" DIA | 0.1 | 206.8 | 206.7 | 210.6 | 210.6 | 209.4 | 209.4 | 209.4 | 209.4 | 7.1 | -7.1 | -6.9 |
| 07-00190 | 07-00140 | 07-00030 | 388.76 | 24" DIA | 0.1 | 206.1 | 205.7 | 209.4 | 209.6 | 209.4 | 209.4 | 209.4 | 209.4 | 7.5 | -3.4 | -3.2 |
| 07-00200 | 07-00030 | 07-00210 | 135.5 | 8" DIA | 0.4 | 205.7 | 205.1 | 209.6 | 211.0 | 209.4 | 207.3 | 209.4 | 207.9 | 0.8 | 2.0 | 1.9 |
| 07-00220 | 07-00230 | 07-00030 | 272.64 | 12" DIA | 0.3 | 206.4 | 205.8 | 210.0 | 209.6 | 209.5 | 209.4 | 209.6 | 209.4 | 1.8 | 1.6 | 1.5 |
| 07-00260 | 07-00270 | 07-00060 | 274.31 | 12" DIA | 0.3 | 207.5 | 206.8 | 210.6 | 210.6 | 209.5 | 209.4 | 209.6 | 209.4 | 1.8 | 1.0 | 1.0 |
| 07-00300 | 07-00310 | 07-00270 | 45.08 | 12" DIA | 0.5 | 207.8 | 207.6 | 210.4 | 210.6 | 209.5 | 209.5 | 209.6 | 209.6 | 2.5 | 0.7 | 0.7 |
| 07-00330 | 07-00320 | 07-00230 | 126.57 | 12" DIA | 0.3 | 206.9 | 206.5 | 209.6 | 210.0 | 209.6 | 209.5 | 209.6 | 209.6 | 2.0 | 1.0 | 0.9 |
| 08-00070 | 08-00100 | 08-00120 | 215 | 12" DIA | 0.3 | 237.7 | 237.0 | 242.4 | 240.1 | 238.3 | 238.1 | 238.6 | 238.4 | 2.0 | 0.9 | 1.1 |
| 08-00090 | 08-00140 | 08-00100 | 155 | 12" DIA | 0.3 | 238.2 | 237.8 | 244.6 | 242.4 | 238.7 | 238.3 | 238.8 | 238.6 | 1.9 | 0.9 | 1.1 |
| 08-00110 | 08-00160 | 08-00140 | 42 | 12" DIA | 0.3 | 238.6 | 238.4 | 243.8 | 244.6 | 239.0 | 238.7 | 239.1 | 238.8 | 2.0 | 0.9 | 1.1 |
| 08-00130 | 08-00180 | 08-00160 | 155 | 12" DIA | 0.3 | 239.1 | 238.7 | 242.6 | 243.8 | 239.4 | 239.0 | 239.5 | 239.1 | 1.9 | 0.4 | 0.5 |
| 08-00150 | 08-00240 | 08-00220 | 40 | 12" DIA | 0.3 | 235.9 | 235.5 | 240.5 | 240.5 | 237.2 | 237.0 | 237.4 | 237.1 | 3.7 | 2.5 | 2.9 |
| 08-00170 | 08-00260 | 08-00240 | 248 | 12" DIA | 0.3 | 236.6 | 235.9 | 239.9 | 240.5 | 238.0 | 237.2 | 238.3 | 237.4 | 2.0 | 2.0 | 2.2 |
| 08-00190 | 08-00120 | 08-00260 | 28 | 12" DIA | 0.3 | 236.8 | 236.7 | 240.1 | 239.9 | 238.1 | 238.0 | 238.4 | 238.3 | 2.0 | 2.0 | 2.2 |
| 09-00010 | 09-00000 | 09-00020 | 22.64 | 12" DIA | 1.1 | 238.2 | 238.0 | 242.4 | 242.4 | 238.5 | 238.0 | 238.6 | 238.2 | 3.7 | 0.7 | 1.0 |
| 09-00030 | 09-00040 | 09-00020 | 16.11 | 6" DIA | 0.2 | 238.2 | 238.2 | 239.8 | 242.4 | 238.5 | 238.0 | 238.7 | 238.2 | 0.3 | 0.2 | 0.5 |
| 09-00050 | 09-00060 | 09-00040 | 100 | 6" DIA | 0.2 | 238.5 | 238.2 | 239.7 | 239.8 | 238.8 | 238.5 | 239.3 | 238.7 | 0.3 | 0.2 | 0.5 |
| 09-00070 | 09-00080 | 09-00060 | 93.61 | 6" DIA | 0.2 | 238.6 | 238.4 | 239.8 | 239.7 | 238.9 | 238.8 | 239.8 | 239.3 | 0.3 | 0.2 | 0.4 |
| 10-00020 | 10-00030 | 10-00010 | 120.58 | 12" DIA | 1 | 211.6 | 210.4 | 219.3 | 217.3 | 215.9 | 212.5 | 216.5 | 213.3 | 3.6 | 6.1 | 6.0 |
| 10-00040 | 10-00050 | 10-00030 | 289.49 | 12" DIA | 2.4 | 218.5 | 211.7 | 224.1 | 219.3 | 224.0 | 215.9 | 224.1 | 216.5 | 5.5 | 6.2 | 6.0 |
| 10-00060 | 10-00070 | 10-00050 | 273.67 | 12" DIA | 1.4 | 222.5 | 218.6 | 227.8 | 224.1 | 227.8 | 224.0 | 227.8 | 224.1 | 4.2 | 5.1 | 5.0 |
| 10-00080 | 10-00090 | 10-00070 | 307.14 | 12" DIA | 1.8 | 228.1 | 222.6 | 233.1 | 227.8 | 233.1 | 227.8 | 233.1 | 227.8 | 4.8 | 4.8 | 4.8 |
| 10-01010 | 19-00020 | 10-01020 | 316.03 | 12" DIA | 1.3 | 224.3 | 220.1 | 227.4 | 225.2 | 225.1 | 221.1 | 226.8 | 223.3 | 4.1 | 4.1 | 4.5 |
| 10-01030 | 10-01020 | 10-01040 | 137.15 | 15" DIA | 0.5 | 219.9 | 219.2 | 225.2 | 224.2 | 221.1 | 220.7 | 223.3 | 222.8 | 4.6 | 4.1 | 4.6 |
| 10-01050 | 10-01040 | 10-01060 | 229.98 | 15" DIA | 0.9 | 219.1 | 216.9 | 224.2 | 228.3 | 220.7 | 218.7 | 222.8 | 220.8 | 6.3 | 6.2 | 6.5 |
| 10-01070 | 10-01060 | 10-01080 | 322.98 | 15" DIA | 1.1 | 216.7 | 213.1 | 228.3 | 219.0 | 218.7 | 215.4 | 220.8 | 216.9 | 6.8 | 7.0 | 7.4 |
| 10-01090 | 10-01080 | 10-01100 | 161.38 | 18" DIA | 0.5 | 212.8 | 212.0 | 219.0 | 217.4 | 215.4 | 214.6 | 216.9 | 215.9 | 7.7 | 8.1 | 8.5 |
| 10-01110 | 10-01120 | 10-01140 | 136.99 | 12" DIA | 0.5 | 216.8 | 215.5 | 219.8 | 220.7 | 217.1 | 215.5 | 217.1 | 216.1 | 3.6 | 0.6 | 0.8 |
| 10-01130 | 10-01140 | 10-01100 | 269.17 | 12" DIA | 1 | 215.3 | 212.5 | 220.7 | 217.4 | 215.5 | 214.6 | 216.1 | 215.9 | 3.6 | 0.6 | 0.9 |
| 10-01150 | 10-01160 | 10-01140 | 90 | 12" DIA | 0.7 | 216.1 | 215.5 | 217.1 | 220.7 | 216.1 | 215.5 | 216.1 | 216.1 | 3.0 | 0.0 | 0.0 |
| 10-01170 | 10-01100 | 10-01180 | 253.4 | 18" DIA | 0.6 | 211.9 | 210.2 | 217.4 | 218.4 | 214.6 | 213.0 | 215.9 | 214.0 | 8.5 | 8.6 | 9.2 |
| 10-01190 | 10-01180 | 10-01200 | 204.64 | 18" DIA | 0.7 | 210.1 | 208.7 | 218.4 | 215.7 | 213.0 | 211.7 | 214.0 | 212.5 | 8.8 | 8.4 | 9.2 |
| 10-01210 | 10-00010 | 10-01200 | 154.84 | 18" DIA | 1 | 210.2 | 208.7 | 217.3 | 215.7 | 212.5 | 211.7 | 213.3 | 212.5 | 10.5 | 7.7 | 7.5 |
| 10-01230 | 10-03010 | 10-03070 | 294.12 | 24" DIA | 0.29 | 206.5 | 205.7 | 212.5 | 211.3 | 210.2 | 208.4 | 210.9 | 209.1 | 12.2 | 17.5 | 18.1 |
| 10-01250 | 10-01220 | 10-01240 | 316.23 | 30" DIA | 0.2 | 204.7 | 204.0 | 211.2 | 212.5 | 207.7 | 207.7 | 208.7 | 208.7 | 18.3 | 19.0 | 19.8 |
| 10-01270 | 10-01240 | 10-01260 | 157.9 | 48" DIA | 0.6 | 202.5 | 201.5 | 212.5 | 210.5 | 207.7 | 207.7 | 208.7 | 208.7 | 116.0 | 19.1 | 23.0 |
| 10-01290 | 10-03120 | CC-N-00-024 | 124.58 | 18" DIA | 0.3 | 203.0 | 202.8 | 208.5 | 208.4 | 206.8 | 206.7 | 207.4 | 207.3 | 4.7 | 5.6 | 6.3 |
| 10-01295 | 10-03240 | 10-01240 | 156.63 | 30" DIA | 0.2 | 204.4 | 204.0 | 211.9 | 212.5 | 207.7 | 207.7 | 208.7 | 208.7 | 19.7 | -0.1 | 3.0 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 10-03020 | 10-03030 | 10-03010 | 151.42 | 12" DIA | 0.94 | 208.2 | 206.7 | 211.7 | 212.5 | 210.3 | 210.2 | 211.0 | 210.9 | 3.5 | 0.8 | 0.8 |
| 10-03040 | 10-03070 | 10-01220 | 149.25 | 24" DIA | 0.4 | 205.7 | 205.2 | 211.3 | 211.2 | 208.4 | 207.7 | 209.1 | 208.7 | 13.5 | 18.4 | 19.1 |
| 10-03041 | 10-03050 | 10-03010 | 149.12 | 12" DIA | 0.7 | 207.8 | 206.7 | 211.4 | 212.5 | 210.2 | 210.2 | 211.0 | 210.9 | 3.0 | 0.7 | 0.7 |
| 10-03060 | 10-03090 | 10-03070 | 269.74 | 12" DIA | 0.5 | 208.0 | 206.7 | 211.7 | 211.3 | 208.7 | 208.4 | 209.3 | 209.1 | 2.5 | 1.0 | 1.0 |
| 10-03080 | 10-03140 | 10-03120 | 179 | 18" DIA | 0.4 | 203.8 | 203.0 | 210.5 | 208.5 | 207.0 | 206.8 | 207.6 | 207.4 | 6.7 | 5.6 | 6.3 |
| 10-03170 | 10-03160 | 10-03140 | 324.69 | 18" DIA | 0.4 | 205.1 | 203.9 | 210.0 | 210.5 | 207.4 | 207.0 | 208.2 | 207.6 | 6.6 | 5.6 | 6.3 |
| 10-03190 | 10-03180 | 10-03160 | 109.07 | 18" DIA | 0.4 | 205.1 | 203.9 | 210.5 | 210.0 | 207.6 | 207.4 | 208.6 | 208.2 | 11.4 | 5.6 | 6.3 |
| 10-03250 | 10-01200 | 10-03010 | 294.12 | 24" DIA | 0.55 | 208.2 | 206.5 | 215.7 | 212.5 | 211.7 | 210.2 | 212.5 | 210.9 | 16.8 | 16.1 | 16.7 |
| 11-00020 | 11-00010 | 11-00030 | 176.29 | 10" DIA | 0.403 | 225.4 | 224.7 | 228.0 | 235.5 | 225.5 | 224.5 | 225.5 | 224.5 | 1.4 | 0.0 | 0.0 |
| 11-00040 | 11-00030 | 11-00050 | 168.75 | 12" DIA | 0.5 | 224.4 | 223.6 | 235.5 | 232.6 | 224.5 | 223.6 | 224.5 | 223.6 | 2.4 | 0.1 | 0.1 |
| 11-00060 | 11-00050 | 11-00070 | 104.68 | 12" DIA | 0.3 | 223.4 | 223.1 | 232.6 | 230.9 | 223.6 | 223.1 | 223.6 | 223.1 | 2.0 | 0.1 | 0.1 |
| 11-00080 | 11-00070 | 11-00090 | 111.76 | 12" DIA | 0.3 | 222.9 | 222.5 | 230.9 | 229.1 | 223.1 | 222.5 | 223.1 | 222.5 | 2.0 | 0.1 | 0.1 |
| 11-00100 | 11-00090 | 11-00110 | 124.38 | 12" DIA | 0.7 | 222.3 | 221.5 | 229.1 | 226.7 | 222.5 | 221.4 | 222.5 | 221.8 | 3.0 | 0.1 | 0.1 |
| 11-00120 | 11-00110 | 11-00130 | 158.35 | 12" DIA | 0.8 | 221.3 | 220.0 | 226.7 | 225.0 | 221.4 | 219.9 | 221.8 | 220.2 | 3.1 | 0.1 | 1.7 |
| 11-00140 | 11-00130 | 11-00150 | 178.11 | 12" DIA | 3 | 219.8 | 214.5 | 225.0 | 220.0 | 219.9 | 214.5 | 220.2 | 214.8 | 6.1 | 0.1 | 1.7 |
| 11-00160 | 11-00150 | 11-00170 | 59.21 | 12" DIA | 10.47 | 214.4 | 208.2 | 220.0 | 220.5 | 214.5 | 207.7 | 214.8 | 208.7 | 11.5 | 0.1 | 2.5 |
| 11-00180 | 11-00170 | 11-00190 | 147.55 | 24" DIA | 0.5 | 207.4 | 206.6 | 220.5 | 217.0 | 207.7 | 207.7 | 208.7 | 208.7 | 15.8 | 0.1 | 2.6 |
| 11-00200 | 11-00190 | 11-00210 | 133.78 | 24" DIA | 0.5 | 206.4 | 205.7 | 217.0 | 213.7 | 207.7 | 207.7 | 208.7 | 208.7 | 16.4 | 0.1 | 2.5 |
| 11-00220 | 11-00210 | 11-00230 | 67.93 | 24" DIA | 0.54 | 205.6 | 205.2 | 213.7 | 212.8 | 207.7 | 207.7 | 208.7 | 208.7 | 16.7 | -0.1 | 2.5 |
| 11-00240 | 11-00230 | 11-00250 | 42.68 | 30" DIA | 0.14 | 204.8 | 204.7 | 212.8 | 212.7 | 207.7 | 207.7 | 208.7 | 208.7 | 15.4 | -0.1 | 3.0 |
| 11-00260 | 11-00270 | 11-00170 | 132.09 | 24" DIA | 0.31 | 207.8 | 207.4 | 220.1 | 220.5 | 207.8 | 207.7 | 208.7 | 208.7 | 12.6 | 0.0 | 0.1 |
| 11-00280 | 11-00250 | 10-03240 | 115.92 | 30" DIA | 0.22 | 204.7 | 204.4 | 212.7 | 211.9 | 207.7 | 207.7 | 208.7 | 208.7 | 19.4 | -0.1 | 3.0 |
| 13-00030 | 13-00020 | 13-00040 | 452.85 | 15" DIA | 0.2 | 235.0 | 234.0 | 239.0 | 237.0 | 235.4 | 233.6 | 235.5 | 233.9 | 2.9 | 0.7 | 0.9 |
| 13-00050 | 13-00060 | 13-00040 | 45.93 | 30" DIA | 0.2 | 232.9 | 232.8 | 236.8 | 237.0 | 233.6 | 233.6 | 233.9 | 233.9 | 18.2 | 2.7 | 3.2 |
| 13-00070 | 13-00080 | 13-00060 | 7.37 | 12" DIA | 0.2 | 234.4 | 234.4 | 237.1 | 236.8 | 234.4 | 233.6 | 234.4 | 233.9 | 1.9 | 0.0 | 0.0 |
| 13-00090 | 13-00100 | 13-00060 | 27.37 | 12" DIA | 0.2 | 234.4 | 234.4 | 237.1 | 236.8 | 234.4 | 233.6 | 234.4 | 233.9 | 1.7 | 0.0 | 0.0 |
| 13-00110 | 13-00120 | 13-00060 | 310.84 | 12" DIA | 0.4 | 235.6 | 234.4 | 239.0 | 236.8 | 236.0 | 233.6 | 236.1 | 233.9 | 2.3 | 0.7 | 0.9 |
| 13-00140 | 13-00130 | 13-00150 | 31.55 | 24" DIA | 2.2 | 235.8 | 235.1 | 240.1 | 240.4 | 236.0 | 235.7 | 236.2 | 235.9 | 33.7 | 0.9 | 2.4 |
| 13-00160 | 13-00170 | 13-00150 | 49.38 | 12" DIA | 0.2 | 236.1 | 236.0 | 240.1 | 240.4 | 237.0 | 235.7 | 237.1 | 235.9 | 1.6 | 2.8 | 3.1 |
| 13-00190 | 13-00040 | 13-00180 | 51 | 36" DIA | 0.2 | 232.3 | 232.2 | 237.0 | 239.6 | 233.6 | 233.6 | 233.9 | 233.8 | 29.5 | 11.1 | 14.0 |
| 13-00200 | 13-00210 | 13-00040 | 254 | 30" DIA | 0.2 | 233.3 | 232.8 | 238.0 | 237.0 | 234.4 | 233.6 | 234.6 | 233.9 | 18.4 | 7.8 | 10.0 |
| 13-00220 | 13-00360 | 13-00210 | 115.1 | 30" DIA | 0.2 | 233.6 | 233.4 | 241.1 | 238.0 | 234.6 | 234.4 | 234.8 | 234.6 | 18.3 | 6.1 | 7.7 |
| 13-00240 | 13-00150 | 13-00230 | 226.36 | 24" DIA | 0.2 | 234.9 | 234.4 | 240.4 | 239.0 | 235.7 | 234.9 | 235.9 | 235.0 | 10.1 | 3.7 | 5.4 |
| 13-00290 | 13-00270 | 13-00330 | 86 | 18" DIA | 0.2 | 231.8 | 231.6 | 239.6 | 239.0 | 232.9 | 232.8 | 233.2 | 233.1 | 4.7 | 3.0 | 3.9 |
| 13-00300 | 13-00270 | 13-00330 | 86 | 18" DIA | 0.2 | 231.8 | 231.6 | 239.6 | 239.0 | 232.9 | 232.8 | 233.2 | 233.1 | 4.7 | 3.0 | 3.9 |
| 13-00310 | 13-00270 | 13-00330 | 86 | 18" DIA | 0.2 | 231.8 | 231.6 | 239.6 | 239.0 | 232.9 | 232.8 | 233.2 | 233.1 | 4.7 | 3.0 | 3.9 |
| 13-00331 | 13-00230 | 13-00360 | 137.99 | 30" DIA | 0.2 | 233.9 | 233.6 | 239.0 | 241.1 | 234.9 | 234.6 | 235.0 | 234.8 | 18.5 | 5.4 | 7.0 |
| 13-00350 | 13-00380 | 13-00360 | 414.95 | 10" DIA | 0.3 | 235.4 | 234.2 | 240.6 | 241.1 | 235.9 | 234.6 | 235.9 | 234.8 | 1.2 | 0.7 | 0.7 |
| 13-00370 | 13-00400 | 13-00380 | 44.98 | 10" DIA | 0.3 | 235.6 | 235.5 | 240.6 | 240.6 | 236.1 | 235.9 | 236.1 | 235.9 | 1.2 | 0.7 | 0.7 |
| 13-00390 | 13-00420 | 13-00400 | 125.62 | 8" DIA | 0.9 | 236.9 | 235.7 | 241.9 | 240.6 | 236.9 | 236.1 | 236.9 | 236.1 | 1.2 | 0.0 | 0.0 |
| 13-00410 | 13-00440 | 13-00420 | 63.45 | 8" DIA | 0.9 | 237.5 | 236.9 | 240.5 | 241.9 | 237.5 | 236.9 | 237.5 | 236.9 | 1.2 | 0.0 | 0.0 |
| 14-00050 | 14-00040 | 14-00060 | 127 | 15" DIA | 0.3 | 209.7 | 209.3 | 215.0 | 215.5 | 209.8 | 209.1 | 209.8 | 209.3 | 3.7 | 0.1 | 0.1 |
| 14-00070 | 14-00060 | 14-00080 | 117.39 | 15" DIA | 0.4 | 209.0 | 208.5 | 215.5 | 214.9 | 209.1 | 208.5 | 209.3 | 208.7 | 4.4 | 0.1 | 0.7 |
| 14-00090 | 14-00080 | 14-00100 | 360.61 | 15" DIA | 0.3 | 208.3 | 207.1 | 214.9 | 213.3 | 208.5 | 207.1 | 208.7 | 207.3 | 3.6 | 0.2 | 0.8 |
| 14-00110 | 14-00100 | 14-00120 | 351 | 15" DIA | 0.6 | 206.9 | 204.7 | 213.3 | 208.8 | 207.1 | 204.9 | 207.3 | 205.1 | 5.1 | 0.3 | 0.9 |
| 14-00130 | 14-00120 | 14-00140 | 130 | 15" DIA | 0.2 | 204.6 | 204.3 | 208.8 | 207.1 | 204.9 | 204.5 | 205.1 | 204.6 | 3.1 | 0.3 | 0.9 |
| 14-00150 | 14-00140 | 14-00160 | 25.82 | 15" DIA | 0.2 | 204.2 | 204.1 | 207.1 | 207.8 | 204.5 | 204.3 | 204.6 | 204.4 | 3.1 | 0.5 | 1.2 |
| 14-00170 | 14-00180 | 14-00140 | 15.17 | 15" DIA | 0.4 | 204.2 | 204.2 | 207.3 | 207.1 | 204.5 | 204.5 | 204.6 | 204.6 | 4.1 | 0.0 | 0.0 |
| 14-00210 | 14-00200 | 14-00060 | 38 | 12" DIA | 1.8 | 209.8 | 209.2 | 214.0 | 215.5 | 209.8 | 209.1 | 210.1 | 209.3 | 4.8 | 0.0 | 0.6 |
| 16-00060 | 16-00070 | 16-00050 | 52.12 | 12" DIA | 0.3 | 205.2 | 205.0 | 208.0 | 207.3 | 205.2 | 205.1 | 205.2 | 205.1 | 1.8 | 0.0 | 0.0 |
| 16-00100 | 16-00050 | 16-00090 | 12 | 12" DIA | 0.3 | 205.0 | 205.0 | 207.3 | 207.3 | 205.1 | 205.0 | 205.1 | 205.0 | 2.0 | 0.0 | 0.0 |
| 16-00110 | 14-00160 | 16-00440 | 378.65 | 24" DIA | 1.07 | 204.1 | 200.0 | 207.8 | 207.8 | 204.3 | 200.4 | 204.4 | 201.0 | 23.4 | 0.5 | 1.2 |
| 16-00160 | 16-00170 | CC-N-00-014 | 10.69 | 12" DIA | 2.81 | 199.3 | 199.0 | 206.7 | 206.0 | 200.4 | 200.4 | 201.1 | 201.0 | 6.0 | 3.8 | 3.8 |

Table B-2 - Hydraulic Model Parameters and Results

| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 16-00180 | 16-00190 | 16-00170 | 78.21 | 12" DIA | 0.3 | 201.3 | 201.1 | 205.4 | 206.7 | 202.8 | 200.4 | 202.8 | 201.1 | 1.9 | 3.8 | 3.8 |
| 16-00190.1 | 16-00200 | 16-00190 | 449.5 | 12" DIA | 0.3 | 202.7 | 201.3 | 206.4 | 205.4 | 205.6 | 202.8 | 205.7 | 202.8 | 2.0 | 2.8 | 2.9 |
| 16-00210 | 16-00220 | 16-00200 | 63.77 | 12" DIA | 1.4 | 203.6 | 202.7 | 206.8 | 206.4 | 205.7 | 205.6 | 205.8 | 205.7 | 4.2 | 2.0 | 2.2 |
| 16-00230 | 16-00240 | 16-00220 | 44.77 | 12" DIA | 0.6 | 203.9 | 203.6 | 205.8 | 206.8 | 205.8 | 205.7 | 205.8 | 205.8 | 2.9 | 1.1 | 1.9 |
| 16-00310 | 16-00300 | 16-00320 | 8.65 | 12" DIA | -1.39 | 201.0 | 201.1 | 203.8 | 203.8 | 202.2 | 202.2 | 203.5 | 203.3 | 4.2 | 2.3 | 4.5 |
| 16-00330 | 16-00320 | 16-00340 | 38.32 | 18" DIA | 0 | 201.1 | 201.1 | 203.8 | 203.8 | 202.2 | 202.2 | 203.3 | 203.3 | 0.3 | 2.3 | 4.5 |
| 16-00350 | 16-00340 | CC-N-02-014 | 36.67 | 12" DIA | 0.3 | 201.1 | 201.0 | 203.8 | 203.5 | 202.2 | 202.1 | 203.3 | 202.7 | 2.0 | 2.3 | 4.5 |
| 16-00390 | 16-00450 | 00-05224 | 1761.52 | 24" H, 72" BOX | 0.2 | 204.3 | 200.3 | 208.8 | 203.8 | 204.9 | 202.1 | 205.4 | 202.7 | 53.8 | 13.6 | 27.2 |
| 16-00400 | 16-21660 | 16-00410 | 118.01 | 24" DIA | -0.29 | 200.5 | 200.8 | 204.8 | 204.8 | 202.1 | 202.1 | 202.9 | 202.7 | 12.1 | 3.6 | 8.3 |
| 16-00430 | 16-00440 | CC-N-00-015 | 260.72 | 24" DIA | 0.93 | 200.0 | 197.6 | 207.8 | 208.2 | 200.4 | 200.4 | 201.0 | 201.0 | 21.8 | 1.9 | 2.6 |
| 17-00360 | 17-00370 | 17-00350 | 713.64 | 12" DIA | 0.3 | 228.1 | 220.2 | 231.7 | 225.0 | 228.6 | 221.8 | 228.8 | 222.1 | 3.8 | 1.8 | 2.5 |
| 17-00380 | 17-00390 | 17-00370 | 876.45 | 12" DIA | 0.3 | 229.9 | 228.1 | 234.0 | 231.7 | 231.9 | 228.6 | 233.8 | 228.8 | 1.6 | 1.8 | 2.5 |
| 17-00400 | 17-00410 | 17-00390 | 236.86 | 12" DIA | 0.6 | 231.3 | 229.9 | 236.2 | 234.0 | 232.5 | 231.9 | 235.0 | 233.8 | 2.8 | 1.9 | 2.5 |
| 17-00420 | 17-00430 | 17-00410 | 197.47 | 12" DIA | 0.2 | 232.0 | 231.4 | 236.5 | 236.2 | 233.0 | 232.5 | 235.9 | 235.0 | 2.0 | 2.0 | 2.5 |
| 18-00010 | 18-00020 | 18-00000 | 16.44 | 15" DIA | 0.6 | 233.6 | 233.5 | 236.8 | 236.8 | 234.1 | 234.0 | 235.9 | 235.9 | 5.0 | 1.4 | 2.4 |
| 18-00030 | 18-00040 | 18-00020 | 172 | 12" DIA | 0.5 | 234.6 | 233.7 | 239.0 | 236.8 | 235.1 | 234.1 | 236.4 | 235.9 | 2.5 | 1.2 | 2.0 |
| 18-00050 | 18-00101 | 18-00040 | 398.48 | 12" DIA | 0.5 | 236.8 | 234.7 | 241.3 | 239.0 | 237.3 | 235.1 | 237.6 | 236.4 | 2.6 | 1.2 | 2.0 |
| 18-00051 | 18-00100 | 18-00101 | 207.74 | 12" DIA | 0.4 | 237.7 | 236.8 | 240.7 | 241.3 | 238.1 | 237.3 | 238.2 | 237.6 | 2.3 | 0.7 | 1.1 |
| 18-00052 | 18-00102 | 18-00101 | 41.48 | 8" DIA | 0.5 | 237.0 | 236.8 | 241.3 | 241.3 | 237.4 | 237.3 | 237.7 | 237.6 | 0.8 | 0.5 | 0.9 |
| 18-00070 | 18-01100 | 18-00020 | 67.4 | 12" DIA | 1.3 | 234.3 | 233.4 | 236.8 | 236.8 | 234.4 | 234.1 | 235.9 | 235.9 | 4.0 | 0.2 | 0.5 |
| 18-00090 | 18-00120 | 18-00100 | 30 | 12" DIA | 0.5 | 237.9 | 237.8 | 240.6 | 240.7 | 238.3 | 238.1 | 238.4 | 238.2 | 2.4 | 0.6 | 1.0 |
| 18-00110 | 18-00140 | 18-00120 | 10.25 | 12" DIA | 0.7 | 238.2 | 238.1 | 240.6 | 240.6 | 238.5 | 238.3 | 238.6 | 238.4 | 2.9 | 0.6 | 1.0 |
| 18-00130 | 18-00160 | 18-00100 | 10 | 4" DIA | 1 | 237.9 | 237.8 | 240.7 | 240.7 | 238.1 | 238.1 | 238.2 | 238.2 | 0.2 | 0.0 | 0.0 |
| 18-00150 | 18-00280 | 18-00300 | 10.29 | 12" DIA | 0.6 | 238.8 | 238.7 | 241.2 | 241.2 | 239.1 | 237.1 | 239.5 | 237.4 | 2.7 | 0.7 | 2.5 |
| 18-00170 | 18-00300 | 18-00320 | 33.05 | 12" DIA | 1.8 | 236.8 | 236.2 | 241.2 | 241.3 | 237.1 | 236.5 | 237.4 | 236.8 | 4.8 | 0.7 | 2.5 |
| 18-00190 | 18-00320 | 18-00340 | 345 | 15" DIA | 0.5 | 236.1 | 234.3 | 241.3 | 239.3 | 236.5 | 234.7 | 236.8 | 235.0 | 4.7 | 0.7 | 2.6 |
| 18-00210 | 18-00340 | 18-00440 | 165 | 15" DIA | 1 | 234.4 | 232.7 | 239.3 | 238.7 | 234.7 | 233.2 | 235.0 | 233.6 | 6.7 | 1.0 | 3.2 |
| 18-00230 | 18-00400 | 18-00420 | 10 | 12" DIA | 0.7 | 236.3 | 236.2 | 238.7 | 238.7 | 236.6 | 233.6 | 236.7 | 233.7 | 3.0 | 0.9 | 1.0 |
| 18-00250 | 18-00420 | 18-00440 | 35.17 | 12" DIA | 1.8 | 233.3 | 232.7 | 238.7 | 238.7 | 233.6 | 233.2 | 233.7 | 233.6 | 4.8 | 0.9 | 1.0 |
| 18-00270 | 18-00460 | 18-00440 | 11.27 | 12" DIA | 0.9 | 236.3 | 236.2 | 238.7 | 238.7 | 236.5 | 233.2 | 236.6 | 233.6 | 3.4 | 0.3 | 0.6 |
| 18-00290 | 18-00440 | 18-00480 | 70.85 | 15" DIA | 0.5 | 232.6 | 232.2 | 238.7 | 239.0 | 233.2 | 232.8 | 233.6 | 233.1 | 4.5 | 2.2 | 4.8 |
| 18-00310 | 18-00480 | 18-00521 | 6.67 | 15" DIA | 1.5 | 232.1 | 232.0 | 239.0 | 239.0 | 232.8 | 232.8 | 233.1 | 233.1 | 7.9 | 2.2 | 4.8 |
| 18-00330 | 13-00330 | 18-00521 | 17.2 | 18" DIA | 0.5 | 231.6 | 231.5 | 239.0 | 239.0 | 232.8 | 232.8 | 233.1 | 233.1 | 7.2 | 3.0 | 3.9 |
| 18-00350 | 13-00330 | 18-00521 | 17.2 | 18" DIA | 0.5 | 231.6 | 231.5 | 239.0 | 239.0 | 232.8 | 232.8 | 233.1 | 233.1 | 7.2 | 3.0 | 3.9 |
| 18-00370 | 13-00330 | 18-00521 | 17.2 | 18" DIA | 0.5 | 231.6 | 231.5 | 239.0 | 239.0 | 232.8 | 232.8 | 233.1 | 233.1 | 7.2 | 3.0 | 3.9 |
| 18-00390 | 18-00500 | 18-00521 | 10.03 | 12" DIA | 3 | 232.3 | 232.0 | 239.0 | 239.0 | 233.0 | 232.8 | 233.1 | 233.1 | 6.2 | 1.3 | 1.8 |
| 18-00410 | 18-00560 | 18-00500 | 300 | 12" DIA | 2 | 238.3 | 232.3 | 243.0 | 239.0 | 238.6 | 233.0 | 238.6 | 233.1 | 5.0 | 0.8 | 0.9 |
| 18-00430 | 18-00580 | 18-00560 | 35.14 | 12" DIA | 1.8 | 239.0 | 238.4 | 243.0 | 243.0 | 239.3 | 238.6 | 239.3 | 238.6 | 4.8 | 0.8 | 0.9 |
| 18-00450 | 18-00600 | 18-00580 | 10 | 12" DIA | 1 | 240.6 | 240.5 | 243.0 | 243.0 | 240.9 | 239.3 | 241.0 | 239.3 | 3.6 | 0.8 | 0.9 |
| 18-00470 | 18-00720 | 09-00000 | 37.02 | 12" DIA | 0.9 | 238.0 | 237.7 | 242.3 | 242.4 | 238.5 | 238.5 | 238.6 | 238.6 | 3.3 | 0.6 | 0.9 |
| 18-00490 | 09-00020 | 18-00740 | 367 | 12" DIA | 0.5 | 237.6 | 235.7 | 242.4 | 238.4 | 238.0 | 236.1 | 238.2 | 236.2 | 2.6 | 0.8 | 1.5 |
| 18-00510 | 18-00740 | 18-00760 | 6.8 | 18" DIA | 0 | 235.4 | 235.4 | 238.4 | 238.6 | 236.1 | 236.0 | 236.2 | 236.2 | 0.3 | 2.4 | 3.5 |
| 18-00530 | 18-00780 | 18-00760 | 33.5 | 4" DIA | 0.9 | 235.7 | 235.4 | 238.4 | 238.6 | 236.0 | 236.0 | 236.2 | 236.2 | 0.2 | 0.0 | 0.0 |
| 18-00550 | 18-00800 | 18-00740 | 37 | 18" DIA | 0.43 | 235.6 | 235.5 | 238.4 | 238.4 | 236.1 | 236.1 | 236.3 | 236.2 | 6.9 | 1.3 | 1.8 |
| 18-00570 | 18-00820 | 18-00800 | 12.69 | 12" DIA | 0.95 | 236.1 | 235.9 | 238.4 | 238.4 | 236.5 | 236.1 | 236.6 | 236.3 | 3.5 | 1.2 | 1.7 |
| 18-00590 | 18-00860 | 18-00760 | 43.7 | 4" DIA | 0.9 | 235.8 | 235.4 | 238.4 | 238.6 | 236.0 | 236.0 | 236.2 | 236.2 | 0.2 | 0.0 | 0.0 |
| 18-00610 | 18-00960 | 18-00980 | 15.8 | 12" DIA | 0.9 | 235.7 | 235.5 | 237.3 | 238.0 | 235.7 | 235.6 | 237.3 | 237.3 | 3.4 | 0.0 | -0.7 |
| 18-00630 | 18-01000 | 18-00980 | 4.71 | 12" DIA | 0.6 | 235.2 | 235.2 | 237.3 | 238.0 | 235.6 | 235.6 | 237.3 | 237.3 | 2.8 | 0.0 | -1.2 |
| 18-00650 | 18-01020 | 18-01000 | 41.02 | 12" DIA | 0.5 | 235.5 | 235.3 | 238.2 | 237.3 | 235.6 | 235.6 | 237.4 | 237.3 | 2.4 | 0.0 | -0.3 |
| 18-00670 | 18-01040 | 18-01020 | 7.7 | 12" DIA | 0.8 | 235.7 | 235.6 | 238.2 | 238.2 | 235.7 | 235.6 | 237.4 | 237.4 | 3.2 | 0.0 | -0.1 |
| 18-01030 | 18-00760 | 18-01050 | 6.01 | 12" DIA | 0 | 235.3 | 235.3 | 238.6 | 238.6 | 236.0 | 235.4 | 236.2 | 235.6 | 0.1 | 2.4 | 3.5 |
| 18-01040.1 | 01-00410 | 18-01110 | 94.83 | 12" DIA | 1.58 | 236.3 | 234.8 | 239.0 | 238.5 | 236.7 | 236.5 | 236.7 | 236.6 | 4.5 | 1.1 | 1.3 |
| 19-00010 | 19-00040 | 19-00020 | 167.89 | 10" DIA | 0.7 | 223.8 | 222.7 | 230.9 | 227.4 | 225.2 | 225.1 | 226.9 | 226.8 | 1.8 | 0.7 | 0.7 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 19-00030 | 19-00060 | 19-00020 | 50.99 | 10" DIA | 0.784 | 223.1 | 222.7 | 226.8 | 227.4 | 225.2 | 225.1 | 226.8 | 226.8 | 1.9 | 0.8 | 0.9 |
| 19-00050 | 19-00080 | 19-00020 | 93.42 | 10" DIA | 1.9 | 224.5 | 222.7 | 228.5 | 227.4 | 226.7 | 225.1 | 228.5 | 226.8 | 3.0 | 3.0 | 4.0 |
| 22-00010 | 22-00020 | 22-00120 | 175 | 36" DIA | 0.2 | 229.5 | 229.1 | 237.7 | 234.2 | 234.0 | 234.0 | 234.1 | 234.1 | 29.8 | -0.5 | -0.5 |
| 22-00030 | 22-00120 | 22-00040 | 24.94 | 12" DIA | 0.2 | 229.1 | 229.1 | 234.2 | 234.2 | 234.0 | 234.0 | 234.1 | 234.1 | 1.6 | -0.9 | -0.9 |
| 22-00050 | 22-00060 | 22-00040 | 178.5 | 36" DIA | 0.2 | 229.4 | 229.1 | 236.2 | 234.2 | 234.0 | 234.0 | 234.1 | 234.1 | 29.5 | -0.5 | -0.5 |
| 22-00070 | 06-00000 | 22-00040 | 325.41 | 36" DIA | 0.2 | 229.7 | 229.0 | 236.3 | 234.2 | 234.0 | 234.0 | 234.1 | 234.1 | 29.6 | 4.3 | 4.4 |
| 22-00100 | 22-Dummy-01 | 10-00090 | 43.39 | 12" DIA | 0.9 | 228.5 | 228.2 | 234.2 | 233.1 | 234.0 | 233.1 | 234.1 | 233.1 | 3.1 | 5.1 | 5.4 |
| 24-00000 | LINN-16 | CC-N-02-017 | 199.72 | 15" DIA | 0.3 | 207.4 | 206.8 | 211.9 | 209.4 | 207.4 | 207.4 | 208.2 | 208.2 | 3.5 | 0.0 | -0.2 |
| 24-00010 | LINN-14 | LINN-16 | 149.03 | 15" DIA | 0.5 | 208.5 | 207.7 | 211.9 | 211.9 | 208.5 | 207.4 | 208.5 | 208.2 | 4.6 | 0.0 | 0.0 |
| 24-00020 | LINN-15 | LINN-16 | 171.45 | 12" DIA | 1 | 209.4 | 207.7 | 213.8 | 211.9 | 209.4 | 207.4 | 209.4 | 208.2 | 3.6 | 0.0 | 0.0 |
| 24-00070 | LINN-0 | LINN-1 | 175.02 | 12" DIA | 0.8 | 235.0 | 233.7 | 238.2 | 237.4 | 235.6 | 234.0 | 237.4 | 237.3 | 3.1 | 2.0 | 2.8 |
| 24-00080 | LINN-1 | LINN-2 | 46.07 | 12" DIA | 0.5 | 233.4 | 233.1 | 237.4 | 237.4 | 234.0 | 233.6 | 237.3 | 237.3 | 3.0 | 2.0 | 2.8 |
| 24-00120 | LINN-2 | LINN-3 | 146.48 | 15" DIA | 0.6 | 233.0 | 232.0 | 237.4 | 235.4 | 233.6 | 232.6 | 237.3 | 235.4 | 5.2 | 2.5 | 7.5 |
| 24-00140 | LINN-3 | LINN-4 | 130.52 | 15" DIA | 0.6 | 232.0 | 231.2 | 235.4 | 235.7 | 232.6 | 231.9 | 235.4 | 234.3 | 5.2 | 2.5 | 6.7 |
| 24-00160 | LINN-4 | LINN-5 | 115 | 18" DIA | 0.3 | 230.7 | 230.4 | 235.7 | 235.2 | 231.9 | 231.3 | 234.3 | 233.0 | 5.6 | 6.0 | 11.2 |
| 24-00200 | LINN-5 | LINN-6 | 150 | 18" DIA | 0.5 | 230.3 | 229.4 | 235.2 | 233.0 | 231.3 | 230.3 | 233.0 | 231.3 | 7.8 | 6.0 | 11.2 |
| 24-00240 | LINN-6 | LINN-7 | 120.78 | 18" DIA | 0.5 | 229.3 | 228.7 | 233.0 | 234.7 | 230.3 | 229.0 | 231.3 | 229.4 | 7.8 | 6.0 | 11.2 |
| 24-00290 | LINN-7 | LINN-9 | 189.26 | 24" DIA | 0.5 | 228.2 | 227.2 | 234.7 | 234.8 | 229.0 | 228.1 | 229.4 | 228.4 | 16.4 | 6.0 | 11.2 |
| 24-00350 | LINN-9 | LINN-10 | 225.02 | 24" DIA | 2.53 | 227.1 | 221.4 | 234.8 | 227.3 | 228.1 | 222.5 | 228.4 | 223.5 | 36.0 | 18.5 | 26.6 |
| 24-00400 | LINN-10 | LINN-11 | 460.05 | 24" DIA | 1.43 | 221.3 | 214.7 | 227.3 | 220.4 | 222.5 | 215.9 | 223.5 | 217.6 | 27.1 | 18.5 | 26.4 |
| 24-00470 | LINN-11 | LINN-12 | 209.03 | 24" DIA | 1.5 | 214.6 | 209.8 | 220.4 | 216.5 | 215.9 | 211.2 | 217.6 | 211.9 | 34.4 | 27.1 | 37.5 |
| 24-00530 | LINN-12 | LINN-13 | 255.01 | 30" DIA | 1.2 | 209.7 | 207.3 | 216.5 | 212.9 | 211.2 | 209.1 | 211.9 | 209.9 | 39.3 | 27.1 | 37.5 |
| 24-00560 | LINN-13 | 00-15365 | 172 | 30" DIA | 0.5 | 207.2 | 206.4 | 212.9 | 213.5 | 209.1 | 207.8 | 209.9 | 208.3 | 28.2 | 27.1 | 37.5 |
| 24-00590 | LINN-17 | 00-15365 | 313 | 15" DIA | 0.13 | 208.1 | 207.7 | 212.9 | 213.5 | 212.9 | 207.8 | 212.9 | 208.3 | 2.3 | 7.5 | 7.5 |
| 24-00630 | LINN-23 | LINN-17 | 161 | 15" DIA | 0.1 | 208.5 | 208.2 | 213.6 | 212.9 | 213.2 | 212.9 | 213.2 | 212.9 | 2.7 | 3.5 | 3.8 |
| 24-00680 | LINN-18 | LINN-23 | 292.71 | 12" DIA | 0.2 | 209.7 | 209.1 | 214.9 | 213.6 | 214.9 | 213.2 | 214.9 | 213.2 | 1.7 | 3.4 | 3.8 |
| 24-00700 | LINN-19 | LINN-18 | 42.98 | 12" DIA | 0.2 | 210.1 | 209.8 | 215.9 | 214.9 | 214.8 | 214.9 | 214.8 | 214.9 | 3.1 | -1.3 | -1.3 |
| 24-00710 | LINN-20 | LINN-19 | 285.22 | 12" DIA | 0.2 | 210.9 | 210.2 | 214.5 | 215.9 | 214.5 | 214.8 | 214.5 | 214.8 | 1.8 | -1.3 | -1.3 |
| 24-00730 | LINN-21 | LINN-20 | 175 | 12" DIA | 0.3 | 211.5 | 211.0 | 214.8 | 214.5 | 214.7 | 214.5 | 214.7 | 214.5 | 1.8 | 1.4 | 1.4 |
| 24-00760 | LINN-22 | LINN-21 | 50.06 | 12" DIA | 0.5 | 211.6 | 211.5 | 214.8 | 214.8 | 214.8 | 214.7 | 214.8 | 214.7 | 1.6 | 1.4 | 1.4 |
| 24-00790 | 18-00980 | LINN-0 | 37.43 | 12" DIA | 0.2 | 235.1 | 235.0 | 238.0 | 238.2 | 235.6 | 235.6 | 237.3 | 237.4 | 1.7 | 0.4 | 1.2 |
| CC-Drainage-01 | 00-05053 | 03-00300 | 1855.38 | Irregular Channel | 1.22 | 235.0 | 212.5 | 237.7 | 216.4 | 235.0 | 212.6 | 235.1 | 212.8 | 41.1 | 0.1 | 0.6 |
| CC-DRAINAGE-02 | 18-01050 | 19-00080 | 1167.69 | Irregular Channel | 0.9 | 235.0 | 224.5 | 238.6 | 228.5 | 235.4 | 226.7 | 235.6 | 228.5 | 347.7 | 3.5 | 7.0 |
| CC-L-00-001 | CC-N-00-001 | CC-N-00-000 | 473.43 | Irregular Channel | -0.017 | 188.2 | 188.3 | 224.3 | 205.3 | 192.1 | 192.0 | 193.0 | 192.9 | 6309.0 | 89.0 | 160.7 |
| CC-L-00-002 | CC-N-00-002 | CC-N-00-001 | 1207.64 | Irregular Channel | 0.194 | 190.6 | 188.2 | 226.6 | 224.3 | 193.2 | 192.1 | 194.0 | 193.0 | 5978.5 | 93.4 | 161.8 |
| CC-L-00-003 | CC-N-00-003 | CC-N-00-002 | 1207.64 | Irregular Channel | 0 | 190.6 | 190.6 | 226.6 | 226.6 | 193.9 | 193.2 | 194.7 | 194.0 | 429.5 | 96.2 | 163.3 |
| CC-L-00-004 | CC-N-00-004 | CC-N-00-003 | 532.52 | Irregular Channel | -0.1 | 190.0 | 190.6 | 213.4 | 226.6 | 194.4 | 193.9 | 195.2 | 194.7 | 2006.5 | 97.4 | 161.9 |
| CC-L-00-005A | 00-05263 | CC-N-00-004 | 101.22 | Irregular Channel | 0.751 | 190.8 | 190.0 | 196.7 | 213.4 | 194.4 | 194.4 | 195.2 | 195.2 | 1753.0 | 98.1 | 162.4 |
| CC-L-00-005B | CC-N-00-005 | 00-15258 | 95.52 | Irregular Channel | 1.07 | 192.0 | 191.0 | 215.4 | 196.7 | 194.5 | 194.5 | 195.4 | 195.4 | 1942.1 | 98.4 | 162.6 |
| CC-L-00-006 | CC-N-00-006 | CC-N-00-005 | 160.91 | Irregular Channel | -0.062 | 191.9 | 192.0 | 209.3 | 215.4 | 194.8 | 194.5 | 195.8 | 195.4 | 4837.2 | 98.6 | 162.9 |
| CC-L-00-007 | CC-N-00-007 | CC-N-00-006 | 150.25 | Irregular Channel | 0.433 | 192.6 | 191.9 | 209.9 | 209.3 | 195.2 | 194.8 | 196.1 | 195.8 | 12782.1 | 98.8 | 163.2 |
| CC-L-00-008 | CC-N-00-008 | CC-N-00-007 | 156.1 | Irregular Channel | 0.79 | 193.8 | 192.6 | 203.7 | 209.9 | 195.9 | 195.2 | 196.5 | 196.1 | 4028.4 | 78.9 | 129.7 |
| CC-L-00-009 | CC-N-00-009 | CC-N-00-008 | 246.47 | Irregular Channel | 0.215 | 194.3 | 193.8 | 204.3 | 203.7 | 196.8 | 195.9 | 197.4 | 196.5 | 1352.5 | 78.9 | 129.8 |
| CC-L-00-010 | CC-N-00-010 | CC-N-00-009 | 522.47 | Irregular Channel | 0.0085 | 194.4 | 194.3 | 204.3 | 204.3 | 197.5 | 196.8 | 198.3 | 197.4 | 291.4 | 79.0 | 129.9 |
| CC-L-00-011 | CC-N-00-011 | CC-N-00-010 | 62.14 | Irregular Channel | 0.17 | 194.5 | 194.4 | 207.0 | 204.3 | 197.6 | 197.5 | 198.3 | 198.3 | 687.8 | 78.5 | 128.3 |
| CC-L-00-012 | CC-N-00-012 | CC-N-00-011 | 416.74 | Irregular Channel | 0.329 | 195.8 | 194.5 | 208.4 | 207.0 | 198.6 | 197.6 | 199.2 | 198.3 | 571.0 | 78.3 | 123.3 |
| CC-L-00-013 | CC-N-00-013 | CC-N-00-012 | 634.83 | Irregular Channel | 0.273 | 197.6 | 195.8 | 204.8 | 208.4 | 200.3 | 198.6 | 200.9 | 199.2 | 630.3 | 78.5 | 123.5 |
| CC-L-00-014 | CC-N-00-014 | CC-N-00-013 | 199.38 | Irregular Channel | 0.085 | 197.7 | 197.6 | 206.0 | 204.8 | 200.4 | 200.3 | 201.0 | 200.9 | 786.1 | 78.6 | 123.6 |
| CC-L-00-016 | CC-N-00-016 | CC-N-00-015 | 102.29 | Irregular Channel | 0.137 | 197.7 | 197.6 | 208.4 | 208.2 | 200.6 | 200.4 | 201.2 | 201.0 | 4221.7 | 74.9 | 118.7 |
| CC-L-00-017 | CC-N-00-017 | CC-N-00-016 | 80.55 | Irregular Channel | 0.161 | 197.9 | 197.7 | 208.1 | 208.4 | 200.6 | 200.6 | 201.2 | 201.2 | 4836.0 | 75.1 | 118.8 |
| CC-L-00-018 | CC-N-00-018 | CC-N-00-017 | 624.93 | Irregular Channel | 0.165 | 198.9 | 197.9 | 207.2 | 208.1 | 201.8 | 200.6 | 202.1 | 201.2 | 812.4 | 75.7 | 120.9 |
| CC-L-00-019A | 03-00530 | CC-N-00-018 | 487 | Irregular Channel | 0.4168 | 200.9 | 198.9 | 212.0 | 207.2 | 203.0 | 201.8 | 203.6 | 202.1 | 1012.8 | 75.4 | 116.7 |
| CC-L-00-019B | CC-N-00-019 | 03-00530 | 208.76 | Irregular Channel | 0.4168 | 201.8 | 200.9 | 208.2 | 212.0 | 203.8 | 203.0 | 204.5 | 203.6 | 1012.7 | 70.5 | 111.9 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| CC-L-00-020 | CC-N-00-020 | CC-N-00-019 | 503.96 | Irregular Channel | 0.135 | 202.5 | 201.8 | 206.4 | 208.2 | 205.6 | 203.8 | 206.3 | 204.5 | 92.5 | 70.6 | 111.9 |
| CC-L-00-021 | CC-N-00-021 | CC-N-00-020 | 228.76 | Irregular Channel | -0.162 | 202.1 | 202.5 | 208.3 | 206.4 | 205.9 | 205.6 | 206.5 | 206.3 | 101.2 | 70.6 | 112.0 |
| CC-L-00-022 | CC-N-00-022 | CC-N-00-021 | 451.77 | Irregular Channel | -0.1 | 201.7 | 202.1 | 207.7 | 208.3 | 206.2 | 205.9 | 206.8 | 206.5 | 18.4 | 68.3 | 89.9 |
| CC-L-00-023 | CC-N-00-023 | CC-N-00-022 | 451.77 | Irregular Channel | 0.242 | 202.8 | 201.7 | 216.1 | 207.7 | 206.5 | 206.2 | 207.2 | 206.8 | 155.9 | 68.6 | 89.8 |
| CC-L-00-024 | CC-N-00-024 | CC-N-00-023 | 479.44 | Irregular Channel | -0.10637 | 202.3 | 202.8 | 208.4 | 216.1 | 206.7 | 206.5 | 207.3 | 207.2 | 125.2 | 59.2 | 70.2 |
| CC-L-00-025 | CC-N-00-025 | CC-N-00-024 | 98.71 | Irregular Channel | -0.01 | 202.2 | 202.3 | 212.1 | 208.4 | 206.7 | 206.7 | 207.4 | 207.3 | 62.7 | 58.4 | 70.7 |
| CC-L-00-026 | CC-N-00-026 | CC-N-00-025 | 620.56 | Irregular Channel | 0.14 | 203.1 | 202.2 | 213.0 | 212.1 | 207.1 | 206.7 | 207.8 | 207.4 | 1173.9 | 60.5 | 75.8 |
| CC-L-00-027A | 07-00210 | CC-N-00-026 | 273.39 | Irregular Channel | 0.172 | 203.6 | 203.1 | 211.0 | 213.0 | 207.3 | 207.1 | 207.9 | 207.8 | 382.6 | 62.4 | 80.0 |
| CC-L-00-027B | CC-N-00-027 | 07-00210 | 437.91 | Irregular Channel | 0.171 | 204.3 | 203.6 | 213.5 | 211.0 | 207.7 | 207.3 | 208.2 | 207.9 | 381.9 | 62.6 | 80.5 |
| CC-L-00-028A | 00-05349 | CC-N-00-027 | 18.5 | Irregular Channel | 0 | 204.3 | 204.3 | 213.5 | 213.5 | 207.8 | 207.7 | 208.2 | 208.2 | 6.3 | 62.4 | 79.0 |
| CC-L-00-028B | CC-N-00-028 | 00-15365 | 20.2 | Irregular Channel | 0 | 205.2 | 205.2 | 219.7 | 213.5 | 207.8 | 207.8 | 208.3 | 208.3 | 30.9 | 32.7 | 37.6 |
| CC-L-00-029 | CC-N-00-029 | CC-N-00-028 | 682.78 | Irregular Channel | 0.18 | 206.4 | 205.2 | 220.7 | 219.7 | 209.0 | 207.8 | 209.2 | 208.3 | 1205.9 | 32.8 | 37.8 |
| CC-L-00-030 | CC-N-00-030 | CC-N-00-029 | 541.06 | Irregular Channel | 0.573 | 213.0 | 206.4 | 222.2 | 220.7 | 214.4 | 209.0 | 214.4 | 209.2 | 1142.8 | 31.6 | 33.9 |
| CC-L-00-031A | 00-05187 | CC-N-00-030 | 18.5 | Irregular Channel | 0 | 213.0 | 213.0 | 220.9 | 222.2 | 214.5 | 214.4 | 214.6 | 214.4 | 54.1 | 31.6 | 33.9 |
| CC-L-00-031B | CC-N-00-031 | 00-15191 | 37.05 | Irregular Channel | 0 | 212.6 | 212.6 | 221.8 | 220.9 | 214.6 | 214.6 | 214.7 | 214.6 | 55.7 | 31.6 | 33.9 |
| CC-L-00-032 | CC-N-00-032 | CC-N-00-031 | 69.8 | Irregular Channel | 1.6 | 213.7 | 212.6 | 223.6 | 221.8 | 215.0 | 214.6 | 215.1 | 214.7 | 390.7 | 31.7 | 33.9 |
| CC-L-00-034 | CC-N-00-034 | CC-N-00-033 | 282.75 | Irregular Channel | 0.877 | 215.9 | 213.4 | 224.7 | 222.4 | 217.7 | 216.2 | 217.8 | 216.4 | 4015.4 | 31.9 | 34.4 |
| CC-L-00-035 | CC-N-00-035 | CC-N-00-034 | 486.15 | Irregular Channel | 0.187 | 216.8 | 215.9 | 225.6 | 224.7 | 218.6 | 217.7 | 218.6 | 217.8 | 1744.9 | 32.6 | 35.4 |
| CC-L-01-001 | CC-N-01-001 | CC-N-00-003 | 125.98 | Irregular Channel | 3.26 | 194.7 | 190.6 | 204.4 | 226.6 | 194.8 | 193.9 | 195.0 | 194.7 | 10195.6 | 1.1 | 5.2 |
| CC-L-01-002 | 00-05502 | CC-N-01-001 | 12.7 | Irregular Channel | -7.09 | 193.8 | 194.7 | 196.5 | 204.4 | 194.8 | 194.8 | 195.0 | 195.0 | 830.5 | 1.0 | 2.7 |
| CC-L-01-003 | CC-N-01-002 | 00-05501 | 365.66 | Irregular Channel | 1.28 | 198.5 | 193.9 | 204.9 | 196.5 | 198.7 | 194.8 | 198.9 | 195.1 | 208.8 | 1.0 | 2.7 |
| CC-L-01-004 | 00-05522 | CC-N-01-002 | 164.89 | Irregular Channel | 0.073 | 198.7 | 198.5 | 201.7 | 204.9 | 199.2 | 198.7 | 199.4 | 198.9 | 51.5 | 1.0 | 2.2 |
| CC-L-01-005 | CC-N-01-003 | 00-05521 | 17.48 | Irregular Channel | 5.15 | 199.7 | 198.8 | 204.1 | 201.7 | 199.9 | 199.4 | 200.0 | 199.6 | 126.5 | 1.0 | 2.2 |
| CC-L-01-006 | 00-05542 | CC-N-01-003 | 272.6 | Irregular Channel | 0.11 | 200.0 | 199.7 | 202.1 | 204.1 | 200.4 | 199.9 | 200.5 | 200.0 | 37.8 | 1.0 | 2.2 |
| CC-L-01-007 | CC-N-01-004 | 00-05541 | 154.08 | Irregular Channel | 0.37 | 200.8 | 200.3 | 205.2 | 202.1 | 201.2 | 200.9 | 201.4 | 201.4 | 49.2 | 1.0 | 2.2 |
| CC-L-01-008 | 00-05552 | CC-N-01-004 | 127.01 | Irregular Channel | -0.02 | 200.8 | 200.8 | 202.8 | 205.2 | 201.4 | 201.2 | 201.6 | 201.4 | 9.4 | 0.9 | 2.1 |
| CC-L-01-009 | CC-N-01-005 | 00-005551 | 252.91 | Irregular Channel | 0.55 | 201.8 | 200.4 | 204.7 | 202.8 | 202.2 | 201.5 | 202.4 | 201.9 | 408.9 | 0.9 | 2.2 |
| CC-L-01-010 | 00-05562 | CC-N-01-005 | 18.42 | Irregular Channel | -2.5 | 201.4 | 201.8 | 203.3 | 204.7 | 202.2 | 202.2 | 202.4 | 202.4 | 647.9 | 0.9 | 2.1 |
| CC-L-01-011 | 00-05572 | 00-05561 | 283.4 | Irregular Channel | 0.007 | 201.5 | 201.5 | 203.4 | 203.3 | 202.3 | 202.3 | 202.6 | 202.6 | 26.5 | 0.9 | 2.3 |
| CC-L-01-012 | CC-N-01-006 | 00-05571 | 101.42 | Irregular Channel | -0.09 | 201.5 | 201.6 | 203.0 | 203.4 | 202.3 | 202.3 | 202.6 | 202.6 | 10.7 | 1.0 | 2.7 |
| CC-L-01-013 | CC-N-01-007 | CC-N-01-006 | 61.73 | Irregular Channel | -0.28 | 201.4 | 201.5 | 202.8 | 203.0 | 202.3 | 202.3 | 202.6 | 202.6 | 54.1 | 1.0 | 2.8 |
| CC-L-01-014 | CC-N-01-008 | CC-N-01-007 | 166.65 | Irregular Channel | 0.5 | 202.2 | 201.4 | 203.6 | 202.8 | 202.5 | 202.3 | 202.7 | 202.6 | 73.3 | 1.3 | 3.0 |
| CC-L-01-015 | CC-N-01-009 | CC-N-01-008 | 86.82 | Irregular Channel | -0.68 | 201.6 | 202.2 | 203.0 | 203.6 | 202.5 | 202.5 | 202.7 | 202.7 | 85.1 | 1.3 | 3.1 |
| CC-L-01-016 | CC-N-01-010 | CC-N-01-009 | 24.02 | Irregular Channel | 1.92 | 202.1 | 201.6 | 203.5 | 203.0 | 202.5 | 202.5 | 202.7 | 202.7 | 142.8 | -0.3 | 2.0 |
| CC-L-01-017 | CC-N-01-011 | CC-N-01-010 | 52.77 | Irregular Channel | -0.42 | 201.9 | 202.1 | 203.3 | 203.5 | 202.5 | 202.5 | 202.7 | 202.7 | 66.6 | -0.3 | 2.0 |
| CC-L-01-018 | CC-N-01-012 | CC-N-01-011 | 117.23 | Irregular Channel | 0.4 | 202.3 | 201.9 | 204.6 | 203.3 | 202.5 | 202.5 | 202.8 | 202.7 | 65.3 | -0.2 | 2.1 |
| CC-L-01-019 | CC-N-01-013 | CC-N-01-012 | 79.82 | Irregular Channel | -0.31 | 202.1 | 202.3 | 204.6 | 204.6 | 202.5 | 202.5 | 202.8 | 202.8 | 57.7 | -0.2 | 2.1 |
| CC-L-01-020 | CC-N-01-014 | CC-N-01-013 | 229.18 | Irregular Channel | 0.17 | 202.5 | 202.1 | 204.6 | 204.6 | 202.5 | 202.5 | 202.9 | 202.8 | 42.6 | 0.0 | 2.1 |
| CC-L-01-021 | CC-N-01-015 | CC-N-01-014 | 59.39 | Irregular Channel | -0.94 | 201.9 | 202.5 | 204.6 | 204.6 | 202.2 | 202.5 | 203.0 | 202.9 | 20.0 | 0.0 | 2.2 |
| CC-L-01-022 | 00-22960 | CC-N-01-015 | 15.57 | Irregular Channel | -8.09 | 200.6 | 201.9 | 204.6 | 204.6 | 202.2 | 202.2 | 203.0 | 203.0 | 58.6 | 0.0 | 2.3 |
| CC-L-01-023 | CC-N-01-016 | 00-22680 | 18.29 | Irregular Channel | 6.4 | 202.0 | 200.8 | 203.5 | 204.6 | 202.3 | 202.2 | 203.0 | 203.0 | 117.8 | 3.5 | 9.3 |
| CC-L-01-024 | CC-N-01-017 | CC-N-01-016 | 204.26 | Irregular Channel | 0.39 | 202.8 | 202.0 | 204.8 | 203.5 | 203.4 | 202.3 | 203.7 | 203.0 | 29.1 | 3.5 | 9.2 |
| CC-L-01-025 | CC-N-01-018 | CC-N-01-017 | 94.22 | Irregular Channel | -0.53 | 202.3 | 202.8 | 204.3 | 204.8 | 203.4 | 203.4 | 203.7 | 203.7 | 53.2 | 3.5 | 9.2 |
| CC-L-01-026 | CC-N-01-019 | CC-N-01-018 | 140.03 | Irregular Channel | 0.4 | 202.8 | 202.3 | 204.9 | 204.3 | 203.6 | 203.4 | 204.0 | 203.7 | 46.2 | 3.5 | 9.3 |
| CC-L-01-027 | CC-N-01-020 | CC-N-01-019 | 23.98 | Irregular Channel | -0.71 | 202.7 | 202.8 | 204.0 | 204.9 | 203.6 | 203.6 | 204.0 | 204.0 | 32.5 | 3.5 | 9.4 |
| CC-L-01-028 | 00-21690 | CC-N-01-020 | 24.91 | Irregular Channel | 3.01 | 203.4 | 202.7 | 206.0 | 204.0 | 203.7 | 203.6 | 204.1 | 204.0 | 67.1 | 3.5 | 15.3 |
| CC-L-01-029 | CC-N-01-021 | 00-21680 | 487.1 | Irregular Channel | -0.04 | 203.4 | 203.6 | 208.1 | 206.0 | 204.3 | 204.2 | 204.8 | 204.7 | 146.7 | 3.5 | 15.3 |
| CC-L-01-030 | 00-05045 | CC-N-01-021 | 231.3 | Irregular Channel | -0.13 | 203.1 | 203.4 | 208.6 | 208.1 | 204.3 | 204.3 | 204.8 | 204.8 | 709.9 | 1.7 | 12.0 |
| CC-L-01-031 | CC-N-01-022 | 00-15049 | 116.68 | Irregular Channel | 1.05 | 204.4 | 203.2 | 209.1 | 208.6 | 204.7 | 204.3 | 205.1 | 204.9 | 1990.8 | 2.1 | 12.4 |
| CC-L-01-032 | CC-N-01-023 | CC-N-01-022 | 899.78 | Irregular Channel | 0.102 | 205.3 | 204.4 | 208.3 | 209.1 | 205.8 | 204.7 | 206.1 | 205.1 | 713.0 | 2.1 | 14.8 |
| CC-L-02-001 | CC-N-02-001 | CC-N-00-007 | 156.98 | Irregular Channel | 1.99 | 195.7 | 192.6 | 206.1 | 209.9 | 196.8 | 195.2 | 197.2 | 196.1 | 9238.9 | 21.1 | 36.6 |
| CC-L-02-002 | 00-05250 | CC-N-02-001 | 154.51 | Irregular Channel | 0.429 | 196.3 | 195.7 | 201.7 | 206.1 | 198.0 | 196.8 | 198.4 | 197.2 | 388.7 | 21.0 | 34.8 |
| CC-L-02-003 | 00-05254 | 00-15253 | 79.54 | Irregular Channel | 0.429 | 197.0 | 196.6 | 202.3 | 201.6 | 198.7 | 198.3 | 199.1 | 198.8 | 289.6 | 21.0 | 34.8 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| CC-L-02-004 | CC-N-02-002 | 00-15256 | 264.34 | Irregular Channel | 0.429 | 198.0 | 196.9 | 205.1 | 202.3 | 199.8 | 198.8 | 200.2 | 199.3 | 409.8 | 21.0 | 34.8 |
| CC-L-02-005 | 05-00400 | CC-N-02-002 | 84.86 | Irregular Channel | 0.121 | 198.1 | 198.0 | 206.4 | 205.1 | 200.0 | 199.8 | 200.5 | 200.2 | 114.1 | 21.0 | 34.8 |
| CC-L-02-006 | CC-N-02-003 | 05-00400 | 525.37 | Irregular Channel | 0.02 | 198.3 | 198.1 | 202.7 | 206.4 | 200.6 | 200.0 | 201.2 | 200.5 | 50.2 | 18.5 | 32.6 |
| CC-L-02-007 | CC-N-02-004 | CC-N-02-003 | 139.92 | Irregular Channel | 0.24 | 198.6 | 198.3 | 202.7 | 202.7 | 200.8 | 200.6 | 201.4 | 201.2 | 77.6 | 18.6 | 32.8 |
| CC-L-02-008 | CC-N-02-005 | CC-N-02-004 | 23.01 | Irregular Channel | 4.09 | 199.5 | 198.6 | 203.6 | 202.7 | 200.9 | 200.8 | 201.4 | 201.4 | 323.1 | 18.6 | 32.9 |
| CC-L-02-009 | CC-N-02-006 | CC-N-02-005 | 62.89 | Irregular Channel | -1.48 | 198.6 | 199.5 | 202.7 | 203.6 | 201.0 | 200.9 | 201.6 | 201.4 | 194.4 | 18.6 | 33.0 |
| CC-L-02-010 | CC-N-02-007 | CC-N-02-006 | 135.48 | Irregular Channel | 0.49 | 199.3 | 198.6 | 203.4 | 202.7 | 201.3 | 201.0 | 201.9 | 201.6 | 112.4 | 18.6 | 33.1 |
| CC-L-02-011 | CC-N-02-008 | CC-N-02-007 | 180.55 | Irregular Channel | -0.13 | 199.0 | 199.3 | 203.1 | 203.4 | 201.5 | 201.3 | 202.1 | 201.9 | 58.3 | 15.0 | 28.5 |
| CC-L-02-012 | CC-N-02-009 | CC-N-02-008 | 94.07 | Irregular Channel | 0.7 | 199.7 | 199.0 | 203.8 | 203.1 | 201.6 | 201.5 | 202.2 | 202.1 | 133.9 | 15.0 | 28.5 |
| CC-L-02-013 | CC-N-02-010 | CC-N-02-009 | 95.4 | Irregular Channel | -0.016 | 199.5 | 199.7 | 203.6 | 203.8 | 201.8 | 201.6 | 202.4 | 202.2 | 63.4 | 15.0 | 28.4 |
| CC-L-02-014 | CC-N-02-011 | CC-N-02-010 | 91.87 | Irregular Channel | 0.56 | 200.1 | 199.5 | 204.1 | 203.6 | 201.9 | 201.8 | 202.6 | 202.4 | 119.1 | 15.0 | 28.7 |
| CC-L-02-015 | CC-N-02-012 | CC-N-02-011 | 95.9 | Irregular Channel | -0.35 | 199.7 | 200.1 | 203.8 | 204.1 | 202.1 | 201.9 | 202.7 | 202.6 | 95.2 | 15.0 | 28.7 |
| CC-L-02-016 | CC-N-02-013 | CC-N-02-012 | 147.94 | Irregular Channel | 0.39 | 200.3 | 199.7 | 202.7 | 203.8 | 202.1 | 202.1 | 202.7 | 202.7 | 249.3 | 15.3 | 31.1 |
| CC-L-02-017 | CC-N-02-014 | CC-N-02-013 | 48.49 | Irregular Channel | -0.47 | 200.1 | 200.3 | 203.5 | 202.7 | 202.1 | 202.1 | 202.7 | 202.7 | 276.6 | 16.0 | 38.5 |
| CC-L-02-018 | 00-05224 | CC-N-02-014 | 109.85 | Irregular Channel | 0.25 | 200.3 | 200.1 | 203.8 | 203.5 | 202.1 | 202.1 | 202.7 | 202.7 | 5.8 | 14.5 | 34.0 |
| CC-L-02-019 | CC-N-02-015 | 00-15067 | 69.5 | Irregular Channel | 2 | 206.1 | 204.7 | 210.2 | 208.8 | 206.6 | 206.0 | 206.9 | 206.8 | 1060.0 | 13.8 | 27.6 |
| CC-L-02-020 | CC-N-02-016 | CC-N-02-015 | 923.13 | Irregular Channel | -0.089 | 205.3 | 206.1 | 209.4 | 210.2 | 207.4 | 206.6 | 208.1 | 206.9 | 16.7 | 13.8 | 28.2 |
| CC-L-02-021 | CC-N-02-017 | CC-N-02-016 | 115 | Irregular Channel | 0 | 205.3 | 205.3 | 209.4 | 209.4 | 207.4 | 207.4 | 208.2 | 208.1 | 1.8 | 14.4 | 30.3 |
| CC-L-03-001 | CC-N-03-001 | CC-N-00-010 | 191.08 | Irregular Channel | 3.79 | 201.6 | 194.4 | 205.8 | 204.3 | 201.8 | 197.5 | 201.9 | 198.3 | 644.4 | 0.7 | 2.4 |
| CC-L-03-002 | CC-N-03-002 | CC-N-03-001 | 1546.61 | Irregular Channel | 0.131 | 203.6 | 201.6 | 209.9 | 205.8 | 203.9 | 201.8 | 204.1 | 201.9 | 13.7 | 0.7 | 2.4 |
| CC-L-03-003A | 00-05039 | CC-N-03-002 | 126.36 | Irregular Channel | 0.07 | 203.7 | 203.6 | 207.9 | 209.9 | 203.9 | 203.9 | 204.1 | 204.1 | 102.5 | 0.1 | 0.8 |
| CC-L-03-003B | CC-N-03-003 | 00-15035 | 39.74 | Irregular Channel | 1.53 | 205.0 | 204.3 | 211.2 | 207.9 | 205.0 | 204.4 | 205.1 | 204.8 | 475.7 | 0.1 | 0.8 |
| CC-L-04-001 | CC-N-04-001 | CC-N-00-021 | 272.64 | Irregular Channel | 2.59 | 209.2 | 202.1 | 218.5 | 208.3 | 209.5 | 205.9 | 210.1 | 206.5 | 3912.8 | 2.6 | 19.2 |
| CC-L-04-002 | CC-N-04-002 | CC-N-04-001 | 1016.17 | Irregular Channel | 1.229 | 221.7 | 209.2 | 226.1 | 218.5 | 221.8 | 209.5 | 222.1 | 210.1 | 3657.0 | 2.6 | 19.2 |
| CC-L-04-003 | 17-00350 | CC-N-04-002 | 215.12 | Irregular Channel | -0.67 | 220.2 | 221.7 | 225.0 | 226.1 | 221.8 | 221.8 | 222.1 | 222.1 | 2717.5 | 2.6 | 14.6 |
| CC-L-05-001 | CC-N-05-001 | CC-N-00-023 | 460.46 | Irregular Channel | 1.14 | 208.0 | 202.8 | 218.8 | 216.1 | 208.9 | 206.5 | 209.2 | 207.2 | 4776.9 | 11.4 | 20.8 |
| CC-L-05-002 | CC-N-05-002 | CC-N-05-001 | 1028.07 | Irregular Channel | 1.42 | 222.6 | 208.0 | 232.2 | 218.8 | 223.2 | 208.9 | 223.4 | 209.2 | 12934.1 | 11.4 | 19.3 |
| CC-L-05-003A | 00-05309 | CC-N-05-002 | 162.66 | Irregular Channel | 0.61 | 223.6 | 222.6 | 226.9 | 232.2 | 224.7 | 223.2 | 224.9 | 223.4 | 116.9 | 11.3 | 18.3 |
| CC-L-05-003B | CC-N-05-003 | 00-15308 | 730.47 | Irregular Channel | 0.768 | 229.5 | 223.9 | 232.5 | 226.9 | 230.5 | 225.7 | 230.8 | 226.3 | 131.4 | 11.6 | 20.4 |
| CC-L-05-004 | 00-05283 | CC-N-05-003 | 158.82 | Irregular Channel | 0.743 | 230.7 | 229.5 | 234.5 | 232.5 | 231.6 | 230.5 | 231.8 | 230.8 | 163.2 | 11.1 | 16.5 |
| CC-L-05-005 | 18-00521 | 00-15286 | 61.02 | Irregular Channel | -0.77 | 231.5 | 232.0 | 239.0 | 234.5 | 232.8 | 232.7 | 233.1 | 233.0 | 361.3 | 11.2 | 16.5 |
| CC-NORTHDITCH-01 | 16-00410 | 00-05224 | 49.97 | Irregular Channel | 0.7 | 200.8 | 200.5 | 204.8 | 203.8 | 202.1 | 202.1 | 202.7 | 202.7 | 416.1 | 3.7 | 8.4 |
| D-ALEXANDER-01 | 18-01110 | 18-00820 | 47.98 | Irregular Channel | -2.71 | 234.8 | 236.1 | 238.5 | 238.4 | 236.5 | 236.5 | 236.6 | 236.6 | 17.2 | 1.1 | 1.3 |
| D-MILLERSBURG-01 | 16-00090 | 00-05039 | 95.18 | Irregular Channel | 1.33 | 205.0 | 203.7 | 207.3 | 207.9 | 205.0 | 203.9 | 205.0 | 204.1 | 1190.8 | 0.0 | 0.0 |
| D-WOODS-1 | 00-05060 | 17-00430 | 131.56 | Irregular Channel | 1 | 233.3 | 232.0 | 235.9 | 236.5 | 233.6 | 233.0 | 235.9 | 235.9 | 65.7 | 2.0 | 3.6 |
| D-WOODS-2 | 18-00000 | 00-05060 | 139.89 | Irregular Channel | 0.14 | 233.5 | 233.3 | 236.8 | 235.9 | 234.0 | 233.6 | 235.9 | 235.9 | 15.3 | 1.4 | 2.4 |
| D-ZUHLKE-01 | 08-00220 | 13-00170 | 87.65 | Irregular Channel | -0.67 | 235.5 | 236.1 | 240.5 | 240.1 | 237.0 | 237.0 | 237.1 | 237.1 | 353.2 | 2.5 | 2.8 |
| Swale 1-B | 01-00120 | Swale 1B Control | 183.2 | Irregular Channel | 0.49 | 237.3 | 236.4 | 242.2 | 239.0 | 238.3 | 238.2 | 238.4 | 238.3 | 2.7 | 1.1 | 1.3 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| MURDER CREEK | | | | | | | | | | | | | | | | |
| 00-05005 | 00-15005 | 00-05001 | 72.22 | 48" DIA | 0.7 | 208.9 | 208.4 | 215.8 | 215.8 | 210.2 | 210.4 | 210.9 | 211.0 | 120.7 | -21.1 | -26.4 |
| 00-05006 | 00-15005 | 00-05001 | 72.05 | 48" DIA | 3.2 | 208.5 | 206.3 | 215.8 | 215.8 | 210.2 | 210.4 | 210.9 | 211.0 | 255.0 | 40.4 | 69.8 |
| 00-05009 | 00-15010 | 00-05015 | 104.01 | 36" DIA | 0.4 | 208.1 | 207.6 | 215.6 | 215.6 | 208.9 | 208.9 | 209.7 | 209.7 | 43.4 | 4.0 | 8.6 |
| 00-05010 | 00-15010 | 00-05015 | 102.97 | 36" DIA | 0.5 | 208.1 | 207.5 | 215.6 | 215.6 | 208.9 | 208.9 | 209.7 | 209.7 | 48.8 | 5.3 | 11.7 |
| 00-05202 | 00-15202 | 00-05219 | 78.33 | 48" H, 36" BOX | 0.3 | 221.1 | 220.9 | 229.0 | 229.0 | 223.0 | 222.8 | 223.4 | 223.0 | 64.1 | 27.8 | 46.0 |
| 00-05380 | 00-05381 | 00-05382 | 32.58 | 12" DIA | 1.5 | 236.3 | 235.8 | 238.3 | 238.3 | 236.5 | 236.1 | 236.6 | 236.3 | 4.4 | 0.5 | 0.8 |
| 00-05390 | 00-05391 | 00-05392 | 37.78 | 18" DIA | 0.2 | 230.7 | 230.6 | 234.7 | 234.7 | 231.5 | 231.5 | 231.7 | 231.7 | 4.2 | 0.9 | 2.1 |
| 00-05400 | 00-05401 | 00-05402 | 40.7 | 15" DIA | 3.1 | 231.0 | 229.8 | 235.2 | 235.2 | 231.5 | 226.7 | 231.7 | 226.8 | 11.4 | 3.1 | 6.7 |
| 00-05410 | 00-05411 | 00-05412 | 30.64 | 10" DIA | 0.8 | 239.3 | 239.0 | 241.0 | 241.0 | 239.4 | 239.1 | 239.4 | 239.1 | 2.0 | 0.1 | 0.1 |
| 00-05420 | 00-05421 | 00-05422 | 40.65 | 12" DIA | 3.91 | 236.3 | 234.7 | 237.7 | 237.7 | 236.4 | 234.9 | 236.5 | 235.0 | 7.1 | 0.5 | 0.7 |
| 00-05430 | 00-05431 | 00-05432 | 31.91 | 10" DIA | 4.11 | 238.4 | 237.1 | 239.4 | 239.4 | 239.4 | 238.9 | 239.4 | 238.9 | 4.4 | 4.1 | 3.4 |
| 01-00140 | 01-00130 | 01-00150 | 35.18 | 10" DIA | 0.5 | 234.7 | 234.5 | 238.7 | 238.7 | 235.3 | 235.3 | 235.7 | 235.7 | 1.6 | 0.0 | 0.0 |
| 01-00160 | 01-00150 | 01-00170 | 107 | 10" DIA | 0.3 | 234.5 | 234.2 | 238.7 | 238.1 | 235.3 | 235.2 | 235.7 | 235.5 | 1.2 | 0.8 | 0.9 |
| 01-00180 | 01-00170 | 01-00190 | 35.18 | 10" DIA | 0.5 | 234.2 | 234.0 | 238.1 | 238.1 | 235.2 | 235.1 | 235.5 | 235.4 | 1.6 | 1.3 | 1.5 |
| 01-00200 | 01-00190 | 01-00210 | 124.6 | 10" DIA | 0.5 | 234.0 | 233.5 | 238.1 | 238.1 | 235.1 | 234.7 | 235.4 | 234.9 | 1.4 | 1.3 | 1.5 |
| 01-00280 | 01-00290 | 01-00310 | 68.15 | 10" DIA | 0.5 | 233.0 | 232.6 | 236.3 | 235.3 | 234.7 | 234.7 | 234.9 | 234.9 | 1.6 | 0.2 | 0.2 |
| 01-00300 | 01-00310 | 01-00350 | 95.94 | 10" DIA | 0.5 | 232.6 | 232.1 | 235.3 | 235.5 | 234.7 | 234.7 | 234.9 | 234.8 | 1.6 | 0.6 | 0.7 |
| 01-00320 | Swale 1A Control | 01-00370 | 37.28 | 12" DIA | 0.3 | 232.1 | 232.0 | 235.5 | 234.5 | 232.6 | 232.2 | 232.8 | 232.3 | 1.9 | 1.6 | 2.3 |
| 01-00340 | 01-00330 | 01-00310 | 39.18 | 10" DIA | 0.3 | 232.7 | 232.6 | 235.3 | 235.3 | 234.7 | 234.7 | 234.9 | 234.9 | 1.2 | 0.0 | 0.1 |
| 01-00360 | 01-00390 | 01-00350 | 16.53 | 12" DIA | 1.7 | 232.5 | 232.1 | 235.5 | 235.5 | 234.7 | 234.7 | 234.9 | 234.8 | 5.2 | 1.4 | 1.7 |
| 08-00010 | 08-00020 | 08-00040 | 70 | 12" DIA | 0.3 | 234.8 | 234.6 | 237.0 | 238.1 | 235.0 | 235.0 | 235.0 | 235.0 | 2.0 | 0.0 | 0.1 |
| 08-00030 | Det 8A Control | 08-00040 | 51 | 12" DIA | 0.3 | 234.7 | 234.6 | 238.2 | 238.1 | 235.1 | 235.0 | 235.2 | 235.0 | 1.9 | 0.7 | 0.7 |
| 08-00050 | 08-00080 | 08-00060 | 372 | 18" DIA | 0.1 | 235.3 | 234.9 | 243.2 | 238.2 | 237.2 | 237.2 | 237.2 | 237.2 | 3.3 | -0.2 | -0.1 |
| 12-00010 | 12-00000 | 12-00020 | 21.72 | 10" DIA | 3.1 | 237.7 | 237.0 | 242.7 | 242.7 | 237.7 | 237.2 | 237.7 | 237.3 | 3.9 | 0.0 | 0.0 |
| 12-00030 | 12-00020 | 12-00040 | 41.54 | 10" DIA | 3.7 | 237.0 | 235.5 | 242.7 | 241.4 | 237.2 | 235.6 | 237.3 | 235.8 | 4.2 | 0.4 | 1.2 |
| 12-00050 | 12-00060 | 12-00080 | 55.8 | 15" DIA | 0.7 | 225.7 | 225.3 | 229.2 | 230.0 | 228.9 | 228.8 | 229.2 | 229.0 | 5.5 | 3.4 | 4.5 |
| 12-00070 | 12-00100 | 12-00120 | 299.58 | 10" DIA | 1 | 236.8 | 233.8 | 244.0 | 242.0 | 237.1 | 234.0 | 237.1 | 234.0 | 2.2 | 0.5 | 0.6 |
| 12-00090 | 12-00140 | 12-00100 | 8 | 10" DIA | 0.12 | 238.0 | 237.9 | 243.8 | 244.0 | 238.0 | 237.1 | 238.0 | 237.1 | 1.9 | 0.0 | 0.0 |
| 12-00110 | 12-00160 | 12-00100 | 30.54 | 10" DIA | 1 | 238.3 | 237.9 | 243.9 | 244.0 | 238.3 | 237.1 | 238.3 | 237.1 | 2.2 | 0.0 | 0.0 |
| 12-00130 | 12-00120 | 12-00180 | 258.88 | 12" DIA | 1.2 | 233.7 | 230.1 | 242.0 | 235.0 | 234.0 | 230.6 | 234.0 | 230.9 | 4.2 | 0.5 | 0.6 |
| 12-00150 | 12-00180 | 12-00200 | 244.48 | 15" DIA | 1.1 | 230.0 | 227.3 | 235.0 | 230.5 | 230.6 | 229.2 | 230.9 | 229.8 | 6.8 | 2.6 | 3.7 |
| 12-00170 | 12-00200 | 12-00060 | 191.99 | 15" DIA | 0.7 | 227.2 | 225.8 | 230.5 | 229.2 | 229.2 | 228.9 | 229.8 | 229.2 | 5.6 | 2.6 | 3.7 |
| 12-00190 | 12-00040 | 12-00180 | 523.19 | 12" DIA | 1 | 235.4 | 230.1 | 241.4 | 235.0 | 235.6 | 230.6 | 235.8 | 230.9 | 3.6 | 0.4 | 1.2 |
| 12-00210 | 12-00242 | 12-00220 | 80.7 | 18" DIA | 0.66 | 225.0 | 224.5 | 230.7 | 230.6 | 227.5 | 226.2 | 229.1 | 226.9 | 8.5 | 13.6 | 17.4 |
| 12-00211 | 12-00220 | 12-00241 | 58 | 18" DIA | 0.4 | 224.5 | 224.2 | 230.6 | 230.6 | 226.2 | 225.3 | 226.9 | 225.4 | 7.8 | 13.6 | 17.4 |
| 12-00230 | 12-00240 | 12-00241 | 23.6 | 15" DIA | 1.9 | 224.8 | 224.3 | 230.0 | 230.6 | 225.4 | 225.3 | 225.5 | 225.4 | 9.4 | 2.6 | 4.1 |
| 12-00243 | 12-00241 | 12-00244 | 48.73 | 36" DIA | 1.8 | 224.2 | 223.1 | 230.6 | 230.7 | 225.3 | 225.0 | 225.4 | 225.0 | 98.8 | 15.6 | 20.3 |
| 15-00010 | 15-00040 | 15-00020 | 74.26 | 18" DIA | 0.7 | 232.0 | 231.5 | 235.3 | 235.3 | 232.4 | 231.9 | 232.5 | 232.0 | 9.0 | 1.8 | 2.2 |
| 15-00030 | 15-00100 | 15-00080 | 41.23 | 18" DIA | 0.2 | 232.5 | 232.4 | 236.0 | 238.0 | 233.8 | 233.8 | 234.5 | 234.4 | 4.6 | 1.8 | 2.9 |
| 15-00050 | 15-00120 | 15-00100 | 200.97 | 18" DIA | 0.2 | 232.9 | 232.5 | 236.0 | 236.0 | 233.8 | 233.8 | 234.5 | 234.5 | 4.6 | 1.9 | 3.0 |
| 15-00090 | 15-00260 | 15-00220 | 34.85 | 10" DIA | 0.63 | 236.4 | 236.2 | 239.6 | 239.6 | 236.6 | 236.6 | 236.8 | 236.8 | 1.7 | 0.2 | 0.2 |
| 15-00110 | 15-00240 | 15-00260 | 106.95 | 10" DIA | 0.9 | 237.4 | 236.4 | 239.6 | 239.6 | 237.6 | 236.6 | 237.6 | 236.8 | 2.1 | 0.2 | 0.2 |
| 23-00010 | 23-00020 | 23-00060 | 235 | 12" DIA | 2 | 237.1 | 232.4 | 241.0 | 237.3 | 237.2 | 232.4 | 237.2 | 232.4 | 5.0 | 0.1 | 0.1 |
| 23-00030 | 23-00040 | 23-00080 | 255 | 12" DIA | 2.2 | 237.1 | 231.9 | 239.4 | 234.4 | 237.3 | 232.0 | 237.4 | 232.0 | 5.1 | 0.4 | 0.6 |
| 23-00050 | 23-00060 | 23-00140 | 135 | 12" DIA | 2 | 232.3 | 229.6 | 237.3 | 234.4 | 232.4 | 229.7 | 232.4 | 229.7 | 5.0 | 0.2 | 0.2 |
| 23-00070 | 23-00140 | 23-00100 | 191 | 12" DIA | 1.5 | 229.5 | 226.7 | 234.4 | 231.4 | 229.7 | 227.8 | 229.7 | 229.1 | 4.4 | 0.5 | 0.5 |
| 23-00090 | 23-00100 | 12-00242 | 77 | 18" DIA | 1.5 | 226.6 | 225.3 | 231.4 | 230.7 | 227.8 | 227.5 | 229.1 | 229.1 | 13.3 | 1.7 | 1.5 |
| 23-00130 | 08-00040 | 23-00260 | 27 | 12" DIA | 0.3 | 234.6 | 234.5 | 238.1 | 237.7 | 235.0 | 233.3 | 235.0 | 233.4 | 1.9 | 0.7 | 0.8 |
| 23-00150 | 23-00160 | 12-00241 | 77 | 18" DIA | 1.5 | 228.0 | 226.9 | 231.6 | 230.6 | 228.1 | 225.3 | 228.1 | 225.4 | 12.6 | 0.1 | 0.1 |
| 23-00170 | 23-00180 | 23-00160 | 88 | 18" DIA | 2 | 229.8 | 228.0 | 233.3 | 231.6 | 229.8 | 228.1 | 229.8 | 228.1 | 14.8 | 0.1 | 0.1 |
| 23-00190 | 23-00220 | 23-00240 | 28 | 12" DIA | 1.96 | 231.4 | 230.8 | 236.8 | 236.6 | 231.7 | 231.1 | 231.7 | 231.3 | 5.0 | 1.1 | 1.2 |
| 23-00200 | 23-00240 | 23-00210 | 47.89 | 24" DIA | 0.65 | 230.7 | 230.4 | 236.6 | 236.6 | 231.1 | 230.6 | 231.3 | 230.6 | 18.2 | 1.4 | 2.7 |

| Table B-2 - Hydraulic Model Parameters and Results | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Conduit ID | Upstream Node | Downstream Node | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 23-00230 | 23-00260 | 23-00220 | 79 | 12" DIA | 1.5 | 233.0 | 231.5 | 237.7 | 236.8 | 233.3 | 231.7 | 233.4 | 231.7 | 5.0 | 1.0 | 1.1 |
| 23-00250 | 23-00280 | 23-00260 | 79 | 12" DIA | 1.5 | 233.0 | 231.5 | 240.4 | 237.7 | 233.4 | 233.3 | 233.4 | 233.4 | 5.0 | 0.3 | 0.3 |
| 23-00270 | 23-00300 | 23-00280 | 68 | 8" DIA | 3.4 | 238.1 | 235.8 | 241.0 | 240.4 | 238.2 | 233.4 | 238.2 | 233.4 | 2.2 | 0.1 | 0.1 |
| 24-00800 | LINN-26 | LINN-25 | 55.95 | 30" DIA | 0.374 | 234.6 | 234.4 | 238.4 | 238.1 | 235.9 | 234.6 | 236.3 | 234.7 | 25.1 | 15.2 | 24.1 |
| 24-00801 | LINN-24 | LINN-26 | 184.55 | 12" DIA | 0.374 | 236.8 | 236.1 | 238.9 | 238.4 | 238.9 | 235.9 | 238.9 | 236.3 | 2.2 | 3.7 | 3.7 |
| D-CONSER-01 | 23-00080 | 12-00244 | 412.5 | Irregular Channel | 2.14 | 231.9 | 223.1 | 234.4 | 230.7 | 232.0 | 225.0 | 232.0 | 225.0 | 151.4 | 0.3 | 0.5 |
| D-CONSER-02 | 23-00210 | 12-00244 | 457.47 | Irregular Channel | 1.6 | 230.4 | 223.1 | 236.6 | 230.7 | 230.6 | 225.0 | 230.6 | 225.0 | 131.0 | 0.9 | 2.3 |
| D-CONSER-03 | 00-05412 | 00-05391 | 443.89 | Irregular Channel | 1.88 | 239.0 | 230.7 | 241.0 | 234.7 | 239.1 | 231.5 | 239.1 | 231.7 | 186.7 | 0.1 | 0.1 |
| D-CONSER-04.1 | 00-05392 | 00-05401 | 12.81 | Irregular Channel | -3.36 | 230.6 | 231.0 | 234.7 | 235.2 | 231.5 | 231.5 | 231.7 | 231.7 | 111.7 | 0.9 | 2.1 |
| D-CONSER-05 | 00-05422 | 00-05401 | 375.05 | Irregular Channel | 0.97 | 234.7 | 231.0 | 237.7 | 235.2 | 234.9 | 231.5 | 235.0 | 231.7 | 60.0 | 1.6 | 3.0 |
| D-WAVERLY-01 | 00-05382 | 00-05422 | 134.55 | Irregular Channel | 0.85 | 235.8 | 234.7 | 238.3 | 237.7 | 236.1 | 234.9 | 236.3 | 235.0 | 21.0 | 1.1 | 2.3 |
| MC-DRAINAGE-01 | MC-DRAIN-N-02 | 12-00242 | 217 | Irregular Channel | 0.75 | 227.0 | 225.4 | 232.1 | 230.7 | 227.7 | 227.5 | 229.1 | 229.1 | 680.4 | 15.6 | 21.7 |
| MC-DRAINAGE-02 | MC-DRAIN-N-03 | MC-DRAIN-N-02 | 218.15 | Irregular Channel | 0 | 228.3 | 227.0 | 233.4 | 232.1 | 228.7 | 227.7 | 229.1 | 229.1 | 6296.5 | 16.3 | 33.8 |
| MC-DRAINAGE-03 | 01-00370 | MC-DRAIN-N-03 | 676.2 | Irregular Channel | 0.54 | 232.0 | 228.3 | 234.5 | 233.4 | 232.2 | 228.7 | 232.3 | 229.1 | 1183.3 | 1.9 | 7.5 |
| MC-DRAINAGE-04 | MC-DRAIN-N-04 | 01-00370 | 681.28 | Irregular Channel | 0.62 | 236.3 | 232.0 | 237.6 | 234.5 | 236.4 | 232.2 | 236.5 | 232.3 | 320.3 | 0.5 | 3.6 |
| MC-DRAINAGE-11 | LINN-25 | MC-DRAIN-N-03 | 1006.4 | Irregular Channel | 0.58 | 234.2 | 228.3 | 238.1 | 233.4 | 234.6 | 228.7 | 234.7 | 229.1 | 942.7 | 14.8 | 27.2 |
| MC-DRAINAGE-12 | 00-05432 | LINN-24 | 380.8 | Irregular Channel | 0.07 | 237.1 | 236.8 | 239.4 | 238.9 | 238.9 | 238.9 | 238.9 | 238.9 | 9.3 | 5.2 | 7.4 |
| MC-L-01-01 | MC-N-01-01 | MC-N-01-00 | 414.11 | Irregular Channel | 2.3 | 188.1 | 178.6 | 208.9 | 207.0 | 189.0 | 179.6 | 189.4 | 179.8 | 15498.4 | 9.5 | 28.0 |
| MC-L-01-02 | MC-N-01-02 | MC-N-01-01 | 583.33 | Irregular Channel | 2.88859 | 205.0 | 188.1 | 209.3 | 208.9 | 206.0 | 189.0 | 206.6 | 189.4 | 1146.4 | 9.5 | 28.0 |
| MC-L-01-03 | MC-N-01-03 | MC-N-01-02 | 625.59 | Irregular Channel | 0.48115 | 208.0 | 205.0 | 211.4 | 209.3 | 208.9 | 206.0 | 209.7 | 206.6 | 112.2 | 9.5 | 28.1 |
| MC-L-01-04 | 00-05015 | MC-N-01-03 | 19.09 | Irregular Channel | -2.25 | 207.5 | 208.0 | 215.6 | 211.4 | 208.9 | 208.9 | 209.7 | 209.7 | 242.7 | 9.3 | 20.5 |
| MC-L-01-05 | MC-N-01-04 | 00-15010 | 359.2 | Irregular Channel | 0.44 | 209.7 | 208.1 | 211.3 | 215.6 | 210.7 | 208.9 | 210.8 | 209.7 | 3.8 | 9.2 | 19.1 |
| MC-L-01-06 | MC-N-01-05 | MC-N-01-04 | 255.21 | Irregular Channel | 0.13714 | 210.0 | 209.7 | 211.7 | 211.3 | 211.2 | 210.7 | 211.6 | 210.8 | 9.9 | 9.2 | 19.0 |
| MC-L-01-07 | MC-N-01-06 | MC-N-01-05 | 68.72 | Irregular Channel | 0.37835 | 210.3 | 210.0 | 211.7 | 211.7 | 211.4 | 211.2 | 211.7 | 211.6 | 15.2 | 9.3 | 19.1 |
| MC-L-01-08 | MC-N-01-07 | MC-N-01-06 | 437.54 | Irregular Channel | 0.45482 | 212.3 | 210.3 | 213.5 | 211.7 | 213.3 | 211.4 | 213.5 | 211.7 | 21.4 | 9.6 | 28.2 |
| MC-L-01-09 | MC-N-01-08 | MC-N-01-07 | 437.54 | Irregular Channel | 0.03 | 212.4 | 212.3 | 213.6 | 213.5 | 213.6 | 213.3 | 213.6 | 213.5 | 5.7 | 8.8 | 8.7 |
| MC-L-01-10 | MC-N-01-09 | MC-N-01-08 | 230.12 | Irregular Channel | 0.03 | 212.5 | 212.4 | 213.7 | 213.6 | 213.7 | 213.6 | 213.7 | 213.6 | 12.0 | 10.2 | 10.2 |
| MC-L-01-11 | MC-N-01-10 | MC-N-01-09 | 356.12 | Irregular Channel | 0.19375 | 213.2 | 212.5 | 214.2 | 213.7 | 214.2 | 213.7 | 214.2 | 213.7 | 8.5 | 31.0 | 31.0 |
| MC-L-01-12 | MC-N-01-11 | MC-N-01-10 | 356.12 | Irregular Channel | 0.36 | 214.4 | 213.2 | 219.3 | 214.2 | 215.4 | 214.2 | 215.7 | 214.2 | 11.7 | 38.1 | 86.7 |
| MC-L-01-13 | MC-N-01-12 | MC-N-01-11 | 259.67 | Irregular Channel | -0.15 | 214.1 | 214.4 | 215.8 | 219.3 | 215.6 | 215.4 | 215.8 | 215.7 | 14.2 | 26.4 | 52.0 |
| MC-L-01-14 | MC-N-01-13 | MC-N-01-12 | 1269.66 | Irregular Channel | 0.36703 | 218.7 | 214.1 | 220.6 | 215.8 | 219.7 | 215.6 | 220.0 | 215.8 | 221.0 | 27.2 | 73.3 |
| MC-L-01-15 | MC-N-01-14 | MC-N-01-13 | 746.08 | Irregular Channel | 0.36189 | 221.4 | 218.7 | 223.7 | 220.6 | 222.8 | 219.7 | 223.0 | 220.0 | 89.7 | 26.9 | 45.7 |
| MC-L-01-16 | 00-05219 | MC-N-01-14 | 64.93 | Irregular Channel | -0.74 | 220.9 | 221.4 | 229.0 | 223.7 | 222.8 | 222.8 | 223.0 | 223.0 | 128.1 | 27.5 | 46.0 |
| MC-L-01-17 | MC-N-01-15 | 00-15202 | 74.86 | Irregular Channel | 2.47 | 223.0 | 221.1 | 225.3 | 229.0 | 224.1 | 223.0 | 224.3 | 223.4 | 201.5 | 27.9 | 46.1 |
| MC-L-02-01 | MC-N-02-01 | MC-N-02-00 | 503.09 | Irregular Channel | 5.53579 | 204.9 | 177.1 | 208.8 | 207.7 | 205.9 | 178.1 | 206.5 | 178.7 | 1296.9 | 18.8 | 59.6 |
| MC-L-02-02 | MC-N-02-02 | MC-N-02-01 | 735.34 | Irregular Channel | 0.56436 | 209.1 | 204.9 | 214.8 | 208.8 | 209.8 | 205.9 | 210.1 | 206.5 | 114.9 | 19.0 | 60.6 |
| MC-L-02-03 | MC-N-02-03 | MC-N-02-02 | 198.37 | Irregular Channel | 0.09074 | 209.2 | 209.1 | 215.0 | 214.8 | 210.4 | 209.8 | 211.0 | 210.1 | 1063.3 | 19.8 | 62.2 |
| MC-L-02-04 | 00-05001 | MC-N-02-03 | 25.6 | Irregular Channel | -11.6 | 206.3 | 209.2 | 215.8 | 215.0 | 210.4 | 210.4 | 211.0 | 211.0 | 12023.3 | 19.2 | 50.1 |
| MC-L-02-05 | MC-N-02-04 | 00-15005 | 62.07 | Irregular Channel | 1.27 | 209.3 | 208.5 | 213.5 | 215.8 | 210.4 | 210.2 | 211.1 | 210.9 | 997.9 | 19.4 | 50.0 |
| MC-L-02-06 | MC-N-02-05 | MC-N-02-04 | 205.44 | Irregular Channel | 0.3456 | 210.0 | 209.3 | 214.1 | 213.5 | 211.6 | 210.4 | 212.5 | 211.1 | 2.6 | 19.5 | 50.0 |
| MC-L-11-01 | MC-N-11-01 | MC-N-01-08 | 124.03 | Irregular Channel | 0.7 | 213.3 | 212.4 | 215.4 | 213.6 | 213.6 | 213.6 | 213.7 | 213.6 | 11.6 | 2.7 | 26.6 |
| MC-L-11-02 | MC-N-11-02 | MC-N-11-01 | 1020.21 | Irregular Channel | 0.97137 | 223.2 | 213.3 | 225.4 | 215.4 | 223.3 | 213.6 | 223.6 | 213.7 | 312.2 | 2.7 | 26.6 |
| MC-L-11-03 | 00-05402 | MC-N-11-02 | 1020.21 | Irregular Channel | 0.33 | 226.5 | 223.2 | 235.2 | 225.4 | 226.7 | 223.3 | 226.8 | 223.6 | 4.4 | 2.7 | 6.3 |
| MC-L-21-01 | MC-N-21-01 | MC-N-01-11 | 476.56 | Irregular Channel | 0.51 | 216.9 | 214.4 | 221.7 | 219.3 | 218.4 | 215.4 | 219.2 | 215.7 | 233.8 | 14.3 | 39.6 |
| MC-L-21-02 | MC-N-21-02 | MC-N-21-01 | 455.67 | Irregular Channel | 0.22824 | 217.9 | 216.9 | 219.8 | 221.7 | 218.5 | 218.4 | 219.2 | 219.2 | 72.8 | 15.3 | 42.0 |
| MC-L-21-03 | 12-00244 | MC-N-21-02 | 1156.83 | Irregular Channel | 0.53422 | 224.1 | 217.9 | 230.7 | 219.8 | 225.0 | 218.5 | 225.0 | 219.2 | 45.6 | 16.3 | 22.1 |
| Swale 1-A-1 | 01-00210 | 01-00390 | 147.7 | Irregular Channel | 0.92 | 233.5 | 232.1 | 238.1 | 235.5 | 234.7 | 234.7 | 234.9 | 234.9 | 38.2 | 1.2 | 1.7 |
| Swale 1-A-2 | Swale 1 | 01-00210 | 477.5 | Irregular Channel | 0.53 | 236.0 | 233.5 | 239.0 | 238.1 | 236.0 | 234.7 | 236.0 | 234.9 | 52.7 | 0.0 | 0.0 |
| Swale 15A | 15-00220 | 15-00120 | 202.03 | Irregular Channel | 1.65 | 236.2 | 232.9 | 239.6 | 236.0 | 236.6 | 233.8 | 236.8 | 234.5 | 29.8 | 1.9 | 3.3 |

**Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID**

| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| **CROOKS CREEK** | | | | | | | | | | | | | | | | |
| 00-005551 | 00-05552 | 00-05550 | 21.45 | 12" DIA | -1.86 | 200.4 | 200.8 | 202.8 | 202.8 | 201.5 | 201.4 | 201.9 | 201.6 | 4.9 | 0.9 | 2.2 |
| 00-05039 | CC-N-03-002 | CC-L-03-003A | 126.36 | Irregular Channel | 0.07 | 203.7 | 203.6 | 207.9 | 209.9 | 203.9 | 203.9 | 204.1 | 204.1 | 102.5 | 0.1 | 0.8 |
| 00-05045 | CC-N-01-021 | CC-L-01-030 | 231.3 | Irregular Channel | -0.13 | 203.1 | 203.4 | 208.6 | 208.1 | 204.3 | 204.3 | 204.8 | 204.8 | 709.9 | 1.7 | 12.0 |
| 00-05053 | 03-00300 | CC-Drainage-01 | 1855.38 | Irregular Channel | 1.22 | 235.0 | 212.5 | 237.7 | 216.4 | 235.0 | 212.6 | 235.1 | 212.8 | 41.1 | 0.1 | 0.6 |
| 00-05060 | 17-00430 | D-WOODS-1 | 131.56 | Irregular Channel | 1 | 233.3 | 232.0 | 235.9 | 236.5 | 233.6 | 233.0 | 235.9 | 235.9 | 65.7 | 2.0 | 3.6 |
| 00-05187 | CC-N-00-030 | CC-L-00-031A | 18.5 | Irregular Channel | 0 | 213.0 | 213.0 | 220.9 | 222.2 | 214.5 | 214.4 | 214.6 | 214.4 | 54.1 | 31.6 | 33.9 |
| 00-05224 | CC-N-02-014 | CC-L-02-018 | 109.85 | Irregular Channel | 0.25 | 200.3 | 200.1 | 203.8 | 203.5 | 202.1 | 202.1 | 202.7 | 202.7 | 5.8 | 14.5 | 34.0 |
| 00-05250 | CC-N-02-001 | CC-L-02-002 | 154.51 | Irregular Channel | 0.429 | 196.3 | 195.7 | 201.7 | 206.1 | 198.0 | 196.8 | 198.4 | 197.2 | 388.7 | 21.0 | 34.8 |
| 00-05254 | 00-15253 | CC-L-02-003 | 79.54 | Irregular Channel | 0.429 | 197.0 | 196.6 | 202.3 | 201.6 | 198.7 | 198.3 | 199.1 | 198.8 | 289.6 | 21.0 | 34.8 |
| 00-05263 | CC-N-00-004 | CC-L-00-005A | 101.22 | Irregular Channel | 0.751 | 190.8 | 190.0 | 196.7 | 213.4 | 194.4 | 194.4 | 195.2 | 195.2 | 1753.0 | 98.1 | 162.4 |
| 00-05283 | CC-N-05-003 | CC-L-05-004 | 158.82 | Irregular Channel | 0.743 | 230.7 | 229.5 | 234.5 | 232.5 | 231.6 | 230.5 | 231.8 | 230.8 | 163.2 | 11.1 | 16.5 |
| 00-05309 | CC-N-05-002 | CC-L-05-003A | 162.66 | Irregular Channel | 0.61 | 223.6 | 222.6 | 226.9 | 232.2 | 224.7 | 223.2 | 224.9 | 223.4 | 116.9 | 11.3 | 18.3 |
| 00-05349 | CC-N-00-027 | CC-L-00-028A | 18.5 | Irregular Channel | 0 | 204.3 | 204.3 | 213.5 | 213.5 | 207.8 | 207.7 | 208.2 | 208.2 | 6.3 | 62.4 | 79.0 |
| 00-05501 | 00-05502 | 00-05500 | 18.13 | 15" DIA | 0.55 | 193.9 | 193.8 | 196.5 | 196.5 | 194.8 | 194.8 | 195.1 | 195.0 | 4.8 | 0.6 | 1.6 |
| 00-05501 | 00-05502 | 00-05510 | 17.35 | 12" DIA | 1.15 | 194.0 | 193.8 | 196.5 | 196.5 | 194.8 | 194.8 | 195.1 | 195.0 | 3.8 | 0.4 | 1.0 |
| 00-05502 | CC-N-01-001 | CC-L-01-002 | 12.7 | Irregular Channel | -7.09 | 193.8 | 194.7 | 196.5 | 204.4 | 194.8 | 194.8 | 195.0 | 195.0 | 830.5 | 1.0 | 2.7 |
| 00-05521 | 00-05522 | 00-05520 | 14.43 | 12" DIA | -1.39 | 199.1 | 199.3 | 201.7 | 201.7 | 199.4 | 199.2 | 199.6 | 199.4 | 4.2 | 0.0 | 0.4 |
| 00-05521 | 00-05522 | 00-05530 | 14.83 | 15" DIA | -0.67 | 198.8 | 198.9 | 201.7 | 201.7 | 199.4 | 199.2 | 199.6 | 199.4 | 5.3 | 1.0 | 1.8 |
| 00-05522 | CC-N-01-002 | CC-L-01-004 | 164.89 | Irregular Channel | 0.073 | 198.7 | 198.5 | 201.7 | 204.9 | 199.2 | 198.7 | 199.4 | 198.9 | 51.5 | 1.0 | 2.2 |
| 00-05541 | 00-05542 | 00-05540 | 24.71 | 12" DIA | 1.21 | 200.3 | 200.0 | 202.1 | 202.1 | 200.9 | 200.4 | 201.4 | 200.5 | 3.9 | 1.0 | 2.2 |
| 00-05542 | CC-N-01-003 | CC-L-01-006 | 272.6 | Irregular Channel | 0.11 | 200.0 | 199.7 | 202.1 | 204.1 | 200.4 | 199.9 | 200.5 | 200.0 | 37.8 | 1.0 | 2.2 |
| 00-05552 | CC-N-01-004 | CC-L-01-008 | 127.01 | Irregular Channel | -0.02 | 200.8 | 200.8 | 202.8 | 205.2 | 201.4 | 201.2 | 201.6 | 201.4 | 9.4 | 0.9 | 2.1 |
| 00-05561 | 00-05562 | 00-05560 | 24.96 | 12" DIA | 0.4 | 201.5 | 201.4 | 203.3 | 203.3 | 202.3 | 202.2 | 202.6 | 202.4 | 2.3 | 0.9 | 2.1 |
| 00-05562 | CC-N-01-005 | CC-L-01-010 | 18.42 | Irregular Channel | -2.5 | 201.4 | 201.8 | 203.3 | 204.7 | 202.2 | 202.2 | 202.4 | 202.4 | 647.9 | 0.9 | 2.1 |
| 00-05571 | 00-05572 | 00-05570 | 21.53 | 12" DIA | 0.7 | 201.6 | 201.5 | 203.4 | 203.4 | 202.3 | 202.3 | 202.6 | 202.6 | 3.0 | 0.9 | 1.3 |
| 00-05572 | 00-05561 | CC-L-01-011 | 283.4 | Irregular Channel | 0.007 | 201.5 | 201.5 | 203.4 | 203.3 | 202.3 | 202.3 | 202.6 | 202.6 | 26.5 | 0.9 | 2.3 |
| 00-15035 | 00-05039 | 00-05035 | 32.8 | 12" DIA | 1.9 | 204.3 | 203.7 | 207.9 | 207.9 | 204.4 | 203.9 | 204.8 | 204.1 | 4.9 | 0.1 | 0.8 |
| 00-15049 | 00-05045 | 00-05047 | 31.87 | 30" DIA | 0.3 | 203.3 | 203.3 | 208.6 | 208.6 | 204.3 | 204.3 | 204.9 | 204.8 | 20.6 | 0.5 | 3.8 |
| 00-15049 | 00-05045 | 00-05048 | 31.8 | 30" DIA | 0.5 | 203.3 | 203.1 | 208.6 | 208.6 | 204.3 | 204.3 | 204.9 | 204.8 | 30.0 | 0.7 | 4.3 |
| 00-15049 | 00-05045 | 00-05049 | 32.14 | 30" DIA | 0.1 | 203.2 | 203.2 | 208.6 | 208.6 | 204.3 | 204.3 | 204.9 | 204.8 | 10.2 | 0.6 | 4.1 |
| 00-15054 | 00-05053 | 00-05054 | 26.66 | 12" DIA | 1.9 | 235.5 | 235.0 | 237.7 | 237.7 | 235.7 | 235.0 | 235.8 | 235.1 | 5.0 | 0.2 | 0.7 |
| 00-15059 | 00-05060 | 00-05059 | 26.66 | 12" DIA | 0.5 | 233.5 | 233.3 | 235.9 | 235.9 | 233.6 | 233.6 | 235.9 | 235.9 | 2.6 | 0.2 | 1.4 |
| 00-15067 | 16-00450 | 00-05067 | 41.03 | 24" DIA | 1 | 204.7 | 204.3 | 208.8 | 208.8 | 206.0 | 204.9 | 206.8 | 205.4 | 22.6 | 6.8 | 13.6 |
| 00-15067 | 16-00450 | 00-05068 | 41.13 | 24" DIA | 1 | 204.7 | 204.3 | 208.8 | 208.8 | 206.0 | 204.9 | 206.8 | 205.4 | 22.3 | 6.9 | 13.7 |
| 00-15191 | 00-05187 | 00-05190 | 30.23 | 84" DIA | 2.3 | 210.4 | 209.7 | 220.9 | 220.9 | 214.6 | 214.5 | 214.6 | 214.6 | 621.7 | 27.9 | 29.7 |
| 00-15191 | 00-05187 | 00-05191 | 31.46 | 84" DIA | 1.5 | 210.1 | 209.6 | 220.9 | 220.9 | 214.6 | 214.5 | 214.6 | 214.6 | 435.9 | -12.2 | -12.4 |
| 00-15191 | 00-05187 | 00-05192 | 31.53 | 84" DIA | 0.4 | 209.7 | 209.5 | 220.9 | 220.9 | 214.6 | 214.5 | 214.6 | 214.6 | 197.9 | -12.1 | -12.1 |
| 00-15253 | 00-05250 | 00-05252 | 35.64 | 36" DIA | 0.1 | 196.6 | 196.6 | 201.6 | 201.7 | 198.3 | 198.0 | 198.8 | 198.4 | 25.0 | 11.1 | 18.1 |
| 00-15253 | 00-05250 | 00-05253 | 35.64 | 36" DIA | 0.1 | 196.7 | 196.7 | 201.6 | 201.7 | 198.3 | 198.0 | 198.8 | 198.4 | 25.0 | 9.9 | 16.7 |
| 00-15256 | 00-05254 | 00-05256 | 19.72 | 51" H, 66" BOX | 1.5 | 197.2 | 197.0 | 202.3 | 202.3 | 198.8 | 198.7 | 199.3 | 199.1 | 313.9 | 21.0 | 34.8 |
| 00-15258 | 00-05263 | 00-05257 | 39.94 | 48" DIA | 0.3 | 191.1 | 191.0 | 196.7 | 196.7 | 194.5 | 194.4 | 195.4 | 195.2 | 71.9 | 24.4 | 40.6 |
| 00-15258 | 00-05263 | 00-05258 | 39.94 | 48" DIA | 0.5 | 191.0 | 190.8 | 196.7 | 196.7 | 194.5 | 194.4 | 195.4 | 195.2 | 99.1 | 25.4 | 41.2 |
| 00-15258 | 00-05263 | 00-05260 | 39.92 | 48" DIA | 0.6 | 191.3 | 191.1 | 196.7 | 196.7 | 194.5 | 194.4 | 195.4 | 195.2 | 113.7 | 23.8 | 40.0 |
| 00-15258 | 00-05263 | 00-05262 | 39.97 | 48" DIA | 0.2 | 191.0 | 190.9 | 196.7 | 196.7 | 194.5 | 194.4 | 195.4 | 195.2 | 64.3 | 24.6 | 40.7 |
| 00-15286 | 00-05283 | 00-05286 | 50.42 | 24" DIA | 2.4 | 231.9 | 230.7 | 234.5 | 234.5 | 232.7 | 231.6 | 233.0 | 231.8 | 34.8 | 4.6 | 5.9 |
| 00-15286 | 00-05283 | 00-05287 | 50.57 | 24" DIA | 0.9 | 231.3 | 230.8 | 234.5 | 234.5 | 232.7 | 231.6 | 233.0 | 231.8 | 21.6 | 7.7 | 10.6 |
| 00-15308 | 00-05309 | 00-05308 | 21.41 | 24" DIA | 1.4 | 223.9 | 223.6 | 226.9 | 226.9 | 225.7 | 224.7 | 226.3 | 224.9 | 27.2 | 11.3 | 18.3 |
| 00-15365 | 00-05349 | 00-05365 | 70.5 | 58" H, 120" BOX | 1.2 | 205.2 | 204.3 | 213.5 | 213.5 | 207.8 | 207.8 | 208.3 | 208.2 | 851.5 | 31.3 | 39.6 |
| 00-15365 | 00-05349 | 00-05370 | 70.61 | 58" H, 120" BOX | 1.23 | 205.2 | 204.3 | 213.5 | 213.5 | 207.8 | 207.8 | 208.3 | 208.2 | 850.8 | 31.3 | 39.6 |
| 00-21680 | 00-21690 | 00-21671 | 20.11 | 24" DIA | 0.5 | 203.6 | 203.5 | 206.0 | 206.0 | 204.2 | 203.7 | 204.7 | 204.1 | 16.0 | 1.6 | 4.4 |
| 00-21680 | 00-21690 | 00-21681 | 20.09 | 24" DIA | 1.29 | 203.7 | 203.4 | 206.0 | 206.0 | 204.2 | 203.7 | 204.7 | 204.1 | 25.7 | 1.9 | 4.2 |
| 00-21690 | CC-N-01-020 | CC-L-01-028 | 24.91 | Irregular Channel | 3.01 | 203.4 | 202.7 | 206.0 | 204.0 | 203.7 | 203.6 | 204.1 | 204.0 | 67.1 | 3.5 | 15.3 |

Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID

| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 00-22680 | 00-22960 | 00-22661 | 23.83 | 12" DIA | 0.8 | 202.2 | 202.0 | 204.6 | 204.6 | 202.2 | 202.2 | 203.0 | 203.0 | 3.0 | 0.0 | 1.1 |
| 00-22680 | 00-22960 | 00-22671 | 24.29 | 12" DIA | 0.82 | 202.4 | 202.2 | 204.6 | 204.6 | 202.2 | 202.2 | 203.0 | 203.0 | 3.0 | 0.0 | 0.9 |
| 00-22680 | 00-22960 | 00-22681 | 24.32 | 30" DIA | -1.77 | 200.8 | 201.2 | 204.6 | 204.6 | 202.2 | 202.2 | 203.0 | 203.0 | 50.6 | 3.5 | 7.4 |
| 00-22960 | CC-N-01-015 | CC-L-01-022 | 15.57 | Irregular Channel | -8.09 | 200.6 | 201.9 | 204.6 | 204.6 | 202.2 | 202.2 | 203.0 | 203.0 | 58.6 | 0.0 | 2.3 |
| 01-00060 | 01-00080 | 01-00070 | 81.6 | 10" DIA | 0.5 | 238.5 | 238.1 | 242.6 | 242.2 | 238.6 | 238.6 | 238.6 | 238.6 | 1.6 | 0.0 | 0.0 |
| 01-00080 | 01-00100 | 01-00090 | 36.03 | 10" DIA | 0.5 | 238.1 | 237.9 | 242.2 | 242.2 | 238.6 | 238.5 | 238.6 | 238.6 | 1.6 | 0.6 | 0.6 |
| 01-00100 | 01-00120 | 01-00110 | 134 | 12" DIA | 0.5 | 237.9 | 237.3 | 242.2 | 242.2 | 238.5 | 238.3 | 238.6 | 238.4 | 2.5 | 1.1 | 1.2 |
| 01-00120 | Swale 1B Control | Swale 1-B | 183.2 | Irregular Channel | 0.49 | 237.3 | 236.4 | 242.2 | 239.0 | 238.3 | 238.2 | 238.4 | 238.3 | 2.7 | 1.1 | 1.3 |
| 01-00230 | 01-00250 | 01-00220 | 35.18 | 10" DIA | 0.4 | 238.7 | 238.5 | 241.2 | 241.2 | 238.9 | 238.9 | 238.9 | 238.9 | 1.4 | 0.0 | 0.0 |
| 01-00250 | 01-00270 | 01-00240 | 126.08 | 10" DIA | 0.3 | 238.5 | 238.2 | 241.2 | 241.8 | 238.9 | 238.6 | 238.9 | 238.7 | 1.2 | 0.5 | 0.5 |
| 01-00270 | 01-00100 | 01-00260 | 71.2 | 10" DIA | 0.3 | 238.2 | 237.9 | 241.8 | 242.2 | 238.6 | 238.5 | 238.7 | 238.6 | 1.2 | 0.6 | 0.6 |
| 01-00410 | 18-01110 | 18-01040.1 | 94.83 | 12" DIA | 1.58 | 236.3 | 234.8 | 239.0 | 238.5 | 236.7 | 236.5 | 236.7 | 236.6 | 4.5 | 1.1 | 1.3 |
| 01-00430 | 01-00410 | 01-00380 | 22.15 | 12" DIA | 0.5 | 236.4 | 236.3 | 239.0 | 239.0 | 236.8 | 236.7 | 236.9 | 236.7 | 2.5 | 1.1 | 1.2 |
| 02-00020 | 00-15308 | 02-00010 | 70 | 12" DIA | 0.4 | 226.1 | 225.8 | 229.6 | 226.9 | 226.5 | 225.7 | 226.5 | 226.3 | 2.3 | 0.8 | 0.9 |
| 02-00040 | 02-00020 | 02-00030 | 285.92 | 12" DIA | 0.8 | 228.5 | 226.2 | 235.9 | 229.6 | 228.8 | 226.5 | 228.8 | 226.5 | 3.2 | 0.6 | 0.6 |
| 02-00080 | 02-00060 | 02-00070 | 120 | 60" DIA | 0.3 | 230.1 | 229.8 | 238.7 | 239.1 | 233.5 | 233.5 | 233.5 | 233.5 | 142.7 | 0.9 | 0.9 |
| 02-00100 | 02-00080 | 02-00090 | 322 | 12" DIA | 0.6 | 236.3 | 234.2 | 240.6 | 238.7 | 236.7 | 233.5 | 236.7 | 233.5 | 2.8 | 1.3 | 1.3 |
| 02-00120 | 02-00100 | 02-00110 | 27.5 | 12" DIA | 0.1 | 237.6 | 237.3 | 240.9 | 240.6 | 238.0 | 236.7 | 238.0 | 236.7 | 3.5 | 1.3 | 1.3 |
| 02-00140 | 02-00120 | 02-00130 | 97.72 | 6" DIA | 2.3 | 240.5 | 238.3 | 243.5 | 240.9 | 240.5 | 238.0 | 240.5 | 238.0 | 0.8 | 0.0 | 0.0 |
| 02-Dummy-01 | 02-00040 | 02-00050 | 135.69 | 12" DIA | 0.8 | 229.7 | 228.6 | 239.1 | 235.9 | 230.0 | 228.8 | 230.0 | 228.8 | 3.2 | 0.6 | 0.6 |
| 03-00010 | 03-00050 | 03-00040 | 28 | 21" DIA | 1.3 | 203.8 | 203.4 | 207.9 | 208.2 | 207.9 | 207.9 | 207.9 | 207.9 | 20.3 | 5.1 | 5.2 |
| 03-00030 | 03-00010 | 03-00020 | 65 | 21" DIA | 0.3 | 204.0 | 203.8 | 208.3 | 207.9 | 207.9 | 207.9 | 207.9 | 207.9 | 8.3 | 4.2 | 4.3 |
| 03-00050 | 03-00070 | 03-00060 | 37 | 21" DIA | 0.4 | 203.4 | 203.2 | 208.2 | 208.2 | 207.9 | 207.9 | 207.9 | 207.9 | 10.4 | 5.1 | 5.2 |
| 03-00090 | 03-00030 | 03-00080 | 102.41 | 21" DIA | 0.3 | 204.3 | 204.0 | 208.8 | 208.3 | 207.9 | 207.9 | 208.0 | 207.9 | 8.4 | 4.2 | 4.3 |
| 03-00110 | 03-00090 | 03-00100 | 160.09 | 18" DIA | 0.3 | 204.8 | 204.3 | 209.2 | 208.8 | 208.0 | 207.9 | 208.0 | 208.0 | 5.6 | 4.2 | 4.3 |
| 03-00130 | 03-00110 | 03-00120 | 233.07 | 18" DIA | 0.3 | 205.4 | 204.8 | 210.6 | 209.2 | 208.1 | 208.0 | 208.1 | 208.0 | 5.6 | 3.4 | 3.5 |
| 03-00150 | 03-00130 | 03-00140 | 400 | 18" DIA | 0.3 | 206.6 | 205.4 | 212.6 | 210.6 | 208.1 | 208.1 | 208.2 | 208.1 | 5.8 | 2.6 | 2.7 |
| 03-00170 | 03-00150 | 03-00160 | 149.59 | 18" DIA | 0.4 | 207.2 | 206.6 | 213.3 | 212.6 | 208.1 | 208.1 | 208.3 | 208.2 | 6.7 | 0.8 | 0.9 |
| 03-00190 | 03-00170 | 03-00180 | 85.97 | 18" DIA | 0.4 | 208.0 | 207.2 | 215.0 | 213.3 | 208.3 | 208.1 | 208.3 | 208.3 | 10.1 | 0.7 | 0.8 |
| 03-00230 | 03-00200 | 03-00210 | 116.33 | 18" DIA | 0.5 | 208.7 | 208.1 | 213.7 | 215.0 | 210.3 | 210.3 | 211.0 | 211.0 | 7.4 | 1.9 | 2.4 |
| 03-00250 | 03-00230 | 03-00240 | 135.93 | 15" DIA | 0.3 | 209.4 | 208.9 | 214.0 | 213.7 | 210.3 | 210.3 | 211.1 | 211.0 | 3.7 | 2.0 | 2.3 |
| 03-00260 | 03-00250 | 03-00270 | 29.5 | 10" DIA | 1 | 210.1 | 209.8 | 214.3 | 214.0 | 210.3 | 210.3 | 211.1 | 211.1 | 2.2 | 0.0 | 0.0 |
| 03-00280 | 03-00250 | 03-00290 | 246.79 | 12" DIA | 0.4 | 210.8 | 209.6 | 215.3 | 214.0 | 211.1 | 210.3 | 211.2 | 211.1 | 2.4 | 0.5 | 0.9 |
| 03-00300 | 03-00280 | 03-00310 | 199.43 | 10" DIA | 0.7 | 212.5 | 211.0 | 216.4 | 215.3 | 212.6 | 211.1 | 212.8 | 211.2 | 1.9 | 0.1 | 0.6 |
| 03-00320 | 03-00340 | 03-00330 | 311.17 | 18" DIA | 0.4 | 209.9 | 208.7 | 215.7 | 214.2 | 212.0 | 212.0 | 212.0 | 212.0 | 6.7 | 3.5 | 3.5 |
| 03-00340 | 03-00550 | 03-00560 | 169.6 | 24" DIA | 0.2 | 208.8 | 208.4 | 214.2 | 213.2 | 212.0 | 211.9 | 212.0 | 211.9 | 11.1 | 8.5 | 8.5 |
| 03-00360 | 03-00340 | 03-00350 | 199.32 | 15" DIA | 0.7 | 210.4 | 208.8 | 216.0 | 214.2 | 212.0 | 212.0 | 212.0 | 212.0 | 5.9 | 1.6 | 1.6 |
| 03-00380 | 03-00150 | 03-00370 | 230.97 | 12" DIA | 0.3 | 208.4 | 207.6 | 213.3 | 212.6 | 209.0 | 208.1 | 209.0 | 208.2 | 2.1 | 1.4 | 1.4 |
| 03-00390 | 03-00410 | 03-00400 | 85.18 | 10" DIA | 0.4 | 209.2 | 208.9 | 213.9 | 213.5 | 211.9 | 211.9 | 211.9 | 211.9 | 1.4 | 1.0 | 1.0 |
| 03-00410 | 03-00430 | 03-00420 | 55.89 | 10" DIA | 0.4 | 208.8 | 208.6 | 213.5 | 213.3 | 211.9 | 211.9 | 211.9 | 211.9 | 1.4 | 1.0 | 1.0 |
| 03-00430 | 03-00450 | 03-00440 | 70.85 | 10" DIA | 0.4 | 208.5 | 208.2 | 213.3 | 213.0 | 211.9 | 211.9 | 211.9 | 211.9 | 1.4 | 1.0 | 1.0 |
| 03-00450 | 03-00470 | 03-00460 | 27.7 | 24" DIA | 2.1 | 208.1 | 207.5 | 213.0 | 213.3 | 211.9 | 211.8 | 211.9 | 211.8 | 32.7 | 10.1 | 10.1 |
| 03-00470 | 03-00490 | 03-00480 | 49.1 | 24" DIA | 0.7 | 207.9 | 207.5 | 213.3 | 213.3 | 211.8 | 211.8 | 211.8 | 211.8 | 21.2 | 10.1 | 10.1 |
| 03-00510 | 03-00530 | 03-00520 | 86 | 24" DIA | 0.5 | 206.5 | 206.0 | 213.3 | 212.0 | 207.2 | 203.0 | 207.2 | 203.6 | 17.3 | 5.0 | 5.0 |
| 03-00530 | CC-N-00-018 | CC-L-00-019A | 487 | Irregular Channel | 0.4168 | 200.9 | 198.9 | 212.0 | 207.2 | 203.0 | 201.8 | 203.6 | 202.1 | 1012.8 | 75.4 | 116.7 |
| 03-00550 | 03-00450 | 03-00540 | 58.51 | 24" DIA | 0.3 | 208.4 | 208.2 | 213.2 | 213.0 | 211.9 | 211.9 | 211.9 | 211.9 | 13.2 | 8.6 | 8.6 |
| 03-00580 | 03-00340 | 03-00570 | 41.86 | 15" DIA | 1.36 | 209.4 | 208.8 | 214.1 | 214.2 | 212.0 | 212.0 | 212.0 | 212.0 | 7.5 | 2.0 | 2.0 |
| 03-00600 | 03-00580 | 03-00590 | 375.14 | 15" DIA | 0.3 | 210.5 | 209.4 | 215.9 | 214.1 | 212.1 | 212.0 | 212.1 | 212.0 | 3.5 | 2.0 | 2.0 |
| 03-00620 | 03-00600 | 03-00610 | 189.77 | 10" DIA | 3.8 | 218.2 | 210.9 | 223.4 | 215.9 | 218.6 | 212.1 | 218.6 | 212.1 | 4.3 | 2.1 | 2.1 |
| 03-00640 | 03-00620 | 03-00630 | 160.23 | 10" DIA | 3.7 | 224.1 | 218.2 | 229.5 | 223.4 | 224.5 | 218.6 | 224.5 | 218.6 | 4.2 | 2.1 | 2.1 |
| 03-00660 | 03-00640 | 03-00650 | 175.95 | 10" DIA | 0.9 | 225.7 | 224.1 | 230.8 | 229.5 | 226.7 | 224.5 | 226.7 | 224.5 | 2.1 | 2.1 | 2.1 |
| 03-00680 | 03-00320 | 03-00670 | 82.22 | 15" DIA | 0.5 | 210.5 | 210.0 | 216.1 | 215.7 | 212.1 | 212.0 | 212.1 | 212.0 | 4.6 | 2.5 | 2.5 |
| 03-00700 | 03-00680 | 03-00690 | 325.45 | 15" DIA | 0.7 | 212.7 | 210.5 | 218.3 | 216.1 | 213.3 | 212.1 | 213.3 | 212.1 | 5.3 | 2.6 | 2.6 |

| Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 03-00720 | 03-00700 | 03-00710 | 400 | 10" DIA | 3.5 | 227.2 | 213.1 | 231.1 | 218.3 | 227.6 | 213.3 | 227.6 | 213.3 | 4.1 | 1.6 | 1.6 |
| 03-00740 | 03-00360 | 03-00730 | 50.43 | 15" DIA | 1.4 | 211.2 | 210.5 | 216.4 | 216.0 | 212.0 | 212.0 | 212.0 | 212.0 | 7.6 | 1.4 | 1.4 |
| 03-00760 | 03-00740 | 03-00750 | 335.79 | 12" DIA | 0.4 | 212.8 | 211.4 | 217.9 | 216.4 | 213.3 | 212.0 | 213.3 | 212.0 | 2.3 | 1.0 | 1.0 |
| 03-00780 | 03-00760 | 03-00770 | 232.75 | 10" DIA | 0.9 | 215.1 | 213.0 | 219.8 | 217.9 | 215.4 | 213.3 | 215.4 | 213.3 | 2.1 | 0.5 | 0.5 |
| 03-00800 | 16-00440 | 03-00810 | 35.19 | 21" DIA | 0.3 | 203.0 | 202.9 | 208.2 | 207.8 | 203.5 | 200.4 | 203.5 | 201.0 | 8.5 | 1.6 | 1.6 |
| 05-00010 | 05-00030 | 05-00020 | 125 | 6" DIA | -0.32 | 205.1 | 205.5 | 206.0 | 207.9 | 206.3 | 206.2 | 206.3 | 206.2 | 0.3 | 0.3 | 0.3 |
| 05-00030 | 05-00050 | 05-00040 | 26.98 | 10" DIA | 5.3 | 205.4 | 204.0 | 207.9 | 207.5 | 206.2 | 206.2 | 206.2 | 206.2 | 5.0 | 0.4 | 0.4 |
| 05-00050 | 05-00070 | 05-00060 | 158.9 | 12" DIA | 0.2 | 203.3 | 203.0 | 207.5 | 208.4 | 206.2 | 206.2 | 206.2 | 206.2 | 1.7 | 0.4 | 0.4 |
| 05-00070 | 05-00090 | 05-00080 | 411.94 | 15" DIA | 0.2 | 202.9 | 202.2 | 208.4 | 207.2 | 206.2 | 205.6 | 206.2 | 205.6 | 2.8 | 2.8 | 2.8 |
| 05-00090 | 05-00110 | 05-00100 | 47.68 | 15" DIA | 0.2 | 202.2 | 202.2 | 207.2 | 207.1 | 205.6 | 205.5 | 205.6 | 205.5 | 1.6 | 2.8 | 2.8 |
| 05-00110 | 05-00130 | 05-00120 | 234.24 | 15" DIA | 0.2 | 202.0 | 201.5 | 207.1 | 206.5 | 205.5 | 204.3 | 205.5 | 204.3 | 3.1 | 4.6 | 4.6 |
| 05-00130 | 05-00150 | 05-00140 | 229.8 | 15" DIA | 0.2 | 201.4 | 201.0 | 206.5 | 204.7 | 204.3 | 203.7 | 204.3 | 203.7 | 2.8 | 4.6 | 4.6 |
| 05-00150 | 05-00330 | 05-00160 | 47.77 | 18" DIA | 0.2 | 200.9 | 200.8 | 204.7 | 205.4 | 203.7 | 203.6 | 203.7 | 203.6 | 5.0 | 6.1 | 6.1 |
| 05-00170 | 05-00070 | 05-00180 | 27.54 | 12" DIA | 0.2 | 203.1 | 203.1 | 207.9 | 208.4 | 206.3 | 206.2 | 206.3 | 206.2 | 1.5 | 1.8 | 1.7 |
| 05-00190 | 05-00170 | 05-00440 | 27.78 | 12" DIA | 0.2 | 203.2 | 203.1 | 207.7 | 207.9 | 206.3 | 206.3 | 206.3 | 206.3 | 2.1 | 1.7 | 1.8 |
| 05-00210 | 05-00190 | 05-00200 | 248.82 | 12" DIA | 0.2 | 203.7 | 203.2 | 210.1 | 207.7 | 206.8 | 206.3 | 206.8 | 206.3 | 1.6 | 1.8 | 1.8 |
| 05-00230 | 05-00210 | 05-00220 | 199.98 | 12" DIA | 0.2 | 204.1 | 203.8 | 208.8 | 210.1 | 206.8 | 206.8 | 206.8 | 206.8 | 1.6 | 1.0 | 1.0 |
| 05-00250 | 05-00230 | 05-00240 | 71.63 | 12" DIA | 0.2 | 204.4 | 204.2 | 208.0 | 208.8 | 206.8 | 206.8 | 206.8 | 206.8 | 1.7 | 1.1 | 1.1 |
| 05-00270 | 05-00210 | 05-00260 | 222.43 | 12" DIA | 0.2 | 204.1 | 203.8 | 207.8 | 210.1 | 207.1 | 206.8 | 207.1 | 206.8 | 1.4 | 1.2 | 1.2 |
| 05-00290 | 05-00310 | 05-00280 | 83.13 | 12" DIA | 0.2 | 200.8 | 200.6 | 204.7 | 205.2 | 203.6 | 203.6 | 203.6 | 203.6 | 1.7 | 0.3 | 0.3 |
| 05-00310 | 05-00380 | 05-00340 | 36 | 18" DIA | 0.1 | 200.6 | 200.6 | 205.2 | 204.4 | 203.6 | 203.6 | 203.6 | 203.6 | 2.5 | 6.4 | 6.4 |
| 05-00330 | 05-00310 | 05-00300 | 52.75 | 18" DIA | 0.23 | 200.7 | 200.6 | 205.4 | 205.2 | 203.6 | 203.6 | 203.6 | 203.6 | 5.0 | 6.1 | 6.1 |
| 05-00350 | 05-00330 | 05-00320 | 39.17 | 12" DIA | 0.2 | 200.8 | 200.8 | 204.9 | 205.4 | 203.6 | 203.6 | 203.6 | 203.6 | 1.5 | 0.1 | 0.1 |
| 05-00390 | 05-00400 | 05-00351 | 14 | 18" DIA | 0.2 | 200.6 | 200.5 | 204.4 | 206.4 | 201.2 | 200.0 | 201.2 | 200.5 | 7.4 | 2.9 | 2.8 |
| 05-00400 | CC-N-02-002 | CC-L-02-005 | 84.86 | Irregular Channel | 0.121 | 198.1 | 198.0 | 206.4 | 205.1 | 200.0 | 199.8 | 200.5 | 200.2 | 114.1 | 21.0 | 34.8 |
| 05-00410 | 05-00250 | 05-00360 | 32.5 | 8" DIA | 0.4 | 204.6 | 204.4 | 207.8 | 208.0 | 206.8 | 206.8 | 206.8 | 206.8 | 0.8 | 0.5 | 0.5 |
| 05-00430 | 05-00410 | 05-00420 | 214 | 8" DIA | 0.4 | 205.3 | 204.6 | 206.5 | 207.8 | 206.5 | 206.8 | 206.5 | 206.8 | 0.7 | 0.5 | 0.5 |
| 06-00000 | 22-00040 | 22-00070 | 325.41 | 36" DIA | 0.2 | 229.7 | 229.0 | 236.3 | 234.2 | 234.0 | 234.0 | 234.1 | 234.1 | 29.6 | 4.3 | 4.4 |
| 06-00020 | 06-00000 | 06-00010 | 176 | 12" DIA | 1.1 | 232.3 | 230.6 | 237.5 | 236.3 | 234.3 | 234.0 | 234.5 | 234.1 | 3.5 | 1.9 | 2.1 |
| 06-00040 | 06-00020 | 06-00030 | 72 | 12" DIA | 0.3 | 232.7 | 232.3 | 238.3 | 237.5 | 234.4 | 234.3 | 234.7 | 234.5 | 2.5 | 1.9 | 2.1 |
| 06-00060 | 06-00040 | 06-00050 | 14 | 12" DIA | 0.3 | 235.0 | 235.0 | 238.2 | 238.3 | 235.7 | 234.4 | 235.7 | 234.7 | 0.1 | 2.0 | 2.1 |
| 06-00080 | 06-00060 | 06-00090 | 31 | 12" DIA | 0.7 | 235.2 | 235.0 | 237.8 | 238.2 | 235.8 | 235.7 | 235.8 | 235.7 | 2.9 | 1.5 | 1.6 |
| 06-00100 | 06-00060 | 06-00070 | 56 | 12" DIA | 0.6 | 235.4 | 235.0 | 238.3 | 238.2 | 235.7 | 235.7 | 235.7 | 235.7 | 2.7 | 0.5 | 0.6 |
| 06-00120 | 06-00080 | 06-00110 | 258.52 | 12" DIA | 1.76 | 239.8 | 235.3 | 243.8 | 237.8 | 240.1 | 235.8 | 240.2 | 235.8 | 4.7 | 1.0 | 1.0 |
| 06-00130 | 06-00150 | 06-00140 | 185.05 | 12" DIA | 1.2 | 243.6 | 241.4 | 247.6 | 244.9 | 243.6 | 241.5 | 243.6 | 241.5 | 3.9 | 0.0 | 0.0 |
| 06-00150 | 06-00170 | 06-00160 | 108.82 | 12" DIA | 0.6 | 241.4 | 240.2 | 244.9 | 243.7 | 241.5 | 240.3 | 241.5 | 240.4 | 3.7 | 0.0 | 0.1 |
| 06-00170 | 09-00000 | 06-00180 | 175.65 | 12" DIA | 0.6 | 240.2 | 239.4 | 243.7 | 242.4 | 240.3 | 238.5 | 240.4 | 238.6 | 2.4 | 0.1 | 0.1 |
| 07-00010 | 07-00030 | 07-00040 | 291.9 | 12" DIA | 0.3 | 206.5 | 205.8 | 210.0 | 209.6 | 210.0 | 209.4 | 210.0 | 209.4 | 1.8 | 2.0 | 1.9 |
| 07-00030 | 07-00210 | 07-00200 | 135.5 | 8" DIA | 0.4 | 205.7 | 205.1 | 209.6 | 211.0 | 209.4 | 207.3 | 209.4 | 207.9 | 0.8 | 2.0 | 1.9 |
| 07-00060 | 07-00140 | 07-00150 | 440 | 24" DIA | 0.1 | 206.7 | 206.2 | 210.6 | 209.4 | 209.4 | 209.4 | 209.4 | 209.4 | 7.5 | -4.8 | -4.6 |
| 07-00080 | 07-00060 | 07-00070 | 277.48 | 12" DIA | 0.3 | 207.5 | 206.8 | 210.9 | 210.6 | 209.6 | 209.4 | 209.6 | 209.4 | 1.8 | 0.9 | 1.0 |
| 07-00140 | 07-00030 | 07-00190 | 388.76 | 24" DIA | 0.1 | 206.1 | 205.7 | 209.4 | 209.6 | 209.4 | 209.4 | 209.4 | 209.4 | 7.5 | -3.4 | -3.2 |
| 07-00170 | 07-00060 | 07-00160 | 70.22 | 24" DIA | 0.1 | 206.8 | 206.7 | 210.6 | 210.6 | 209.4 | 209.4 | 209.4 | 209.4 | 7.1 | -7.1 | -6.9 |
| 07-00210 | CC-N-00-026 | CC-L-00-027A | 273.39 | Irregular Channel | 0.172 | 203.6 | 203.1 | 211.0 | 213.0 | 207.3 | 207.1 | 207.9 | 207.8 | 382.6 | 62.4 | 80.0 |
| 07-00230 | 07-00030 | 07-00220 | 272.64 | 12" DIA | 0.3 | 206.4 | 205.8 | 210.0 | 209.6 | 209.5 | 209.4 | 209.6 | 209.4 | 1.8 | 1.6 | 1.5 |
| 07-00270 | 07-00060 | 07-00260 | 274.31 | 12" DIA | 0.3 | 207.5 | 206.8 | 210.6 | 210.6 | 209.5 | 209.4 | 209.6 | 209.4 | 1.8 | 1.0 | 1.0 |
| 07-00310 | 07-00270 | 07-00300 | 45.08 | 12" DIA | 0.5 | 207.8 | 207.6 | 210.4 | 210.6 | 209.5 | 209.5 | 209.6 | 209.6 | 2.5 | 0.7 | 0.7 |
| 07-00320 | 07-00230 | 07-00330 | 126.57 | 12" DIA | 0.3 | 206.9 | 206.5 | 209.6 | 210.0 | 209.6 | 209.5 | 209.6 | 209.6 | 2.0 | 1.0 | 0.9 |
| 08-00100 | 08-00120 | 08-00070 | 215 | 12" DIA | 0.3 | 237.7 | 237.0 | 242.4 | 240.1 | 238.3 | 238.1 | 238.6 | 238.4 | 2.0 | 0.9 | 1.1 |
| 08-00120 | 08-00260 | 08-00190 | 28 | 12" DIA | 0.3 | 236.8 | 236.7 | 240.1 | 239.9 | 238.1 | 238.0 | 238.4 | 238.3 | 2.0 | 2.0 | 2.2 |
| 08-00140 | 08-00100 | 08-00090 | 155 | 12" DIA | 0.3 | 238.2 | 237.8 | 244.6 | 242.4 | 238.7 | 238.3 | 238.8 | 238.6 | 1.9 | 0.9 | 1.1 |
| 08-00160 | 08-00140 | 08-00110 | 42 | 12" DIA | 0.3 | 238.6 | 238.4 | 243.8 | 244.6 | 239.0 | 238.7 | 239.1 | 238.8 | 2.0 | 0.9 | 1.1 |
| 08-00180 | 08-00160 | 08-00130 | 155 | 12" DIA | 0.3 | 239.1 | 238.7 | 242.6 | 243.8 | 239.4 | 239.0 | 239.5 | 239.1 | 1.9 | 0.4 | 0.5 |

| Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 08-00220 | 13-00170 | D-ZUHLKE-01 | 87.65 | Irregular Channel | -0.67 | 235.5 | 236.1 | 240.5 | 240.1 | 237.0 | 237.0 | 237.1 | 237.1 | 353.2 | 2.5 | 2.8 |
| 08-00240 | 08-00220 | 08-00150 | 40 | 12" DIA | 0.3 | 235.9 | 235.5 | 240.5 | 240.5 | 237.2 | 237.0 | 237.4 | 237.1 | 3.7 | 2.5 | 2.9 |
| 08-00260 | 08-00240 | 08-00170 | 248 | 12" DIA | 0.3 | 236.6 | 235.9 | 239.9 | 240.5 | 238.0 | 237.2 | 238.3 | 237.4 | 2.0 | 2.0 | 2.2 |
| 09-00000 | 09-00020 | 09-00010 | 22.64 | 12" DIA | 1.1 | 238.2 | 238.0 | 242.4 | 242.4 | 238.5 | 238.0 | 238.6 | 238.2 | 3.7 | 0.7 | 1.0 |
| 09-00020 | 18-00740 | 18-00490 | 367 | 12" DIA | 0.5 | 237.6 | 235.7 | 242.4 | 238.4 | 238.0 | 236.1 | 238.2 | 236.2 | 2.6 | 0.8 | 1.5 |
| 09-00040 | 09-00020 | 09-00030 | 16.11 | 6" DIA | 0.2 | 238.2 | 238.2 | 239.8 | 242.4 | 238.5 | 238.0 | 238.7 | 238.2 | 0.3 | 0.2 | 0.5 |
| 09-00060 | 09-00040 | 09-00050 | 100 | 6" DIA | 0.2 | 238.5 | 238.2 | 239.7 | 239.8 | 238.8 | 238.5 | 239.3 | 238.7 | 0.3 | 0.2 | 0.5 |
| 09-00080 | 09-00060 | 09-00070 | 93.61 | 6" DIA | 0.2 | 238.6 | 238.4 | 239.8 | 239.7 | 238.9 | 238.8 | 239.8 | 239.3 | 0.3 | 0.2 | 0.4 |
| 10-00010 | 10-01200 | 10-01210 | 154.84 | 18" DIA | 1 | 210.2 | 208.7 | 217.3 | 215.7 | 212.5 | 211.7 | 213.3 | 212.5 | 10.5 | 7.7 | 7.5 |
| 10-00030 | 10-00010 | 10-00020 | 120.58 | 12" DIA | 1 | 211.6 | 210.4 | 219.3 | 217.3 | 215.9 | 212.5 | 216.5 | 213.3 | 3.6 | 6.1 | 6.0 |
| 10-00050 | 10-00030 | 10-00040 | 289.49 | 12" DIA | 2.4 | 218.5 | 211.7 | 224.1 | 219.3 | 224.0 | 215.9 | 224.1 | 216.5 | 5.5 | 6.2 | 6.0 |
| 10-00070 | 10-00050 | 10-00060 | 273.67 | 12" DIA | 1.4 | 222.5 | 218.6 | 227.8 | 224.1 | 227.8 | 224.0 | 227.8 | 224.1 | 4.2 | 5.1 | 5.0 |
| 10-00090 | 10-00070 | 10-00080 | 307.14 | 12" DIA | 1.8 | 228.1 | 222.6 | 233.1 | 227.8 | 233.1 | 227.8 | 233.1 | 227.8 | 4.8 | 4.8 | 4.8 |
| 10-01020 | 10-01040 | 10-01030 | 137.15 | 15" DIA | 0.5 | 219.9 | 219.2 | 225.2 | 224.2 | 221.1 | 220.7 | 223.3 | 222.8 | 4.6 | 4.1 | 4.6 |
| 10-01040 | 10-01060 | 10-01050 | 229.98 | 15" DIA | 0.9 | 219.1 | 216.9 | 224.2 | 228.3 | 220.7 | 218.7 | 222.8 | 220.8 | 6.3 | 6.2 | 6.5 |
| 10-01060 | 10-01080 | 10-01070 | 322.98 | 15" DIA | 1.1 | 216.7 | 213.1 | 228.3 | 219.0 | 218.7 | 215.4 | 220.8 | 216.9 | 6.8 | 7.0 | 7.4 |
| 10-01080 | 10-01100 | 10-01090 | 161.38 | 18" DIA | 0.5 | 212.8 | 212.0 | 219.0 | 217.4 | 215.4 | 214.6 | 216.9 | 215.9 | 7.7 | 8.1 | 8.5 |
| 10-01100 | 10-01180 | 10-01170 | 253.4 | 18" DIA | 0.6 | 211.9 | 210.2 | 217.4 | 218.4 | 214.6 | 213.0 | 215.9 | 214.0 | 8.5 | 8.6 | 9.2 |
| 10-01120 | 10-01140 | 10-01110 | 136.99 | 12" DIA | 0.5 | 216.8 | 215.5 | 219.8 | 220.7 | 217.1 | 215.5 | 217.1 | 216.1 | 3.6 | 0.6 | 0.8 |
| 10-01140 | 10-01100 | 10-01130 | 269.17 | 12" DIA | 1 | 215.3 | 212.5 | 220.7 | 217.4 | 215.5 | 214.6 | 216.1 | 215.9 | 3.6 | 0.6 | 0.9 |
| 10-01160 | 10-01140 | 10-01150 | 90 | 12" DIA | 0.7 | 216.1 | 215.5 | 217.1 | 220.7 | 216.1 | 215.5 | 216.1 | 216.1 | 3.0 | 0.0 | 0.0 |
| 10-01180 | 10-01200 | 10-01190 | 204.64 | 18" DIA | 0.7 | 210.1 | 208.7 | 218.4 | 215.7 | 213.0 | 211.7 | 214.0 | 212.5 | 8.8 | 8.4 | 9.2 |
| 10-01200 | 10-03010 | 10-03250 | 294.12 | 24" DIA | 0.55 | 208.2 | 206.5 | 215.7 | 212.5 | 211.7 | 210.2 | 212.5 | 210.9 | 16.8 | 16.1 | 16.7 |
| 10-01220 | 10-01240 | 10-01250 | 316.23 | 30" DIA | 0.2 | 204.7 | 204.0 | 211.2 | 212.5 | 207.7 | 207.7 | 208.7 | 208.7 | 18.3 | 19.0 | 19.8 |
| 10-01240 | 10-01260 | 10-01270 | 157.9 | 48" DIA | 0.6 | 202.5 | 201.5 | 212.5 | 210.5 | 207.7 | 207.7 | 208.7 | 208.7 | 116.0 | 19.1 | 23.0 |
| 10-03010 | 10-03070 | 10-01230 | 294.12 | 24" DIA | 0.29 | 206.5 | 205.7 | 212.5 | 211.3 | 210.2 | 208.4 | 210.9 | 209.1 | 12.2 | 17.5 | 18.1 |
| 10-03030 | 10-03010 | 10-03020 | 151.42 | 12" DIA | 0.94 | 208.2 | 206.7 | 211.7 | 212.5 | 210.3 | 210.2 | 211.0 | 210.9 | 3.5 | 0.8 | 0.8 |
| 10-03050 | 10-03010 | 10-03041 | 149.12 | 12" DIA | 0.7 | 207.8 | 206.7 | 211.4 | 212.5 | 210.2 | 210.2 | 211.0 | 210.9 | 3.0 | 0.7 | 0.7 |
| 10-03070 | 10-01220 | 10-03040 | 149.25 | 24" DIA | 0.4 | 205.7 | 205.2 | 211.3 | 211.2 | 208.4 | 207.7 | 209.1 | 208.7 | 13.5 | 18.4 | 19.1 |
| 10-03090 | 10-03070 | 10-03060 | 269.74 | 12" DIA | 0.5 | 208.0 | 206.7 | 211.7 | 211.3 | 208.7 | 208.4 | 209.3 | 209.1 | 2.5 | 1.0 | 1.0 |
| 10-03120 | CC-N-00-024 | 10-01290 | 124.58 | 18" DIA | 0.3 | 203.0 | 202.8 | 208.5 | 208.4 | 206.8 | 206.7 | 207.4 | 207.3 | 4.7 | 5.6 | 6.3 |
| 10-03140 | 10-03120 | 10-03080 | 179 | 18" DIA | 0.4 | 203.8 | 203.0 | 210.5 | 208.5 | 207.0 | 206.8 | 207.6 | 207.4 | 6.7 | 5.6 | 6.3 |
| 10-03160 | 10-03140 | 10-03170 | 324.69 | 18" DIA | 0.4 | 205.1 | 203.9 | 210.0 | 210.5 | 207.4 | 207.0 | 208.2 | 207.6 | 6.6 | 5.6 | 6.3 |
| 10-03180 | 10-03160 | 10-03190 | 109.07 | 18" DIA | 0.4 | 205.1 | 203.9 | 210.5 | 210.0 | 207.6 | 207.4 | 208.6 | 208.2 | 11.4 | 5.6 | 6.3 |
| 10-03240 | 10-01240 | 10-01295 | 156.63 | 30" DIA | 0.2 | 204.4 | 204.0 | 211.9 | 212.5 | 207.7 | 207.7 | 208.7 | 208.7 | 19.7 | -0.1 | 3.0 |
| 11-00010 | 11-00030 | 11-00020 | 176.29 | 10" DIA | 0.403 | 225.4 | 224.7 | 228.0 | 235.5 | 225.5 | 224.5 | 225.5 | 224.5 | 1.4 | 0.0 | 0.0 |
| 11-00030 | 11-00050 | 11-00040 | 168.75 | 12" DIA | 0.5 | 224.4 | 223.6 | 235.5 | 232.6 | 224.5 | 223.6 | 224.5 | 223.6 | 2.4 | 0.1 | 0.1 |
| 11-00050 | 11-00070 | 11-00060 | 104.68 | 12" DIA | 0.3 | 223.4 | 223.1 | 232.6 | 230.9 | 223.6 | 223.1 | 223.6 | 223.1 | 2.0 | 0.1 | 0.1 |
| 11-00070 | 11-00090 | 11-00080 | 111.76 | 12" DIA | 0.3 | 222.9 | 222.5 | 230.9 | 229.1 | 223.1 | 222.5 | 223.1 | 222.5 | 2.0 | 0.1 | 0.1 |
| 11-00090 | 11-00110 | 11-00100 | 124.38 | 12" DIA | 0.7 | 222.3 | 221.5 | 229.1 | 226.7 | 222.5 | 221.4 | 222.5 | 221.8 | 3.0 | 0.1 | 0.1 |
| 11-00110 | 11-00130 | 11-00120 | 158.35 | 12" DIA | 0.8 | 221.3 | 220.0 | 226.7 | 225.0 | 221.4 | 219.9 | 221.8 | 220.2 | 3.1 | 0.1 | 1.7 |
| 11-00130 | 11-00150 | 11-00140 | 178.11 | 12" DIA | 3 | 219.8 | 214.5 | 225.0 | 220.0 | 219.9 | 214.5 | 220.2 | 214.8 | 6.1 | 0.1 | 1.7 |
| 11-00150 | 11-00170 | 11-00160 | 59.21 | 12" DIA | 10.47 | 214.4 | 208.2 | 220.0 | 220.5 | 214.5 | 207.7 | 214.8 | 208.7 | 11.5 | 0.1 | 2.5 |
| 11-00170 | 11-00190 | 11-00180 | 147.55 | 24" DIA | 0.5 | 207.4 | 206.6 | 220.5 | 217.0 | 207.7 | 207.7 | 208.7 | 208.7 | 15.8 | 0.1 | 2.6 |
| 11-00190 | 11-00210 | 11-00200 | 133.78 | 24" DIA | 0.5 | 206.4 | 205.7 | 217.0 | 213.7 | 207.7 | 207.7 | 208.7 | 208.7 | 16.4 | 0.1 | 2.5 |
| 11-00210 | 11-00230 | 11-00220 | 67.93 | 24" DIA | 0.54 | 205.6 | 205.2 | 213.7 | 212.8 | 207.7 | 207.7 | 208.7 | 208.7 | 16.7 | -0.1 | 2.5 |
| 11-00230 | 11-00250 | 11-00240 | 42.68 | 30" DIA | 0.14 | 204.8 | 204.7 | 212.8 | 212.7 | 207.7 | 207.7 | 208.7 | 208.7 | 15.4 | -0.1 | 3.0 |
| 11-00250 | 10-03240 | 11-00280 | 115.92 | 30" DIA | 0.22 | 204.7 | 204.4 | 212.7 | 211.9 | 207.7 | 207.7 | 208.7 | 208.7 | 19.4 | -0.1 | 3.0 |
| 11-00270 | 11-00170 | 11-00260 | 132.09 | 24" DIA | 0.31 | 207.8 | 207.4 | 220.1 | 220.5 | 207.8 | 207.7 | 208.7 | 208.7 | 12.6 | 0.0 | 0.1 |
| 13-00020 | 13-00040 | 13-00030 | 452.85 | 15" DIA | 0.2 | 235.0 | 234.0 | 239.0 | 237.0 | 235.4 | 233.6 | 235.5 | 233.9 | 2.9 | 0.7 | 0.9 |
| 13-00040 | 13-00180 | 13-00190 | 51 | 36" DIA | 0.2 | 232.3 | 232.2 | 237.0 | 239.6 | 233.6 | 233.6 | 233.9 | 233.8 | 29.5 | 11.1 | 14.0 |
| 13-00060 | 13-00040 | 13-00050 | 45.93 | 30" DIA | 0.2 | 232.9 | 232.8 | 236.8 | 237.0 | 233.6 | 233.6 | 233.9 | 233.9 | 18.2 | 2.7 | 3.2 |
| 13-00080 | 13-00060 | 13-00070 | 7.37 | 12" DIA | 0.2 | 234.4 | 234.4 | 237.1 | 236.8 | 234.4 | 233.6 | 234.4 | 233.9 | 1.9 | 0.0 | 0.0 |

| Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 13-00100 | 13-00060 | 13-00090 | 27.37 | 12" DIA | 0.2 | 234.4 | 234.4 | 237.1 | 236.8 | 234.4 | 233.6 | 234.4 | 233.9 | 1.7 | 0.0 | 0.0 |
| 13-00120 | 13-00060 | 13-00110 | 310.84 | 12" DIA | 0.4 | 235.6 | 234.4 | 239.0 | 236.8 | 236.0 | 233.6 | 236.1 | 233.9 | 2.3 | 0.7 | 0.9 |
| 13-00130 | 13-00150 | 13-00140 | 31.55 | 24" DIA | 2.2 | 235.8 | 235.1 | 240.1 | 240.4 | 236.0 | 235.7 | 236.2 | 235.9 | 33.7 | 0.9 | 2.4 |
| 13-00150 | 13-00230 | 13-00240 | 226.36 | 24" DIA | 0.2 | 234.9 | 234.4 | 240.4 | 239.0 | 235.7 | 234.9 | 235.9 | 235.0 | 10.1 | 3.7 | 5.4 |
| 13-00170 | 13-00150 | 13-00160 | 49.38 | 12" DIA | 0.2 | 236.1 | 236.0 | 240.1 | 240.4 | 237.0 | 235.7 | 237.1 | 235.9 | 1.6 | 2.8 | 3.1 |
| 13-00210 | 13-00040 | 13-00200 | 254 | 30" DIA | 0.2 | 233.3 | 232.8 | 238.0 | 237.0 | 234.4 | 233.6 | 234.6 | 233.9 | 18.4 | 7.8 | 10.0 |
| 13-00230 | 13-00360 | 13-00331 | 137.99 | 30" DIA | 0.2 | 233.9 | 233.6 | 239.0 | 241.1 | 234.9 | 234.6 | 235.0 | 234.8 | 18.5 | 5.4 | 7.0 |
| 13-00270 | 13-00330 | 13-00290 | 86 | 18" DIA | 0.2 | 231.8 | 231.6 | 239.6 | 239.0 | 232.9 | 232.8 | 233.2 | 233.1 | 4.7 | 3.0 | 3.9 |
| 13-00270 | 13-00330 | 13-00300 | 86 | 18" DIA | 0.2 | 231.8 | 231.6 | 239.6 | 239.0 | 232.9 | 232.8 | 233.2 | 233.1 | 4.7 | 3.0 | 3.9 |
| 13-00270 | 13-00330 | 13-00310 | 86 | 18" DIA | 0.2 | 231.8 | 231.6 | 239.6 | 239.0 | 232.9 | 232.8 | 233.2 | 233.1 | 4.7 | 3.0 | 3.9 |
| 13-00330 | 18-00521 | 18-00330 | 17.2 | 18" DIA | 0.5 | 231.6 | 231.5 | 239.0 | 239.0 | 232.8 | 232.8 | 233.1 | 233.1 | 7.2 | 3.0 | 3.9 |
| 13-00330 | 18-00521 | 18-00350 | 17.2 | 18" DIA | 0.5 | 231.6 | 231.5 | 239.0 | 239.0 | 232.8 | 232.8 | 233.1 | 233.1 | 7.2 | 3.0 | 3.9 |
| 13-00330 | 18-00521 | 18-00370 | 17.2 | 18" DIA | 0.5 | 231.6 | 231.5 | 239.0 | 239.0 | 232.8 | 232.8 | 233.1 | 233.1 | 7.2 | 3.0 | 3.9 |
| 13-00360 | 13-00210 | 13-00220 | 115.1 | 30" DIA | 0.2 | 233.6 | 233.4 | 241.1 | 238.0 | 234.6 | 234.4 | 234.8 | 234.6 | 18.3 | 6.1 | 7.7 |
| 13-00380 | 13-00360 | 13-00350 | 414.95 | 10" DIA | 0.3 | 235.4 | 234.2 | 240.6 | 241.1 | 235.9 | 234.6 | 235.9 | 234.8 | 1.2 | 0.7 | 0.7 |
| 13-00400 | 13-00380 | 13-00370 | 44.98 | 10" DIA | 0.3 | 235.6 | 235.5 | 240.6 | 240.6 | 236.1 | 235.9 | 236.1 | 235.9 | 1.2 | 0.7 | 0.7 |
| 13-00420 | 13-00400 | 13-00390 | 125.62 | 8" DIA | 0.9 | 236.9 | 235.7 | 241.9 | 240.6 | 236.9 | 236.1 | 236.9 | 236.1 | 1.2 | 0.0 | 0.0 |
| 13-00440 | 13-00420 | 13-00410 | 63.45 | 8" DIA | 0.9 | 237.5 | 236.9 | 240.5 | 241.9 | 237.5 | 236.9 | 237.5 | 236.9 | 1.2 | 0.0 | 0.0 |
| 14-00040 | 14-00060 | 14-00050 | 127 | 15" DIA | 0.3 | 209.7 | 209.3 | 215.0 | 215.5 | 209.8 | 209.1 | 209.8 | 209.3 | 3.7 | 0.1 | 0.1 |
| 14-00060 | 14-00080 | 14-00070 | 117.39 | 15" DIA | 0.4 | 209.0 | 208.5 | 215.5 | 214.9 | 209.1 | 208.5 | 209.3 | 208.7 | 4.4 | 0.1 | 0.7 |
| 14-00080 | 14-00100 | 14-00090 | 360.61 | 15" DIA | 0.3 | 208.3 | 207.1 | 214.9 | 213.3 | 208.5 | 207.1 | 208.7 | 207.3 | 3.6 | 0.2 | 0.8 |
| 14-00100 | 14-00120 | 14-00110 | 351 | 15" DIA | 0.6 | 206.9 | 204.7 | 213.3 | 208.8 | 207.1 | 204.9 | 207.3 | 205.1 | 5.1 | 0.3 | 0.9 |
| 14-00120 | 14-00140 | 14-00130 | 130 | 15" DIA | 0.2 | 204.6 | 204.3 | 208.8 | 207.1 | 204.9 | 204.5 | 205.1 | 204.6 | 3.1 | 0.3 | 0.9 |
| 14-00140 | 14-00160 | 14-00150 | 25.82 | 15" DIA | 0.2 | 204.2 | 204.1 | 207.1 | 207.8 | 204.5 | 204.3 | 204.6 | 204.4 | 3.1 | 0.5 | 1.2 |
| 14-00160 | 16-00440 | 16-00110 | 378.65 | 24" DIA | 1.07 | 204.1 | 200.0 | 207.8 | 207.8 | 204.3 | 200.4 | 204.4 | 201.0 | 23.4 | 0.5 | 1.2 |
| 14-00180 | 14-00140 | 14-00170 | 15.17 | 15" DIA | 0.4 | 204.2 | 204.2 | 207.3 | 207.1 | 204.5 | 204.5 | 204.6 | 204.6 | 4.1 | 0.0 | 0.0 |
| 14-00200 | 14-00060 | 14-00210 | 38 | 12" DIA | 1.8 | 209.8 | 209.2 | 214.0 | 215.5 | 209.8 | 209.1 | 210.1 | 209.3 | 4.8 | 0.0 | 0.6 |
| 16-00050 | 16-00090 | 16-00100 | 12 | 12" DIA | 0.3 | 205.0 | 205.0 | 207.3 | 207.3 | 205.1 | 205.0 | 205.1 | 205.0 | 2.0 | 0.0 | 0.0 |
| 16-00070 | 16-00050 | 16-00060 | 52.12 | 12" DIA | 0.3 | 205.2 | 205.0 | 208.0 | 207.3 | 205.2 | 205.1 | 205.2 | 205.1 | 1.8 | 0.0 | 0.0 |
| 16-00090 | 00-05039 | D-MILLERSBURG-01 | 95.18 | Irregular Channel | 1.33 | 205.0 | 203.7 | 207.3 | 207.9 | 205.0 | 203.9 | 205.0 | 204.1 | 1190.8 | 0.0 | 0.0 |
| 16-00170 | CC-N-00-014 | 16-00160 | 10.69 | 12" DIA | 2.81 | 199.3 | 199.0 | 206.7 | 206.0 | 200.4 | 200.4 | 201.1 | 201.0 | 6.0 | 3.8 | 3.8 |
| 16-00190 | 16-00170 | 16-00180 | 78.21 | 12" DIA | 0.3 | 201.3 | 201.1 | 205.4 | 206.7 | 202.8 | 200.4 | 202.8 | 201.1 | 1.9 | 3.8 | 3.8 |
| 16-00200 | 16-00190 | 16-00190.1 | 449.5 | 12" DIA | 0.3 | 202.7 | 201.3 | 206.4 | 205.4 | 205.6 | 202.8 | 205.7 | 202.8 | 2.0 | 2.8 | 2.9 |
| 16-00220 | 16-00200 | 16-00210 | 63.77 | 12" DIA | 1.4 | 203.6 | 202.7 | 206.8 | 206.4 | 205.7 | 205.6 | 205.8 | 205.7 | 4.2 | 2.0 | 2.2 |
| 16-00240 | 16-00220 | 16-00230 | 44.77 | 12" DIA | 0.6 | 203.9 | 203.6 | 205.8 | 206.8 | 205.8 | 205.7 | 205.8 | 205.8 | 2.9 | 1.1 | 1.9 |
| 16-00300 | 16-00320 | 16-00310 | 8.65 | 12" DIA | -1.39 | 201.0 | 201.1 | 203.8 | 203.8 | 202.2 | 202.2 | 203.5 | 203.3 | 4.2 | 2.3 | 4.5 |
| 16-00320 | 16-00340 | 16-00330 | 38.32 | 18" DIA | 0 | 201.1 | 201.1 | 203.8 | 203.8 | 202.2 | 202.2 | 203.3 | 203.3 | 0.3 | 2.3 | 4.5 |
| 16-00340 | CC-N-02-014 | 16-00350 | 36.67 | 12" DIA | 0.3 | 201.1 | 201.0 | 203.8 | 203.5 | 202.2 | 202.1 | 203.3 | 202.7 | 2.0 | 2.3 | 4.5 |
| 16-00410 | 00-05224 | CC-NORTHDITCH-01 | 49.97 | Irregular Channel | 0.7 | 200.8 | 200.5 | 204.8 | 203.8 | 202.1 | 202.1 | 202.7 | 202.7 | 416.1 | 3.7 | 8.4 |
| 16-00440 | CC-N-00-015 | 16-00430 | 260.72 | 24" DIA | 0.93 | 200.0 | 197.6 | 207.8 | 208.2 | 200.4 | 200.4 | 201.0 | 201.0 | 21.8 | 1.9 | 2.6 |
| 16-00450 | 00-05224 | 16-00390 | 1761.52 | 24" H, 72" BOX | 0.2 | 204.3 | 200.3 | 208.8 | 203.8 | 204.9 | 202.1 | 205.4 | 202.7 | 53.8 | 13.6 | 27.2 |
| 16-21660 | 16-00410 | 16-00400 | 118.01 | 24" DIA | -0.29 | 200.5 | 200.8 | 204.8 | 204.8 | 202.1 | 202.1 | 202.9 | 202.7 | 12.1 | 3.6 | 8.3 |
| 17-00350 | CC-N-04-002 | CC-L-04-003 | 215.12 | Irregular Channel | -0.67 | 220.2 | 221.7 | 225.0 | 226.1 | 221.8 | 221.8 | 222.1 | 222.1 | 2717.5 | 2.6 | 14.6 |
| 17-00370 | 17-00350 | 17-00360 | 713.64 | 12" DIA | 0.3 | 228.1 | 220.2 | 231.7 | 225.0 | 228.6 | 221.8 | 228.8 | 222.1 | 3.8 | 1.8 | 2.5 |
| 17-00390 | 17-00370 | 17-00380 | 876.45 | 12" DIA | 0.3 | 229.9 | 228.1 | 234.0 | 231.7 | 231.9 | 228.6 | 233.8 | 228.8 | 1.6 | 1.8 | 2.5 |
| 17-00410 | 17-00390 | 17-00400 | 236.86 | 12" DIA | 0.6 | 231.3 | 229.9 | 236.2 | 234.0 | 232.5 | 231.9 | 235.0 | 233.8 | 2.8 | 1.9 | 2.5 |
| 17-00430 | 17-00410 | 17-00420 | 197.47 | 12" DIA | 0.2 | 232.0 | 231.4 | 236.5 | 236.2 | 233.0 | 232.5 | 235.9 | 235.0 | 2.0 | 2.0 | 2.5 |
| 18-00000 | 00-05060 | D-WOODS-2 | 139.89 | Irregular Channel | 0.14 | 233.5 | 233.3 | 236.8 | 235.9 | 234.0 | 233.6 | 235.9 | 235.9 | 15.3 | 1.4 | 2.4 |
| 18-00020 | 18-00000 | 18-00010 | 16.44 | 15" DIA | 0.6 | 233.6 | 233.5 | 236.8 | 236.8 | 234.1 | 234.0 | 235.9 | 235.9 | 5.0 | 1.4 | 2.4 |
| 18-00040 | 18-00020 | 18-00030 | 172 | 12" DIA | 0.5 | 234.6 | 233.7 | 239.0 | 236.8 | 235.1 | 234.1 | 236.4 | 235.9 | 2.5 | 1.2 | 2.0 |
| 18-00100 | 18-00101 | 18-00051 | 207.74 | 12" DIA | 0.4 | 237.7 | 236.8 | 240.7 | 241.3 | 238.1 | 237.3 | 238.2 | 237.6 | 2.3 | 0.7 | 1.1 |
| 18-00101 | 18-00040 | 18-00050 | 398.48 | 12" DIA | 0.5 | 236.8 | 234.7 | 241.3 | 239.0 | 237.3 | 235.1 | 237.6 | 236.4 | 2.6 | 1.2 | 2.0 |
| 18-00102 | 18-00101 | 18-00052 | 41.48 | 8" DIA | 0.5 | 237.0 | 236.8 | 241.3 | 241.3 | 237.4 | 237.3 | 237.7 | 237.6 | 0.8 | 0.5 | 0.9 |

**Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID**

| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 18-00120 | 18-00100 | 18-00090 | 30 | 12" DIA | 0.5 | 237.9 | 237.8 | 240.6 | 240.7 | 238.3 | 238.1 | 238.4 | 238.2 | 2.4 | 0.6 | 1.0 |
| 18-00140 | 18-00120 | 18-00110 | 10.25 | 12" DIA | 0.7 | 238.2 | 238.1 | 240.6 | 240.6 | 238.5 | 238.3 | 238.6 | 238.4 | 2.9 | 0.6 | 1.0 |
| 18-00160 | 18-00100 | 18-00130 | 10 | 4" DIA | 1 | 237.9 | 237.8 | 240.7 | 240.7 | 238.1 | 238.1 | 238.2 | 238.2 | 0.2 | 0.0 | 0.0 |
| 18-00280 | 18-00300 | 18-00150 | 10.29 | 12" DIA | 0.6 | 238.8 | 238.7 | 241.2 | 241.2 | 239.1 | 237.1 | 239.5 | 237.4 | 2.7 | 0.7 | 2.5 |
| 18-00300 | 18-00320 | 18-00170 | 33.05 | 12" DIA | 1.8 | 236.8 | 236.2 | 241.2 | 241.3 | 237.1 | 236.5 | 237.4 | 236.8 | 4.8 | 0.7 | 2.5 |
| 18-00320 | 18-00340 | 18-00190 | 345 | 15" DIA | 0.5 | 236.1 | 234.3 | 241.3 | 239.3 | 236.5 | 234.7 | 236.8 | 235.0 | 4.7 | 0.7 | 2.6 |
| 18-00340 | 18-00440 | 18-00210 | 165 | 15" DIA | 1 | 234.4 | 232.7 | 239.3 | 238.7 | 234.7 | 233.2 | 235.0 | 233.6 | 6.7 | 1.0 | 3.2 |
| 18-00400 | 18-00420 | 18-00230 | 10 | 12" DIA | 0.7 | 236.3 | 236.2 | 238.7 | 238.7 | 236.6 | 233.6 | 236.7 | 233.7 | 3.0 | 0.9 | 1.0 |
| 18-00420 | 18-00440 | 18-00250 | 35.17 | 12" DIA | 1.8 | 233.3 | 232.7 | 238.7 | 238.7 | 233.6 | 233.2 | 233.7 | 233.6 | 4.8 | 0.9 | 1.0 |
| 18-00440 | 18-00480 | 18-00290 | 70.85 | 15" DIA | 0.5 | 232.6 | 232.2 | 238.7 | 239.0 | 233.2 | 232.8 | 233.6 | 233.1 | 4.5 | 2.2 | 4.8 |
| 18-00460 | 18-00440 | 18-00270 | 11.27 | 12" DIA | 0.9 | 236.3 | 236.2 | 238.7 | 238.7 | 236.5 | 233.2 | 236.6 | 233.6 | 3.4 | 0.3 | 0.6 |
| 18-00480 | 18-00521 | 18-00310 | 6.67 | 15" DIA | 1.5 | 232.1 | 232.0 | 239.0 | 239.0 | 232.8 | 232.8 | 233.1 | 233.1 | 7.9 | 2.2 | 4.8 |
| 18-00500 | 18-00521 | 18-00390 | 10.03 | 12" DIA | 3 | 232.3 | 232.0 | 239.0 | 239.0 | 233.0 | 232.8 | 233.1 | 233.1 | 6.2 | 1.3 | 1.8 |
| 18-00521 | 00-15286 | CC-L-05-005 | 61.02 | Irregular Channel | -0.77 | 231.5 | 232.0 | 239.0 | 234.5 | 232.8 | 232.7 | 233.1 | 233.0 | 361.3 | 11.2 | 16.5 |
| 18-00560 | 18-00500 | 18-00410 | 300 | 12" DIA | 2 | 238.3 | 232.3 | 243.0 | 239.0 | 238.6 | 233.0 | 238.6 | 233.1 | 5.0 | 0.8 | 0.9 |
| 18-00580 | 18-00560 | 18-00430 | 35.14 | 12" DIA | 1.8 | 239.0 | 238.4 | 243.0 | 243.0 | 239.3 | 238.6 | 239.3 | 238.6 | 4.8 | 0.8 | 0.9 |
| 18-00600 | 18-00580 | 18-00450 | 10 | 12" DIA | 1 | 240.6 | 240.5 | 243.0 | 243.0 | 240.9 | 239.3 | 241.0 | 239.3 | 3.6 | 0.8 | 0.9 |
| 18-00720 | 09-00000 | 18-00470 | 37.02 | 12" DIA | 0.9 | 238.0 | 237.7 | 242.3 | 242.4 | 238.5 | 238.5 | 238.6 | 238.6 | 3.3 | 0.6 | 0.9 |
| 18-00740 | 18-00760 | 18-00510 | 6.8 | 18" DIA | 0 | 235.4 | 235.4 | 238.4 | 238.6 | 236.1 | 236.0 | 236.2 | 236.2 | 0.3 | 2.4 | 3.5 |
| 18-00760 | 18-01050 | 18-01030 | 6.01 | 12" DIA | 0 | 235.3 | 235.3 | 238.6 | 238.6 | 236.0 | 235.4 | 236.2 | 235.6 | 0.1 | 2.4 | 3.5 |
| 18-00780 | 18-00760 | 18-00530 | 33.5 | 4" DIA | 0.9 | 235.7 | 235.4 | 238.4 | 238.6 | 236.0 | 236.0 | 236.2 | 236.2 | 0.2 | 0.0 | 0.0 |
| 18-00800 | 18-00740 | 18-00550 | 37 | 18" DIA | 0.43 | 235.6 | 235.5 | 238.4 | 238.4 | 236.1 | 236.1 | 236.3 | 236.2 | 6.9 | 1.3 | 1.8 |
| 18-00820 | 18-00800 | 18-00570 | 12.69 | 12" DIA | 0.95 | 236.1 | 235.9 | 238.4 | 238.4 | 236.5 | 236.1 | 236.6 | 236.3 | 3.5 | 1.2 | 1.7 |
| 18-00860 | 18-00760 | 18-00590 | 43.7 | 4" DIA | 0.9 | 235.8 | 235.4 | 238.4 | 238.6 | 236.0 | 236.0 | 236.2 | 236.2 | 0.2 | 0.0 | 0.0 |
| 18-00960 | 18-00980 | 18-00610 | 15.8 | 12" DIA | 0.9 | 235.7 | 235.5 | 237.3 | 238.0 | 235.7 | 235.6 | 237.3 | 237.3 | 3.4 | 0.0 | -0.7 |
| 18-00980 | LINN-0 | 24-00790 | 37.43 | 12" DIA | 0.2 | 235.1 | 235.0 | 238.0 | 238.2 | 235.6 | 235.6 | 237.3 | 237.4 | 1.7 | 0.4 | 1.2 |
| 18-01000 | 18-00980 | 18-00630 | 4.71 | 12" DIA | 0.6 | 235.2 | 235.2 | 237.3 | 238.0 | 235.6 | 235.6 | 237.3 | 237.3 | 2.8 | 0.0 | -1.2 |
| 18-01020 | 18-01000 | 18-00650 | 41.02 | 12" DIA | 0.5 | 235.5 | 235.3 | 238.2 | 237.3 | 235.6 | 235.6 | 237.4 | 237.3 | 2.4 | 0.0 | -0.3 |
| 18-01040 | 18-01020 | 18-00670 | 7.7 | 12" DIA | 0.8 | 235.7 | 235.6 | 238.2 | 238.2 | 235.7 | 235.6 | 237.4 | 237.4 | 3.2 | 0.0 | -0.1 |
| 18-01050 | 19-00080 | CC-DRAINAGE-02 | 1167.69 | Irregular Channel | 0.9 | 235.0 | 224.5 | 238.6 | 228.5 | 235.4 | 226.7 | 235.6 | 228.5 | 347.7 | 3.5 | 7.0 |
| 18-01100 | 18-00020 | 18-00070 | 67.4 | 12" DIA | 1.3 | 234.3 | 233.4 | 236.8 | 236.8 | 234.4 | 234.1 | 235.9 | 235.9 | 4.0 | 0.2 | 0.5 |
| 18-01110 | 18-00820 | D-ALEXANDER-01 | 47.98 | Irregular Channel | -2.71 | 234.8 | 236.1 | 238.5 | 238.4 | 236.5 | 236.5 | 236.6 | 236.6 | 17.2 | 1.1 | 1.3 |
| 19-00020 | 10-01020 | 10-01010 | 316.03 | 12" DIA | 1.3 | 224.3 | 220.1 | 227.4 | 225.2 | 225.1 | 221.1 | 226.8 | 223.3 | 4.1 | 4.1 | 4.5 |
| 19-00040 | 19-00020 | 19-00010 | 167.89 | 10" DIA | 0.7 | 223.8 | 222.7 | 230.9 | 227.4 | 225.2 | 225.1 | 226.9 | 226.8 | 1.8 | 0.7 | 0.7 |
| 19-00060 | 19-00020 | 19-00030 | 50.99 | 10" DIA | 0.784 | 223.1 | 222.7 | 226.8 | 227.4 | 225.2 | 225.1 | 226.8 | 226.8 | 1.9 | 0.8 | 0.9 |
| 19-00080 | 19-00020 | 19-00050 | 93.42 | 10" DIA | 1.9 | 224.5 | 222.7 | 228.5 | 227.4 | 226.7 | 225.1 | 228.5 | 226.8 | 3.0 | 3.0 | 4.0 |
| 22-00020 | 22-00120 | 22-00010 | 175 | 36" DIA | 0.2 | 229.5 | 229.1 | 237.7 | 234.2 | 234.0 | 234.0 | 234.1 | 234.1 | 29.8 | -0.5 | -0.5 |
| 22-00060 | 22-00040 | 22-00050 | 178.5 | 36" DIA | 0.2 | 229.4 | 229.1 | 236.2 | 234.2 | 234.0 | 234.0 | 234.1 | 234.1 | 29.5 | -0.5 | -0.5 |
| 22-00120 | 22-00040 | 22-00030 | 24.94 | 12" DIA | 0.2 | 229.1 | 229.1 | 234.2 | 234.2 | 234.0 | 234.0 | 234.1 | 234.1 | 1.6 | -0.9 | -0.9 |
| 22-Dummy-01 | 10-00090 | 22-00100 | 43.39 | 12" DIA | 0.9 | 228.5 | 228.2 | 234.2 | 233.1 | 234.0 | 233.1 | 234.1 | 233.1 | 3.1 | 5.1 | 5.4 |
| CC-N-00-001 | CC-N-00-000 | CC-L-00-001 | 473.43 | Irregular Channel | -0.017 | 188.2 | 188.3 | 224.3 | 205.3 | 192.1 | 192.0 | 193.0 | 192.9 | 6309.0 | 89.0 | 160.7 |
| CC-N-00-002 | CC-N-00-001 | CC-L-00-002 | 1207.64 | Irregular Channel | 0.194 | 190.6 | 188.2 | 226.6 | 224.3 | 193.2 | 192.1 | 194.0 | 193.0 | 5978.5 | 93.4 | 161.8 |
| CC-N-00-003 | CC-N-00-002 | CC-L-00-003 | 1207.64 | Irregular Channel | 0 | 190.6 | 190.6 | 226.6 | 226.6 | 193.9 | 193.2 | 194.7 | 194.0 | 429.5 | 96.2 | 163.3 |
| CC-N-00-004 | CC-N-00-003 | CC-L-00-004 | 532.52 | Irregular Channel | -0.1 | 190.0 | 190.6 | 213.4 | 226.6 | 194.4 | 193.9 | 195.2 | 194.7 | 2006.5 | 97.4 | 161.9 |
| CC-N-00-005 | 00-15258 | CC-L-00-005B | 95.52 | Irregular Channel | 1.07 | 192.0 | 191.0 | 215.4 | 196.7 | 194.5 | 194.5 | 195.4 | 195.4 | 1942.1 | 98.4 | 162.6 |
| CC-N-00-006 | CC-N-00-005 | CC-L-00-006 | 160.91 | Irregular Channel | -0.062 | 191.9 | 192.0 | 209.3 | 215.4 | 194.8 | 194.5 | 195.8 | 195.4 | 4837.2 | 98.6 | 162.9 |
| CC-N-00-007 | CC-N-00-006 | CC-L-00-007 | 150.25 | Irregular Channel | 0.433 | 192.6 | 191.9 | 209.9 | 209.3 | 195.2 | 194.8 | 196.1 | 195.8 | 12782.1 | 98.8 | 163.2 |
| CC-N-00-008 | CC-N-00-007 | CC-L-00-008 | 156.1 | Irregular Channel | 0.79 | 193.8 | 192.6 | 203.7 | 209.9 | 195.9 | 195.2 | 196.5 | 196.1 | 4028.4 | 78.9 | 129.7 |
| CC-N-00-009 | CC-N-00-008 | CC-L-00-009 | 246.47 | Irregular Channel | 0.215 | 194.3 | 193.8 | 204.3 | 203.7 | 196.8 | 195.9 | 197.4 | 196.5 | 1352.5 | 78.9 | 129.8 |
| CC-N-00-010 | CC-N-00-009 | CC-L-00-010 | 522.47 | Irregular Channel | 0.0085 | 194.4 | 194.3 | 204.3 | 204.3 | 197.5 | 196.8 | 198.3 | 197.4 | 291.4 | 79.0 | 129.9 |
| CC-N-00-011 | CC-N-00-010 | CC-L-00-011 | 62.14 | Irregular Channel | 0.17 | 194.5 | 194.4 | 207.0 | 204.3 | 197.6 | 197.5 | 198.3 | 198.3 | 687.8 | 78.5 | 128.3 |
| CC-N-00-012 | CC-N-00-011 | CC-L-00-012 | 416.74 | Irregular Channel | 0.329 | 195.8 | 194.5 | 208.4 | 207.0 | 198.6 | 197.6 | 199.2 | 198.3 | 571.0 | 78.3 | 123.3 |
| CC-N-00-013 | CC-N-00-012 | CC-L-00-013 | 634.83 | Irregular Channel | 0.273 | 197.6 | 195.8 | 204.8 | 208.4 | 200.3 | 198.6 | 200.9 | 199.2 | 630.3 | 78.5 | 123.5 |

| Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| CC-N-00-014 | CC-N-00-013 | CC-L-00-014 | 199.38 | Irregular Channel | 0.085 | 197.7 | 197.6 | 206.0 | 204.8 | 200.4 | 200.3 | 201.0 | 200.9 | 786.1 | 78.6 | 123.6 |
| CC-N-00-016 | CC-N-00-015 | CC-L-00-016 | 102.29 | Irregular Channel | 0.137 | 197.7 | 197.6 | 208.4 | 208.2 | 200.6 | 200.4 | 201.2 | 201.0 | 4221.7 | 74.9 | 118.7 |
| CC-N-00-017 | CC-N-00-016 | CC-L-00-017 | 80.55 | Irregular Channel | 0.161 | 197.9 | 197.7 | 208.1 | 208.4 | 200.6 | 200.6 | 201.2 | 201.2 | 4836.0 | 75.1 | 118.8 |
| CC-N-00-018 | CC-N-00-017 | CC-L-00-018 | 624.93 | Irregular Channel | 0.165 | 198.9 | 197.9 | 207.2 | 208.1 | 201.8 | 200.6 | 202.1 | 201.2 | 812.4 | 75.7 | 120.9 |
| CC-N-00-019 | 03-00530 | CC-L-00-019B | 208.76 | Irregular Channel | 0.4168 | 201.8 | 200.9 | 208.2 | 212.0 | 203.8 | 203.0 | 204.5 | 203.6 | 1012.7 | 70.5 | 111.9 |
| CC-N-00-020 | CC-N-00-019 | CC-L-00-020 | 503.96 | Irregular Channel | 0.135 | 202.5 | 201.8 | 206.4 | 208.2 | 205.6 | 203.8 | 206.3 | 204.5 | 92.5 | 70.6 | 111.9 |
| CC-N-00-021 | CC-N-00-020 | CC-L-00-021 | 228.76 | Irregular Channel | -0.162 | 202.1 | 202.5 | 208.3 | 206.4 | 205.9 | 205.6 | 206.5 | 206.3 | 101.2 | 70.6 | 112.0 |
| CC-N-00-022 | CC-N-00-021 | CC-L-00-022 | 451.77 | Irregular Channel | -0.1 | 201.7 | 202.1 | 207.7 | 208.3 | 206.2 | 205.9 | 206.8 | 206.5 | 18.4 | 68.3 | 89.9 |
| CC-N-00-023 | CC-N-00-022 | CC-L-00-023 | 451.77 | Irregular Channel | 0.242 | 202.8 | 201.7 | 216.1 | 207.7 | 206.5 | 206.2 | 207.2 | 206.8 | 155.9 | 68.6 | 89.8 |
| CC-N-00-024 | CC-N-00-023 | CC-L-00-024 | 479.44 | Irregular Channel | -0.10637 | 202.3 | 202.8 | 208.4 | 216.1 | 206.7 | 206.5 | 207.3 | 207.2 | 125.2 | 59.2 | 70.2 |
| CC-N-00-025 | CC-N-00-024 | CC-L-00-025 | 98.71 | Irregular Channel | -0.01 | 202.2 | 202.3 | 212.1 | 208.4 | 206.7 | 206.7 | 207.4 | 207.3 | 62.7 | 58.4 | 70.7 |
| CC-N-00-026 | CC-N-00-025 | CC-L-00-026 | 620.56 | Irregular Channel | 0.14 | 203.1 | 202.2 | 213.0 | 212.1 | 207.1 | 206.7 | 207.8 | 207.4 | 1173.9 | 60.5 | 75.8 |
| CC-N-00-027 | 07-00210 | CC-L-00-027B | 437.91 | Irregular Channel | 0.171 | 204.3 | 203.6 | 213.5 | 211.0 | 207.7 | 207.3 | 208.2 | 207.9 | 381.9 | 62.6 | 80.5 |
| CC-N-00-028 | 00-15365 | CC-L-00-028B | 20.2 | Irregular Channel | 0 | 205.2 | 205.2 | 219.7 | 213.5 | 207.8 | 207.8 | 208.3 | 208.3 | 30.9 | 32.7 | 37.6 |
| CC-N-00-029 | CC-N-00-028 | CC-L-00-029 | 682.78 | Irregular Channel | 0.18 | 206.4 | 205.2 | 220.7 | 219.7 | 209.0 | 207.8 | 209.2 | 208.3 | 1205.9 | 32.8 | 37.8 |
| CC-N-00-030 | CC-N-00-029 | CC-L-00-030 | 541.06 | Irregular Channel | 0.573 | 213.0 | 206.4 | 222.2 | 220.7 | 214.4 | 209.0 | 214.4 | 209.2 | 1142.8 | 31.6 | 33.9 |
| CC-N-00-031 | 00-15191 | CC-L-00-031B | 37.05 | Irregular Channel | 0 | 212.6 | 212.6 | 221.8 | 220.9 | 214.6 | 214.6 | 214.7 | 214.6 | 55.7 | 31.6 | 33.9 |
| CC-N-00-032 | CC-N-00-031 | CC-L-00-032 | 69.8 | Irregular Channel | 1.6 | 213.7 | 212.6 | 223.6 | 221.8 | 215.0 | 214.6 | 215.1 | 214.7 | 390.7 | 31.7 | 33.9 |
| CC-N-00-034 | CC-N-00-033 | CC-L-00-034 | 282.75 | Irregular Channel | 0.877 | 215.9 | 213.4 | 224.7 | 222.4 | 217.7 | 216.2 | 217.8 | 216.4 | 4015.4 | 31.9 | 34.4 |
| CC-N-00-035 | CC-N-00-034 | CC-L-00-035 | 486.15 | Irregular Channel | 0.187 | 216.8 | 215.9 | 225.6 | 224.7 | 218.6 | 217.7 | 218.6 | 217.8 | 1744.9 | 32.6 | 35.4 |
| CC-N-01-001 | CC-N-00-003 | CC-L-01-001 | 125.98 | Irregular Channel | 3.26 | 194.7 | 190.6 | 204.4 | 226.6 | 194.8 | 193.9 | 195.0 | 194.7 | 10195.6 | 1.1 | 5.2 |
| CC-N-01-002 | 00-05501 | CC-L-01-003 | 365.66 | Irregular Channel | 1.28 | 198.5 | 193.9 | 204.9 | 196.5 | 198.7 | 194.8 | 198.9 | 195.1 | 208.8 | 1.0 | 2.7 |
| CC-N-01-003 | 00-05521 | CC-L-01-005 | 17.48 | Irregular Channel | 5.15 | 199.7 | 198.8 | 204.1 | 201.7 | 199.9 | 199.4 | 200.0 | 199.6 | 126.5 | 1.0 | 2.2 |
| CC-N-01-004 | 00-05541 | CC-L-01-007 | 154.08 | Irregular Channel | 0.37 | 200.8 | 200.3 | 205.2 | 202.1 | 201.2 | 200.9 | 201.4 | 201.4 | 49.2 | 1.0 | 2.2 |
| CC-N-01-005 | 00-005551 | CC-L-01-009 | 252.91 | Irregular Channel | 0.55 | 201.8 | 200.4 | 204.7 | 202.8 | 202.2 | 201.5 | 202.4 | 201.9 | 408.9 | 0.9 | 2.2 |
| CC-N-01-006 | 00-05571 | CC-L-01-012 | 101.42 | Irregular Channel | -0.09 | 201.5 | 201.6 | 203.0 | 203.4 | 202.3 | 202.3 | 202.6 | 202.6 | 10.7 | 1.0 | 2.7 |
| CC-N-01-007 | CC-N-01-006 | CC-L-01-013 | 61.73 | Irregular Channel | -0.28 | 201.4 | 201.5 | 202.8 | 203.0 | 202.3 | 202.3 | 202.6 | 202.6 | 54.1 | 1.0 | 2.8 |
| CC-N-01-008 | CC-N-01-007 | CC-L-01-014 | 166.65 | Irregular Channel | 0.5 | 202.2 | 201.4 | 203.6 | 202.8 | 202.5 | 202.3 | 202.7 | 202.6 | 73.3 | 1.3 | 3.0 |
| CC-N-01-009 | CC-N-01-008 | CC-L-01-015 | 86.82 | Irregular Channel | -0.68 | 201.6 | 202.2 | 203.0 | 203.6 | 202.5 | 202.5 | 202.7 | 202.7 | 85.1 | 1.3 | 3.1 |
| CC-N-01-010 | CC-N-01-009 | CC-L-01-016 | 24.02 | Irregular Channel | 1.92 | 202.1 | 201.6 | 203.5 | 203.0 | 202.5 | 202.5 | 202.7 | 202.7 | 142.8 | -0.3 | 2.0 |
| CC-N-01-011 | CC-N-01-010 | CC-L-01-017 | 52.77 | Irregular Channel | -0.42 | 201.9 | 202.1 | 203.3 | 203.5 | 202.5 | 202.5 | 202.7 | 202.7 | 66.6 | -0.3 | 2.0 |
| CC-N-01-012 | CC-N-01-011 | CC-L-01-018 | 117.23 | Irregular Channel | 0.4 | 202.3 | 201.9 | 204.6 | 203.3 | 202.5 | 202.5 | 202.8 | 202.7 | 65.3 | -0.2 | 2.1 |
| CC-N-01-013 | CC-N-01-012 | CC-L-01-019 | 79.82 | Irregular Channel | -0.31 | 202.1 | 202.3 | 204.6 | 204.6 | 202.5 | 202.5 | 202.8 | 202.8 | 57.7 | -0.2 | 2.1 |
| CC-N-01-014 | CC-N-01-013 | CC-L-01-020 | 229.18 | Irregular Channel | 0.17 | 202.5 | 202.1 | 204.6 | 204.6 | 202.5 | 202.5 | 202.9 | 202.8 | 42.6 | 0.0 | 2.1 |
| CC-N-01-015 | CC-N-01-014 | CC-L-01-021 | 59.39 | Irregular Channel | -0.94 | 201.9 | 202.5 | 204.6 | 204.6 | 202.2 | 202.5 | 203.0 | 202.9 | 20.0 | 0.0 | 2.2 |
| CC-N-01-016 | 00-22680 | CC-L-01-023 | 18.29 | Irregular Channel | 6.4 | 202.0 | 200.8 | 203.5 | 204.6 | 202.3 | 202.2 | 203.0 | 203.0 | 117.8 | 3.5 | 9.3 |
| CC-N-01-017 | CC-N-01-016 | CC-L-01-024 | 204.26 | Irregular Channel | 0.39 | 202.8 | 202.0 | 204.8 | 203.5 | 203.4 | 202.3 | 203.7 | 203.0 | 29.1 | 3.5 | 9.2 |
| CC-N-01-018 | CC-N-01-017 | CC-L-01-025 | 94.22 | Irregular Channel | -0.53 | 202.3 | 202.8 | 204.3 | 204.8 | 203.4 | 203.4 | 203.7 | 203.7 | 53.2 | 3.5 | 9.2 |
| CC-N-01-019 | CC-N-01-018 | CC-L-01-026 | 140.03 | Irregular Channel | 0.4 | 202.8 | 202.3 | 204.9 | 204.3 | 203.6 | 203.4 | 204.0 | 203.7 | 46.2 | 3.5 | 9.3 |
| CC-N-01-020 | CC-N-01-019 | CC-L-01-027 | 23.98 | Irregular Channel | -0.71 | 202.7 | 202.8 | 204.0 | 204.9 | 203.6 | 203.6 | 204.0 | 204.0 | 32.5 | 3.5 | 9.4 |
| CC-N-01-021 | 00-21680 | CC-L-01-029 | 487.1 | Irregular Channel | -0.04 | 203.4 | 203.6 | 208.1 | 206.0 | 204.3 | 204.2 | 204.8 | 204.7 | 146.7 | 3.5 | 15.3 |
| CC-N-01-022 | 00-15049 | CC-L-01-031 | 116.68 | Irregular Channel | 1.05 | 204.4 | 203.2 | 209.1 | 208.6 | 204.7 | 204.3 | 205.1 | 204.9 | 1990.8 | 2.1 | 12.4 |
| CC-N-01-023 | CC-N-01-022 | CC-L-01-032 | 899.78 | Irregular Channel | 0.102 | 205.3 | 204.4 | 208.3 | 209.1 | 205.8 | 204.7 | 206.1 | 205.1 | 713.0 | 2.1 | 14.8 |
| CC-N-02-001 | CC-N-00-007 | CC-L-02-001 | 156.98 | Irregular Channel | 1.99 | 195.7 | 192.6 | 206.1 | 209.9 | 196.8 | 195.2 | 197.2 | 196.1 | 9238.9 | 21.1 | 36.6 |
| CC-N-02-002 | 00-15256 | CC-L-02-004 | 264.34 | Irregular Channel | 0.429 | 198.0 | 196.9 | 205.1 | 202.3 | 199.8 | 198.8 | 200.2 | 199.3 | 409.8 | 21.0 | 34.8 |
| CC-N-02-003 | 05-00400 | CC-L-02-006 | 525.37 | Irregular Channel | 0.02 | 198.3 | 198.1 | 202.7 | 206.4 | 200.6 | 200.0 | 201.2 | 200.5 | 50.2 | 18.5 | 32.6 |
| CC-N-02-004 | CC-N-02-003 | CC-L-02-007 | 139.92 | Irregular Channel | 0.24 | 198.6 | 198.3 | 202.7 | 202.7 | 200.8 | 200.6 | 201.4 | 201.2 | 77.6 | 18.6 | 32.8 |
| CC-N-02-005 | CC-N-02-004 | CC-L-02-008 | 23.01 | Irregular Channel | 4.09 | 199.5 | 198.6 | 203.6 | 202.7 | 200.9 | 200.8 | 201.4 | 201.4 | 323.1 | 18.6 | 32.9 |
| CC-N-02-006 | CC-N-02-005 | CC-L-02-009 | 62.89 | Irregular Channel | -1.48 | 198.6 | 199.5 | 202.7 | 203.6 | 201.0 | 200.9 | 201.6 | 201.4 | 194.4 | 18.6 | 33.0 |
| CC-N-02-007 | CC-N-02-006 | CC-L-02-010 | 135.48 | Irregular Channel | 0.49 | 199.3 | 198.6 | 203.4 | 202.7 | 201.3 | 201.0 | 201.9 | 201.6 | 112.4 | 18.6 | 33.1 |
| CC-N-02-008 | CC-N-02-007 | CC-L-02-011 | 180.55 | Irregular Channel | -0.13 | 199.0 | 199.3 | 203.1 | 203.4 | 201.5 | 201.3 | 202.1 | 201.9 | 58.3 | 15.0 | 28.5 |
| CC-N-02-009 | CC-N-02-008 | CC-L-02-012 | 94.07 | Irregular Channel | 0.7 | 199.7 | 199.0 | 203.8 | 203.1 | 201.6 | 201.5 | 202.2 | 202.1 | 133.9 | 15.0 | 28.5 |
| CC-N-02-010 | CC-N-02-009 | CC-L-02-013 | 95.4 | Irregular Channel | -0.016 | 199.5 | 199.7 | 203.6 | 203.8 | 201.8 | 201.6 | 202.4 | 202.2 | 63.4 | 15.0 | 28.4 |

| Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| CC-N-02-011 | CC-N-02-010 | CC-L-02-014 | 91.87 | Irregular Channel | 0.56 | 200.1 | 199.5 | 204.1 | 203.6 | 201.9 | 201.8 | 202.6 | 202.4 | 119.1 | 15.0 | 28.7 |
| CC-N-02-012 | CC-N-02-011 | CC-L-02-015 | 95.9 | Irregular Channel | -0.35 | 199.7 | 200.1 | 203.8 | 204.1 | 202.1 | 201.9 | 202.7 | 202.6 | 95.2 | 15.0 | 28.7 |
| CC-N-02-013 | CC-N-02-012 | CC-L-02-016 | 147.94 | Irregular Channel | 0.39 | 200.3 | 199.7 | 202.7 | 203.8 | 202.1 | 202.1 | 202.7 | 202.7 | 249.3 | 15.3 | 31.1 |
| CC-N-02-014 | CC-N-02-013 | CC-L-02-017 | 48.49 | Irregular Channel | -0.47 | 200.1 | 200.3 | 203.5 | 202.7 | 202.1 | 202.1 | 202.7 | 202.7 | 276.6 | 16.0 | 38.5 |
| CC-N-02-015 | 00-15067 | CC-L-02-019 | 69.5 | Irregular Channel | 2 | 206.1 | 204.7 | 210.2 | 208.8 | 206.6 | 206.0 | 206.9 | 206.8 | 1060.0 | 13.8 | 27.6 |
| CC-N-02-016 | CC-N-02-015 | CC-L-02-020 | 923.13 | Irregular Channel | -0.089 | 205.3 | 206.1 | 209.4 | 210.2 | 207.4 | 206.6 | 208.1 | 206.9 | 16.7 | 13.8 | 28.2 |
| CC-N-02-017 | CC-N-02-016 | CC-L-02-021 | 115 | Irregular Channel | 0 | 205.3 | 205.3 | 209.4 | 209.4 | 207.4 | 207.4 | 208.2 | 208.1 | 1.8 | 14.4 | 30.3 |
| CC-N-03-001 | CC-N-00-010 | CC-L-03-001 | 191.08 | Irregular Channel | 3.79 | 201.6 | 194.4 | 205.8 | 204.3 | 201.8 | 197.5 | 201.9 | 198.3 | 644.4 | 0.7 | 2.4 |
| CC-N-03-002 | CC-N-03-001 | CC-L-03-002 | 1546.61 | Irregular Channel | 0.131 | 203.6 | 201.6 | 209.9 | 205.8 | 203.9 | 201.8 | 204.1 | 201.9 | 13.7 | 0.7 | 2.4 |
| CC-N-03-003 | 00-15035 | CC-L-03-003B | 39.74 | Irregular Channel | 1.53 | 205.0 | 204.3 | 211.2 | 207.9 | 205.0 | 204.4 | 205.1 | 204.8 | 475.7 | 0.1 | 0.8 |
| CC-N-04-001 | CC-N-00-021 | CC-L-04-001 | 272.64 | Irregular Channel | 2.59 | 209.2 | 202.1 | 218.5 | 208.3 | 209.5 | 205.9 | 210.1 | 206.5 | 3912.8 | 2.6 | 19.2 |
| CC-N-04-002 | CC-N-04-001 | CC-L-04-002 | 1016.17 | Irregular Channel | 1.229 | 221.7 | 209.2 | 226.1 | 218.5 | 221.8 | 209.5 | 222.1 | 210.1 | 3657.0 | 2.6 | 19.2 |
| CC-N-05-001 | CC-N-00-023 | CC-L-05-001 | 460.46 | Irregular Channel | 1.14 | 208.0 | 202.8 | 218.8 | 216.1 | 208.9 | 206.5 | 209.2 | 207.2 | 4776.9 | 11.4 | 20.8 |
| CC-N-05-002 | CC-N-05-001 | CC-L-05-002 | 1028.07 | Irregular Channel | 1.42 | 222.6 | 208.0 | 232.2 | 218.8 | 223.2 | 208.9 | 223.4 | 209.2 | 12934.1 | 11.4 | 19.3 |
| CC-N-05-003 | 00-15308 | CC-L-05-003B | 730.47 | Irregular Channel | 0.768 | 229.5 | 223.9 | 232.5 | 226.9 | 230.5 | 225.7 | 230.8 | 226.3 | 131.4 | 11.6 | 20.4 |
| LINN-0 | LINN-1 | 24-00070 | 175.02 | 12" DIA | 0.8 | 235.0 | 233.7 | 238.2 | 237.4 | 235.6 | 234.0 | 237.4 | 237.3 | 3.1 | 2.0 | 2.8 |
| LINN-1 | LINN-2 | 24-00080 | 46.07 | 12" DIA | 0.5 | 233.4 | 233.1 | 237.4 | 237.4 | 234.0 | 233.6 | 237.3 | 237.3 | 3.0 | 2.0 | 2.8 |
| LINN-10 | LINN-11 | 24-00400 | 460.05 | 24" DIA | 1.43 | 221.3 | 214.7 | 227.3 | 220.4 | 222.5 | 215.9 | 223.5 | 217.6 | 27.1 | 18.5 | 26.4 |
| LINN-11 | LINN-12 | 24-00470 | 209.03 | 24" DIA | 1.5 | 214.6 | 209.8 | 220.4 | 216.5 | 215.9 | 211.2 | 217.6 | 211.9 | 34.4 | 27.1 | 37.5 |
| LINN-12 | LINN-13 | 24-00530 | 255.01 | 30" DIA | 1.2 | 209.7 | 207.3 | 216.5 | 212.9 | 211.2 | 209.1 | 211.9 | 209.9 | 39.3 | 27.1 | 37.5 |
| LINN-13 | 00-15365 | 24-00560 | 172 | 30" DIA | 0.5 | 207.2 | 206.4 | 212.9 | 213.5 | 209.1 | 207.8 | 209.9 | 208.3 | 28.2 | 27.1 | 37.5 |
| LINN-14 | LINN-16 | 24-00010 | 149.03 | 15" DIA | 0.5 | 208.5 | 207.7 | 211.9 | 211.9 | 208.5 | 207.4 | 208.5 | 208.2 | 4.6 | 0.0 | 0.0 |
| LINN-15 | LINN-16 | 24-00020 | 171.45 | 12" DIA | 1 | 209.4 | 207.7 | 213.8 | 211.9 | 209.4 | 207.4 | 209.4 | 208.2 | 3.6 | 0.0 | 0.0 |
| LINN-16 | CC-N-02-017 | 24-00000 | 199.72 | 15" DIA | 0.3 | 207.4 | 206.8 | 211.9 | 209.4 | 207.4 | 207.4 | 208.2 | 208.2 | 3.5 | 0.0 | -0.2 |
| LINN-17 | 00-15365 | 24-00590 | 313 | 15" DIA | 0.13 | 208.1 | 207.7 | 212.9 | 213.5 | 212.9 | 207.8 | 212.9 | 208.3 | 2.3 | 7.5 | 7.5 |
| LINN-18 | LINN-23 | 24-00680 | 292.71 | 12" DIA | 0.2 | 209.7 | 209.1 | 214.9 | 213.6 | 214.9 | 213.2 | 214.9 | 213.2 | 1.7 | 3.4 | 3.8 |
| LINN-19 | LINN-18 | 24-00700 | 42.98 | 12" DIA | 0.2 | 210.1 | 209.8 | 215.9 | 214.9 | 214.8 | 214.9 | 214.8 | 214.9 | 3.1 | -1.3 | -1.3 |
| LINN-2 | LINN-3 | 24-00120 | 146.48 | 15" DIA | 0.6 | 233.0 | 232.0 | 237.4 | 235.4 | 233.6 | 232.6 | 237.3 | 235.4 | 5.2 | 2.5 | 7.5 |
| LINN-20 | LINN-19 | 24-00710 | 285.22 | 12" DIA | 0.2 | 210.9 | 210.2 | 214.5 | 215.9 | 214.5 | 214.8 | 214.5 | 214.8 | 1.8 | -1.3 | -1.3 |
| LINN-21 | LINN-20 | 24-00730 | 175 | 12" DIA | 0.3 | 211.5 | 211.0 | 214.8 | 214.5 | 214.7 | 214.5 | 214.7 | 214.5 | 1.8 | 1.4 | 1.4 |
| LINN-22 | LINN-21 | 24-00760 | 50.06 | 12" DIA | 0.5 | 211.6 | 211.5 | 214.8 | 214.8 | 214.8 | 214.7 | 214.8 | 214.7 | 1.6 | 1.4 | 1.4 |
| LINN-23 | LINN-17 | 24-00630 | 161 | 15" DIA | 0.1 | 208.5 | 208.2 | 213.6 | 212.9 | 213.2 | 212.9 | 213.2 | 212.9 | 2.7 | 3.5 | 3.8 |
| LINN-3 | LINN-4 | 24-00140 | 130.52 | 15" DIA | 0.6 | 232.0 | 231.2 | 235.4 | 235.7 | 232.6 | 231.9 | 235.4 | 234.3 | 5.2 | 2.5 | 6.7 |
| LINN-4 | LINN-5 | 24-00160 | 115 | 18" DIA | 0.3 | 230.7 | 230.4 | 235.7 | 235.2 | 231.9 | 231.3 | 234.3 | 233.0 | 5.6 | 6.0 | 11.2 |
| LINN-5 | LINN-6 | 24-00200 | 150 | 18" DIA | 0.5 | 230.3 | 229.4 | 235.2 | 233.0 | 231.3 | 230.3 | 233.0 | 231.3 | 7.8 | 6.0 | 11.2 |
| LINN-6 | LINN-7 | 24-00240 | 120.78 | 18" DIA | 0.5 | 229.3 | 228.7 | 233.0 | 234.7 | 230.3 | 229.0 | 231.3 | 229.4 | 7.8 | 6.0 | 11.2 |
| LINN-7 | LINN-9 | 24-00290 | 189.26 | 24" DIA | 0.5 | 228.2 | 227.2 | 234.7 | 234.8 | 229.0 | 228.1 | 229.4 | 228.4 | 16.4 | 6.0 | 11.2 |
| LINN-9 | LINN-10 | 24-00350 | 225.02 | 24" DIA | 2.53 | 227.1 | 221.4 | 234.8 | 227.3 | 228.1 | 222.5 | 228.4 | 223.5 | 36.0 | 18.5 | 26.6 |
| MURDER CREEK | | | | | | | | | | | | | | | | |
| 00-05001 | MC-N-02-03 | MC-L-02-04 | 25.6 | Irregular Channel | -11.6 | 206.3 | 209.2 | 215.8 | 215.0 | 210.4 | 210.4 | 211.0 | 211.0 | 12023.3 | 19.2 | 50.1 |
| 00-05015 | MC-N-01-03 | MC-L-01-04 | 19.09 | Irregular Channel | -2.25 | 207.5 | 208.0 | 215.6 | 211.4 | 208.9 | 208.9 | 209.7 | 209.7 | 242.7 | 9.3 | 20.5 |
| 00-05219 | MC-N-01-14 | MC-L-01-16 | 64.93 | Irregular Channel | -0.74 | 220.9 | 221.4 | 229.0 | 223.7 | 222.8 | 222.8 | 223.0 | 223.0 | 128.1 | 27.5 | 46.0 |
| 00-05381 | 00-05382 | 00-05380 | 32.58 | 12" DIA | 1.5 | 236.3 | 235.8 | 238.3 | 238.3 | 236.5 | 236.1 | 236.6 | 236.3 | 4.4 | 0.5 | 0.8 |
| 00-05382 | 00-05422 | D-WAVERLY-01 | 134.55 | Irregular Channel | 0.85 | 235.8 | 234.7 | 238.3 | 237.7 | 236.1 | 234.9 | 236.3 | 235.0 | 21.0 | 1.1 | 2.3 |
| 00-05391 | 00-05392 | 00-05390 | 37.78 | 18" DIA | 0.2 | 230.7 | 230.6 | 234.7 | 234.7 | 231.5 | 231.5 | 231.7 | 231.7 | 4.2 | 0.9 | 2.1 |
| 00-05392 | 00-05401 | D-CONSER-04.1 | 12.81 | Irregular Channel | -3.36 | 230.6 | 231.0 | 234.7 | 235.2 | 231.5 | 231.5 | 231.7 | 231.7 | 111.7 | 0.9 | 2.1 |
| 00-05401 | 00-05402 | 00-05400 | 40.7 | 15" DIA | 3.1 | 231.0 | 229.8 | 235.2 | 235.2 | 231.5 | 226.7 | 231.7 | 226.8 | 11.4 | 3.1 | 6.7 |
| 00-05402 | MC-N-11-02 | MC-L-11-03 | 1020.21 | Irregular Channel | 0.33 | 226.5 | 223.2 | 235.2 | 225.4 | 226.7 | 223.3 | 226.8 | 223.6 | 4.4 | 2.7 | 6.3 |
| 00-05411 | 00-05412 | 00-05410 | 30.64 | 10" DIA | 0.8 | 239.3 | 239.0 | 241.0 | 241.0 | 239.4 | 239.1 | 239.4 | 239.1 | 2.0 | 0.1 | 0.1 |
| 00-05412 | 00-05391 | D-CONSER-03 | 443.89 | Irregular Channel | 1.88 | 239.0 | 230.7 | 241.0 | 234.7 | 239.1 | 231.5 | 239.1 | 231.7 | 186.7 | 0.1 | 0.1 |
| 00-05421 | 00-05422 | 00-05420 | 40.65 | 12" DIA | 3.91 | 236.3 | 234.7 | 237.7 | 237.7 | 236.4 | 234.9 | 236.5 | 235.0 | 7.1 | 0.5 | 0.7 |
| 00-05422 | 00-05401 | D-CONSER-05 | 375.05 | Irregular Channel | 0.97 | 234.7 | 231.0 | 237.7 | 235.2 | 234.9 | 231.5 | 235.0 | 231.7 | 60.0 | 1.6 | 3.0 |
| 00-05431 | 00-05432 | 00-05430 | 31.91 | 10" DIA | 4.11 | 238.4 | 237.1 | 239.4 | 239.4 | 239.4 | 238.9 | 239.4 | 238.9 | 4.4 | 4.1 | 3.4 |

**Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID**

| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 00-05432 | LINN-24 | MC-DRAINAGE-12 | 380.8 | Irregular Channel | 0.07 | 237.1 | 236.8 | 239.4 | 238.9 | 238.9 | 238.9 | 238.9 | 238.9 | 9.3 | 5.2 | 7.4 |
| 00-15005 | 00-05001 | 00-05005 | 72.22 | 48" DIA | 0.7 | 208.9 | 208.4 | 215.8 | 215.8 | 210.2 | 210.4 | 210.9 | 211.0 | 120.7 | -21.1 | -26.4 |
| 00-15005 | 00-05001 | 00-05006 | 72.05 | 48" DIA | 3.2 | 208.5 | 206.3 | 215.8 | 215.8 | 210.2 | 210.4 | 210.9 | 211.0 | 255.0 | 40.4 | 69.8 |
| 00-15010 | 00-05015 | 00-05009 | 104.01 | 36" DIA | 0.4 | 208.1 | 207.6 | 215.6 | 215.6 | 208.9 | 208.9 | 209.7 | 209.7 | 43.4 | 4.0 | 8.6 |
| 00-15010 | 00-05015 | 00-05010 | 102.97 | 36" DIA | 0.5 | 208.1 | 207.5 | 215.6 | 215.6 | 208.9 | 208.9 | 209.7 | 209.7 | 48.8 | 5.3 | 11.7 |
| 00-15202 | 00-05219 | 00-05202 | 78.33 | 48" H, 36" BOX | 0.3 | 221.1 | 220.9 | 229.0 | 229.0 | 223.0 | 222.8 | 223.4 | 223.0 | 64.1 | 27.8 | 46.0 |
| 01-00130 | 01-00150 | 01-00140 | 35.18 | 10" DIA | 0.5 | 234.7 | 234.5 | 238.7 | 238.7 | 235.3 | 235.3 | 235.7 | 235.7 | 1.6 | 0.0 | 0.0 |
| 01-00150 | 01-00170 | 01-00160 | 107 | 10" DIA | 0.3 | 234.5 | 234.2 | 238.7 | 238.1 | 235.3 | 235.2 | 235.7 | 235.5 | 1.2 | 0.8 | 0.9 |
| 01-00170 | 01-00190 | 01-00180 | 35.18 | 10" DIA | 0.5 | 234.2 | 234.0 | 238.1 | 238.1 | 235.2 | 235.1 | 235.5 | 235.4 | 1.6 | 1.3 | 1.5 |
| 01-00190 | 01-00210 | 01-00200 | 124.6 | 10" DIA | 0.5 | 234.0 | 233.5 | 238.1 | 238.1 | 235.1 | 234.7 | 235.4 | 234.9 | 1.4 | 1.3 | 1.5 |
| 01-00210 | 01-00390 | Swale 1-A-1 | 147.7 | Irregular Channel | 0.92 | 233.5 | 232.1 | 238.1 | 235.5 | 234.7 | 234.7 | 234.9 | 234.9 | 38.2 | 1.2 | 1.7 |
| 01-00290 | 01-00310 | 01-00280 | 68.15 | 10" DIA | 0.5 | 233.0 | 232.6 | 236.3 | 235.3 | 234.7 | 234.7 | 234.9 | 234.9 | 1.6 | 0.2 | 0.2 |
| 01-00310 | 01-00350 | 01-00300 | 95.94 | 10" DIA | 0.5 | 232.6 | 232.1 | 235.3 | 235.5 | 234.7 | 234.7 | 234.9 | 234.8 | 1.6 | 0.6 | 0.7 |
| 01-00330 | 01-00310 | 01-00340 | 39.18 | 10" DIA | 0.3 | 232.7 | 232.6 | 235.3 | 235.3 | 234.7 | 234.7 | 234.9 | 234.9 | 1.2 | 0.0 | 0.1 |
| 01-00370 | MC-DRAIN-N-03 | MC-DRAINAGE-03 | 676.2 | Irregular Channel | 0.54 | 232.0 | 228.3 | 234.5 | 233.4 | 232.2 | 228.7 | 232.3 | 229.1 | 1183.3 | 1.9 | 7.5 |
| 01-00390 | 01-00350 | 01-00360 | 16.53 | 12" DIA | 1.7 | 232.5 | 232.1 | 235.5 | 235.5 | 234.7 | 234.7 | 234.9 | 234.8 | 5.2 | 1.4 | 1.7 |
| 08-00020 | 08-00040 | 08-00010 | 70 | 12" DIA | 0.3 | 234.8 | 234.6 | 237.0 | 238.1 | 235.0 | 235.0 | 235.0 | 235.0 | 2.0 | 0.0 | 0.1 |
| 08-00040 | 23-00260 | 23-00130 | 27 | 12" DIA | 0.3 | 234.6 | 234.5 | 238.1 | 237.7 | 235.0 | 233.3 | 235.0 | 233.4 | 1.9 | 0.7 | 0.8 |
| 08-00080 | 08-00060 | 08-00050 | 372 | 18" DIA | 0.1 | 235.3 | 234.9 | 243.2 | 238.2 | 237.2 | 237.2 | 237.2 | 237.2 | 3.3 | -0.2 | -0.1 |
| 12-00000 | 12-00020 | 12-00010 | 21.72 | 10" DIA | 3.1 | 237.7 | 237.0 | 242.7 | 242.7 | 237.7 | 237.2 | 237.7 | 237.3 | 3.9 | 0.0 | 0.0 |
| 12-00020 | 12-00040 | 12-00030 | 41.54 | 10" DIA | 3.7 | 237.0 | 235.5 | 242.7 | 241.4 | 237.2 | 235.6 | 237.3 | 235.8 | 4.2 | 0.4 | 1.2 |
| 12-00040 | 12-00180 | 12-00190 | 523.19 | 12" DIA | 1 | 235.4 | 230.1 | 241.4 | 235.0 | 235.6 | 230.6 | 235.8 | 230.9 | 3.6 | 0.4 | 1.2 |
| 12-00060 | 12-00080 | 12-00050 | 55.8 | 15" DIA | 0.7 | 225.7 | 225.3 | 229.2 | 230.0 | 228.9 | 228.8 | 229.2 | 229.0 | 5.5 | 3.4 | 4.5 |
| 12-00100 | 12-00120 | 12-00070 | 299.58 | 10" DIA | 1 | 236.8 | 233.8 | 244.0 | 242.0 | 237.1 | 234.0 | 237.1 | 234.0 | 2.2 | 0.5 | 0.6 |
| 12-00120 | 12-00180 | 12-00130 | 258.88 | 12" DIA | 1.2 | 233.7 | 230.1 | 242.0 | 235.0 | 234.0 | 230.6 | 234.0 | 230.9 | 4.2 | 0.5 | 0.6 |
| 12-00140 | 12-00100 | 12-00090 | 8 | 10" DIA | 0.12 | 238.0 | 237.9 | 243.8 | 244.0 | 238.0 | 237.1 | 238.0 | 237.1 | 1.9 | 0.0 | 0.0 |
| 12-00160 | 12-00100 | 12-00110 | 30.54 | 10" DIA | 1 | 238.3 | 237.9 | 243.9 | 244.0 | 238.3 | 237.1 | 238.3 | 237.1 | 2.2 | 0.0 | 0.0 |
| 12-00180 | 12-00200 | 12-00150 | 244.48 | 15" DIA | 1.1 | 230.0 | 227.3 | 235.0 | 230.5 | 230.6 | 229.2 | 230.9 | 229.8 | 6.8 | 2.6 | 3.7 |
| 12-00200 | 12-00060 | 12-00170 | 191.99 | 15" DIA | 0.7 | 227.2 | 225.8 | 230.5 | 229.2 | 229.2 | 228.9 | 229.8 | 229.2 | 5.6 | 2.6 | 3.7 |
| 12-00220 | 12-00241 | 12-00211 | 58 | 18" DIA | 0.4 | 224.5 | 224.2 | 230.6 | 230.6 | 226.2 | 225.3 | 226.9 | 225.4 | 7.8 | 13.6 | 17.4 |
| 12-00240 | 12-00241 | 12-00230 | 23.6 | 15" DIA | 1.9 | 224.8 | 224.3 | 230.0 | 230.6 | 225.4 | 225.3 | 225.5 | 225.4 | 9.4 | 2.6 | 4.1 |
| 12-00241 | 12-00244 | 12-00243 | 48.73 | 36" DIA | 1.8 | 224.2 | 223.1 | 230.6 | 230.7 | 225.3 | 225.0 | 225.4 | 225.0 | 98.8 | 15.6 | 20.3 |
| 12-00242 | 12-00220 | 12-00210 | 80.7 | 18" DIA | 0.66 | 225.0 | 224.5 | 230.7 | 230.6 | 227.5 | 226.2 | 229.1 | 226.9 | 8.5 | 13.6 | 17.4 |
| 12-00244 | MC-N-21-02 | MC-L-21-03 | 1156.83 | Irregular Channel | 0.53422 | 224.1 | 217.9 | 230.7 | 219.8 | 225.0 | 218.5 | 225.0 | 219.2 | 45.6 | 16.3 | 22.1 |
| 15-00040 | 15-00020 | 15-00010 | 74.26 | 18" DIA | 0.7 | 232.0 | 231.5 | 235.3 | 235.3 | 232.4 | 231.9 | 232.5 | 232.0 | 9.0 | 1.8 | 2.2 |
| 15-00100 | 15-00080 | 15-00030 | 41.23 | 18" DIA | 0.2 | 232.5 | 232.4 | 236.0 | 238.0 | 233.8 | 233.8 | 234.5 | 234.4 | 4.6 | 1.8 | 2.9 |
| 15-00120 | 15-00100 | 15-00050 | 200.97 | 18" DIA | 0.2 | 232.9 | 232.5 | 236.0 | 236.0 | 233.8 | 233.8 | 234.5 | 234.5 | 4.6 | 1.9 | 3.0 |
| 15-00220 | 15-00120 | Swale 15A | 202.03 | Irregular Channel | 1.65 | 236.2 | 232.9 | 239.6 | 236.0 | 236.6 | 233.8 | 236.8 | 234.5 | 29.8 | 1.9 | 3.3 |
| 15-00240 | 15-00260 | 15-00110 | 106.95 | 10" DIA | 0.9 | 237.4 | 236.4 | 239.6 | 239.6 | 237.6 | 236.6 | 237.6 | 236.8 | 2.1 | 0.2 | 0.2 |
| 15-00260 | 15-00220 | 15-00090 | 34.85 | 10" DIA | 0.63 | 236.4 | 236.2 | 239.6 | 239.6 | 236.6 | 236.6 | 236.8 | 236.8 | 1.7 | 0.2 | 0.2 |
| 23-00020 | 23-00060 | 23-00010 | 235 | 12" DIA | 2 | 237.1 | 232.4 | 241.0 | 237.3 | 237.2 | 232.4 | 237.2 | 232.4 | 5.0 | 0.1 | 0.1 |
| 23-00040 | 23-00080 | 23-00030 | 255 | 12" DIA | 2.2 | 237.1 | 231.9 | 239.4 | 234.4 | 237.3 | 232.0 | 237.4 | 232.0 | 5.1 | 0.4 | 0.6 |
| 23-00060 | 23-00140 | 23-00050 | 135 | 12" DIA | 2 | 232.3 | 229.6 | 237.3 | 234.4 | 232.4 | 229.7 | 232.4 | 229.7 | 5.0 | 0.2 | 0.2 |
| 23-00080 | 12-00244 | D-CONSER-01 | 412.5 | Irregular Channel | 2.14 | 231.9 | 223.1 | 234.4 | 230.7 | 232.0 | 225.0 | 232.0 | 225.0 | 151.4 | 0.3 | 0.5 |
| 23-00100 | 12-00242 | 23-00090 | 77 | 18" DIA | 1.5 | 226.6 | 225.3 | 231.4 | 230.7 | 227.8 | 227.5 | 229.1 | 229.1 | 13.3 | 1.7 | 1.5 |
| 23-00140 | 23-00100 | 23-00070 | 191 | 12" DIA | 1.5 | 229.5 | 226.7 | 234.4 | 231.4 | 229.7 | 227.8 | 229.7 | 229.1 | 4.4 | 0.5 | 0.5 |
| 23-00160 | 12-00241 | 23-00150 | 77 | 18" DIA | 1.5 | 228.0 | 226.9 | 231.6 | 230.6 | 228.1 | 225.3 | 228.1 | 225.4 | 12.6 | 0.1 | 0.1 |
| 23-00180 | 23-00160 | 23-00170 | 88 | 18" DIA | 2 | 229.8 | 228.0 | 233.3 | 231.6 | 229.8 | 228.1 | 229.8 | 228.1 | 14.8 | 0.1 | 0.1 |
| 23-00210 | 12-00244 | D-CONSER-02 | 457.47 | Irregular Channel | 1.6 | 230.4 | 223.1 | 236.6 | 230.7 | 230.6 | 225.0 | 230.6 | 225.0 | 131.0 | 0.9 | 2.3 |
| 23-00220 | 23-00240 | 23-00190 | 28 | 12" DIA | 1.96 | 231.4 | 230.8 | 236.8 | 236.6 | 231.7 | 231.1 | 231.7 | 231.3 | 5.0 | 1.1 | 1.2 |
| 23-00240 | 23-00210 | 23-00200 | 47.89 | 24" DIA | 0.65 | 230.7 | 230.4 | 236.6 | 236.6 | 231.1 | 230.6 | 231.3 | 230.6 | 18.2 | 1.4 | 2.7 |
| 23-00260 | 23-00220 | 23-00230 | 79 | 12" DIA | 1.5 | 233.0 | 231.5 | 237.7 | 236.8 | 233.3 | 231.7 | 233.4 | 231.7 | 5.0 | 1.0 | 1.1 |
| 23-00280 | 23-00260 | 23-00250 | 79 | 12" DIA | 1.5 | 233.0 | 231.5 | 240.4 | 237.7 | 233.4 | 233.3 | 233.4 | 233.4 | 5.0 | 0.3 | 0.3 |

**Table B-2 - Hydraulic Model Parameters and Results Sorted by Upstream Node ID**

| Upstream Node | Downstream Node | Conduit ID | Length (feet) | Size/Type | Slope (%) | US IE (feet) | DS IE (feet) | Ground Elevation (feet) | | Existing 10-yr Water Surface | | Future 10-yr Water Surface | | Capacity (cfs) | Existing 10-yr Peak Flow | Future 10-yr Peak Flow |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | US | DS | US | DS | US | DS | | | |
| 23-00300 | 23-00280 | 23-00270 | 68 | 8" DIA | 3.4 | 238.1 | 235.8 | 241.0 | 240.4 | 238.2 | 233.4 | 238.2 | 233.4 | 2.2 | 0.1 | 0.1 |
| Det 8A Control | 08-00040 | 08-00030 | 51 | 12" DIA | 0.3 | 234.7 | 234.6 | 238.2 | 238.1 | 235.1 | 235.0 | 235.2 | 235.0 | 1.9 | 0.7 | 0.7 |
| LINN-24 | LINN-26 | 24-00801 | 184.55 | 12" DIA | 0.374 | 236.8 | 236.1 | 238.9 | 238.4 | 238.9 | 235.9 | 238.9 | 236.3 | 2.2 | 3.7 | 3.7 |
| LINN-25 | MC-DRAIN-N-03 | MC-DRAINAGE-11 | 1006.4 | Irregular Channel | 0.58 | 234.2 | 228.3 | 238.1 | 233.4 | 234.6 | 228.7 | 234.7 | 229.1 | 942.7 | 14.8 | 27.2 |
| LINN-26 | LINN-25 | 24-00800 | 55.95 | 30" DIA | 0.374 | 234.6 | 234.4 | 238.4 | 238.1 | 235.9 | 234.6 | 236.3 | 234.7 | 25.1 | 15.2 | 24.1 |
| MC-DRAIN-N-02 | 12-00242 | MC-DRAINAGE-01 | 217 | Irregular Channel | 0.75 | 227.0 | 225.4 | 232.1 | 230.7 | 227.7 | 227.5 | 229.1 | 229.1 | 680.4 | 15.6 | 21.7 |
| MC-DRAIN-N-03 | MC-DRAIN-N-02 | MC-DRAINAGE-02 | 218.15 | Irregular Channel | 0 | 228.3 | 227.0 | 233.4 | 232.1 | 228.7 | 227.7 | 229.1 | 229.1 | 6296.5 | 16.3 | 33.8 |
| MC-DRAIN-N-04 | 01-00370 | MC-DRAINAGE-04 | 681.28 | Irregular Channel | 0.62 | 236.3 | 232.0 | 237.6 | 234.5 | 236.4 | 232.2 | 236.5 | 232.3 | 320.3 | 0.5 | 3.6 |
| MC-N-01-01 | MC-N-01-00 | MC-L-01-01 | 414.11 | Irregular Channel | 2.3 | 188.1 | 178.6 | 208.9 | 207.0 | 189.0 | 179.6 | 189.4 | 179.8 | 15498.4 | 9.5 | 28.0 |
| MC-N-01-02 | MC-N-01-01 | MC-L-01-02 | 583.33 | Irregular Channel | 2.88859 | 205.0 | 188.1 | 209.3 | 208.9 | 206.0 | 189.0 | 206.6 | 189.4 | 1146.4 | 9.5 | 28.0 |
| MC-N-01-03 | MC-N-01-02 | MC-L-01-03 | 625.59 | Irregular Channel | 0.48115 | 208.0 | 205.0 | 211.4 | 209.3 | 208.9 | 206.0 | 209.7 | 206.6 | 112.2 | 9.5 | 28.1 |
| MC-N-01-04 | 00-15010 | MC-L-01-05 | 359.2 | Irregular Channel | 0.44 | 209.7 | 208.1 | 211.3 | 215.6 | 210.7 | 208.9 | 210.8 | 209.7 | 3.8 | 9.2 | 19.1 |
| MC-N-01-05 | MC-N-01-04 | MC-L-01-06 | 255.21 | Irregular Channel | 0.13714 | 210.0 | 209.7 | 211.7 | 211.3 | 211.2 | 210.7 | 211.6 | 210.8 | 9.9 | 9.2 | 19.0 |
| MC-N-01-06 | MC-N-01-05 | MC-L-01-07 | 68.72 | Irregular Channel | 0.37835 | 210.3 | 210.0 | 211.7 | 211.7 | 211.4 | 211.2 | 211.7 | 211.6 | 15.2 | 9.3 | 19.1 |
| MC-N-01-07 | MC-N-01-06 | MC-L-01-08 | 437.54 | Irregular Channel | 0.45482 | 212.3 | 210.3 | 213.5 | 211.7 | 213.3 | 211.4 | 213.5 | 211.7 | 21.4 | 9.6 | 28.2 |
| MC-N-01-08 | MC-N-01-07 | MC-L-01-09 | 437.54 | Irregular Channel | 0.03 | 212.4 | 212.3 | 213.6 | 213.5 | 213.6 | 213.3 | 213.6 | 213.5 | 5.7 | 8.8 | 8.7 |
| MC-N-01-09 | MC-N-01-08 | MC-L-01-10 | 230.12 | Irregular Channel | 0.03 | 212.5 | 212.4 | 213.7 | 213.6 | 213.7 | 213.6 | 213.7 | 213.6 | 12.0 | 10.2 | 10.2 |
| MC-N-01-10 | MC-N-01-09 | MC-L-01-11 | 356.12 | Irregular Channel | 0.19375 | 213.2 | 212.5 | 214.2 | 213.7 | 214.2 | 213.7 | 214.2 | 213.7 | 8.5 | 31.0 | 31.0 |
| MC-N-01-11 | MC-N-01-10 | MC-L-01-12 | 356.12 | Irregular Channel | 0.36 | 214.4 | 213.2 | 219.3 | 214.2 | 215.4 | 214.2 | 215.7 | 214.2 | 11.7 | 38.1 | 86.7 |
| MC-N-01-12 | MC-N-01-11 | MC-L-01-13 | 259.67 | Irregular Channel | -0.15 | 214.1 | 214.4 | 215.8 | 219.3 | 215.6 | 215.4 | 215.8 | 215.7 | 14.2 | 26.4 | 52.0 |
| MC-N-01-13 | MC-N-01-12 | MC-L-01-14 | 1269.66 | Irregular Channel | 0.36703 | 218.7 | 214.1 | 220.6 | 215.8 | 219.7 | 215.6 | 220.0 | 215.8 | 221.0 | 27.2 | 73.3 |
| MC-N-01-14 | MC-N-01-13 | MC-L-01-15 | 746.08 | Irregular Channel | 0.36189 | 221.4 | 218.7 | 223.7 | 220.6 | 222.8 | 219.7 | 223.0 | 220.0 | 89.7 | 26.9 | 45.7 |
| MC-N-01-15 | 00-15202 | MC-L-01-17 | 74.86 | Irregular Channel | 2.47 | 223.0 | 221.1 | 225.3 | 229.0 | 224.1 | 223.0 | 224.3 | 223.4 | 201.5 | 27.9 | 46.1 |
| MC-N-02-01 | MC-N-02-00 | MC-L-02-01 | 503.09 | Irregular Channel | 5.53579 | 204.9 | 177.1 | 208.8 | 207.7 | 205.9 | 178.1 | 206.5 | 178.7 | 1296.9 | 18.8 | 59.6 |
| MC-N-02-02 | MC-N-02-01 | MC-L-02-02 | 735.34 | Irregular Channel | 0.56436 | 209.1 | 204.9 | 214.8 | 208.8 | 209.8 | 205.9 | 210.1 | 206.5 | 114.9 | 19.0 | 60.6 |
| MC-N-02-03 | MC-N-02-02 | MC-L-02-03 | 198.37 | Irregular Channel | 0.09074 | 209.2 | 209.1 | 215.0 | 214.8 | 210.4 | 209.8 | 211.0 | 210.1 | 1063.3 | 19.8 | 62.2 |
| MC-N-02-04 | 00-15005 | MC-L-02-05 | 62.07 | Irregular Channel | 1.27 | 209.3 | 208.5 | 213.5 | 215.8 | 210.4 | 210.2 | 211.1 | 210.9 | 997.9 | 19.4 | 50.0 |
| MC-N-02-05 | MC-N-02-04 | MC-L-02-06 | 205.44 | Irregular Channel | 0.3456 | 210.0 | 209.3 | 214.1 | 213.5 | 211.6 | 210.4 | 212.5 | 211.1 | 2.6 | 19.5 | 50.0 |
| MC-N-11-01 | MC-N-01-08 | MC-L-11-01 | 124.03 | Irregular Channel | 0.7 | 213.3 | 212.4 | 215.4 | 213.6 | 213.6 | 213.6 | 213.7 | 213.6 | 11.6 | 2.7 | 26.6 |
| MC-N-11-02 | MC-N-11-01 | MC-L-11-02 | 1020.21 | Irregular Channel | 0.97137 | 223.2 | 213.3 | 225.4 | 215.4 | 223.3 | 213.6 | 223.6 | 213.7 | 312.2 | 2.7 | 26.6 |
| MC-N-21-01 | MC-N-01-11 | MC-L-21-01 | 476.56 | Irregular Channel | 0.51 | 216.9 | 214.4 | 221.7 | 219.3 | 218.4 | 215.4 | 219.2 | 215.7 | 233.8 | 14.3 | 39.6 |
| MC-N-21-02 | MC-N-21-01 | MC-L-21-02 | 455.67 | Irregular Channel | 0.22824 | 217.9 | 216.9 | 219.8 | 221.7 | 218.5 | 218.4 | 219.2 | 219.2 | 72.8 | 15.3 | 42.0 |
| Swale 1 | 01-00210 | Swale 1-A-2 | 477.5 | Irregular Channel | 0.53 | 236.0 | 233.5 | 239.0 | 238.1 | 236.0 | 234.7 | 236.0 | 234.9 | 52.7 | 0.0 | 0.0 |
| Swale 1A Control | 01-00370 | 01-00320 | 37.28 | 12" DIA | 0.3 | 232.1 | 232.0 | 235.5 | 234.5 | 232.6 | 232.2 | 232.8 | 232.3 | 1.9 | 1.6 | 2.3 |

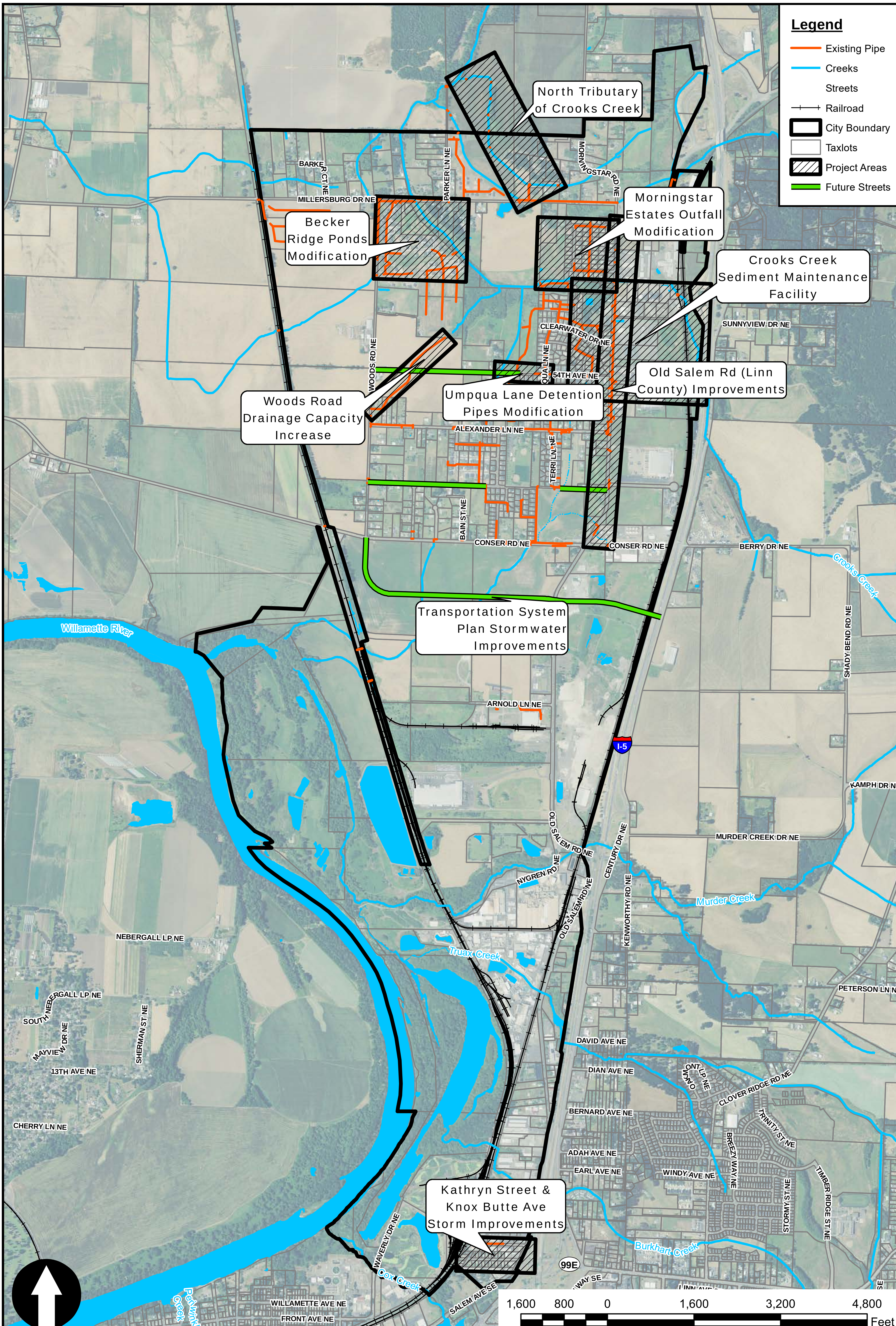
City of Millersburg
Stormwater Master Plan

# APPENDIX C

## CIP FACT SHEETS AND COST ESTIMATES

# Appendix C
# CIP Conceptual Plans and Cost Estimates

- CIP Conceptual Plan Sheets
  - North Tributary of Crooks Creek Improvements
    - Alternative 1
    - Alternative 2
  - Hoffman Estates Capacity Increase
  - Becker Ridge Detention Ponds Modification
  - Morningstar Estates Outfall Modification
  - Umpqua Lane Detention Pipes Modification
  - Woods Road Drainage Capacity Increase
  - Transportation System Plan Stormwater Improvements
  - Kathryn St & Knox Butte Ave Storm Improvements
  - Old Salem Rd (Linn County) Improvements
- CIP Cost Summary
- CIP Detailed Cost Estimates
  - North Tributary of Crooks Creek Improvements
    - Alternative 1
    - Alternative 2
  - Hoffman Estates Capacity Increase
  - Becker Ridge Detention Ponds Modification
  - Morningstar Estates Outfall Modification
  - Umpqua Lane Detention Pipes Modification
  - Woods Road Drainage Capacity Increase
  - Transportation System Plan Stormwater Improvements
  - Kathryn St & Knox Butte Ave Storm Improvements
  - Old Salem Rd (Linn County) Improvements

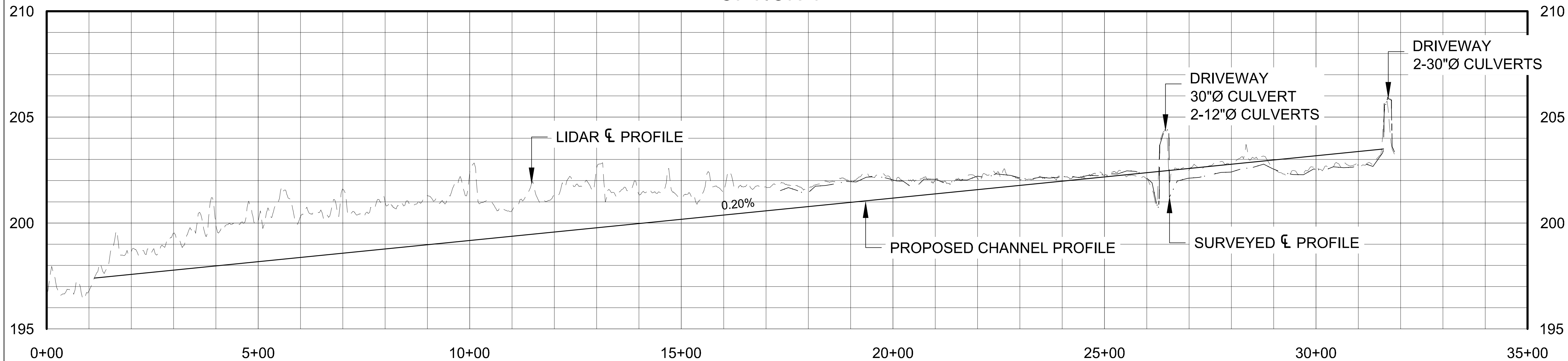



**PROPOSED PROJECTS**

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

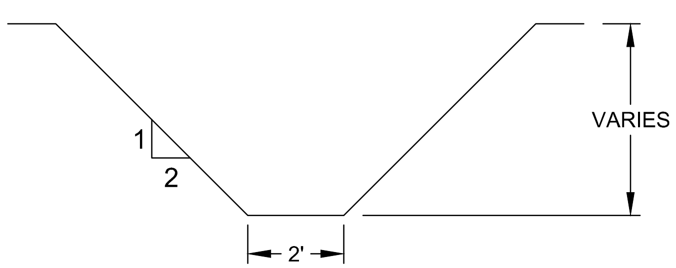
# NORTH TRIBUTARY OF CROOKS CREEK
## OPTION 1




## PROFILE VIEW

HORIZONTAL SCALE: 1" = 250'
VERTICAL SCALE: 1" = 5'

| IMPACT | |
|---|---|
| ITEM | QUANTITY |
| CUT | 953 CY |
| FILL | 59 CY |
| AREA | 0.72 AC |




## TYPICAL CHANNEL SECTION

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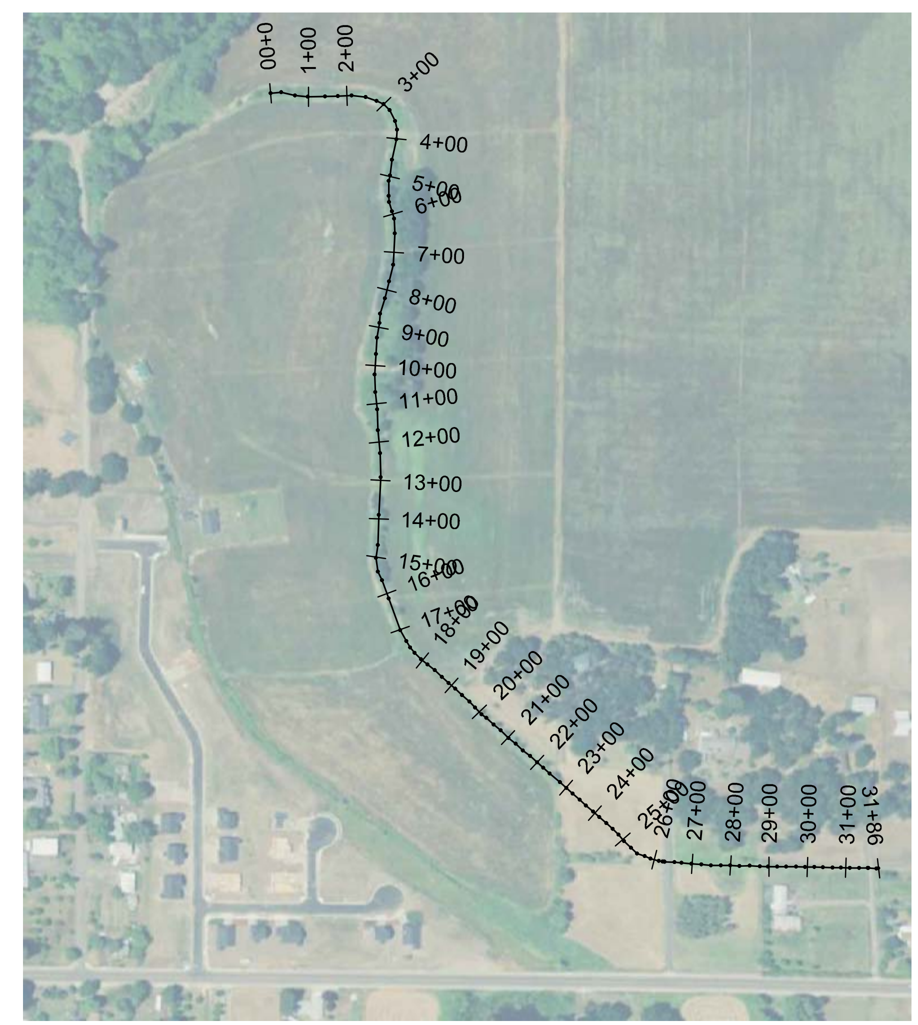



## PLAN VIEW

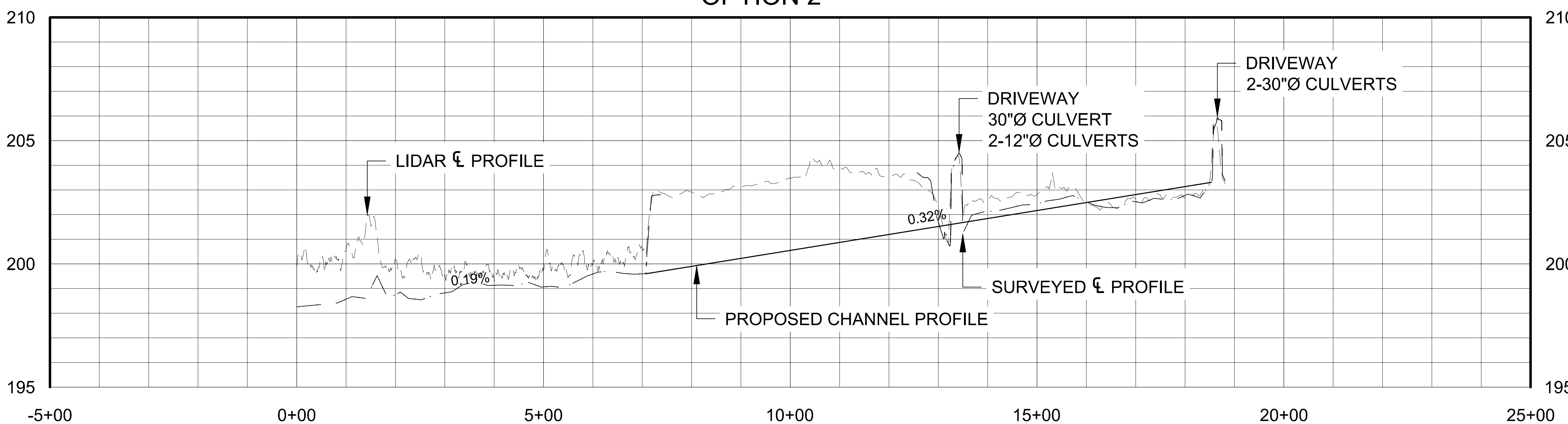
SCALE: 1" = 500'

NORTH TRIBUTARY OF CROOKS CREEK - CIP OPTION 1
CITY OF MILLERSBURG STORMWATER MASTER PLAN

City of Millersburg, Oregon

CARDNO #: 21713530
DATE: 08/28/2018
BY: DEC
CIP: A

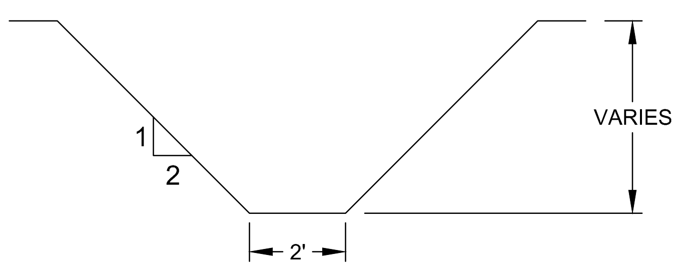
# NORTH TRIBUTARY OF CROOKS CREEK
# OPTION 2




## PROFILE VIEW

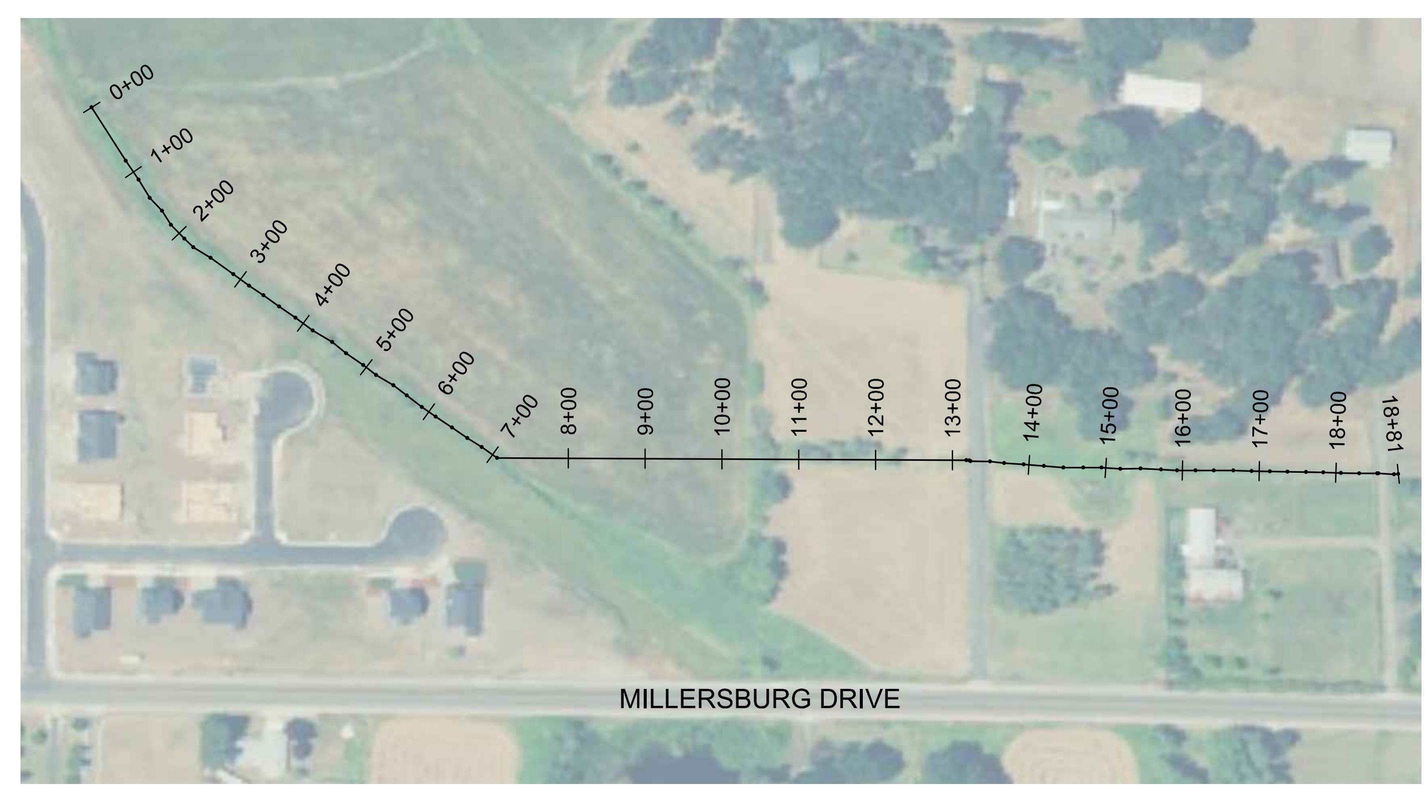
HORIZONTAL SCALE: 1" = 250'
VERTICAL SCALE: 1" = 5'

| IMPACT | |
|---|---|
| ITEM | QUANTITY |
| CUT | 953 CY |
| FILL | 59 CY |
| AREA | 0.72 AC |




## TYPICAL CHANNEL SECTION

SCALE: NTS



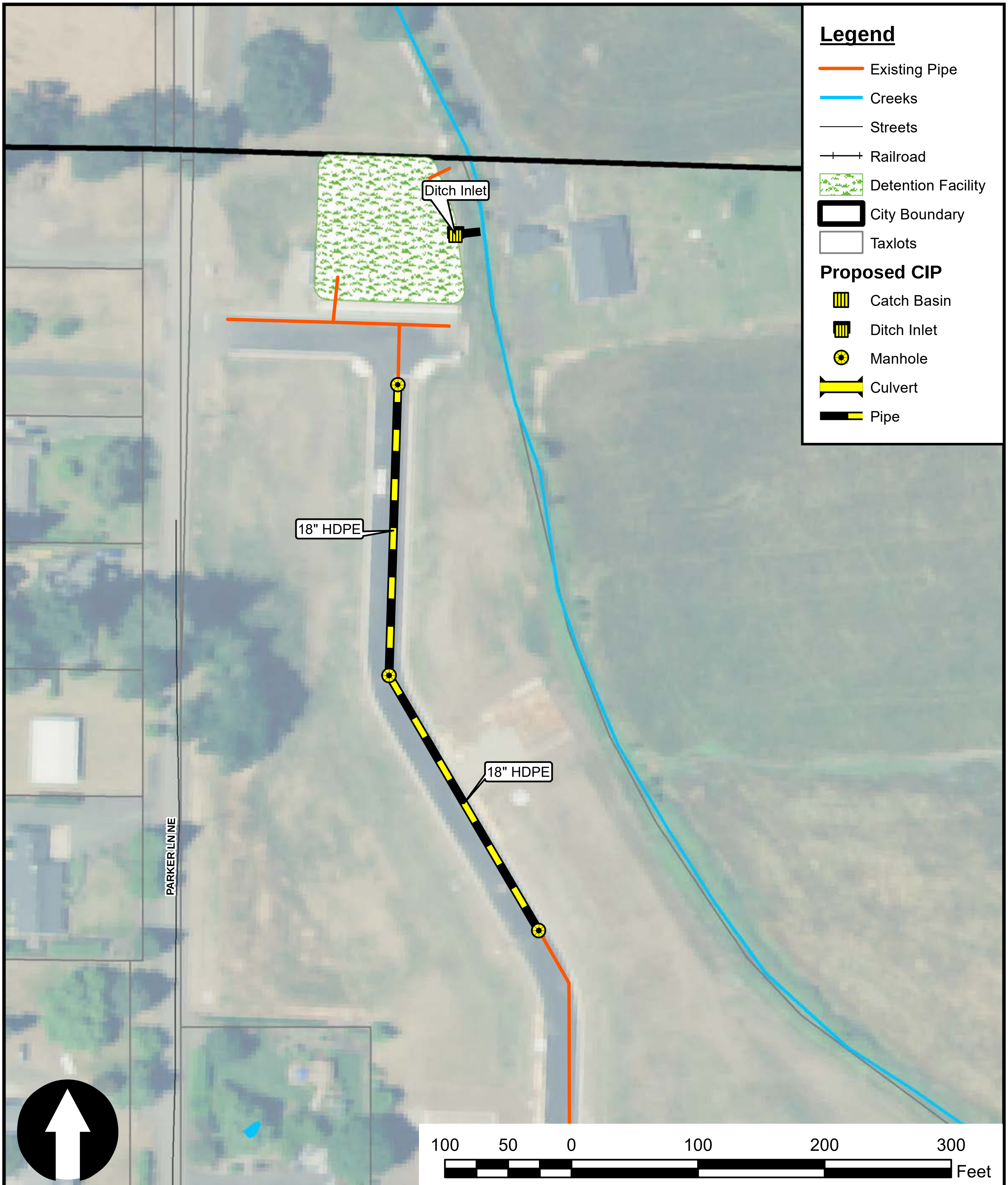

## PLAN VIEW

SCALE: 1" = 250'

NORTH TRIBUTARY OF CROOKS CREEK - CIP OPTION 2
CITY OF MILLERSBURG STORMWATER MASTER PLAN

City of Millersburg, Oregon

CARDNO #: 21713530
DATE: 08/28/2018
BY: DEC
CIP: A




Cardno

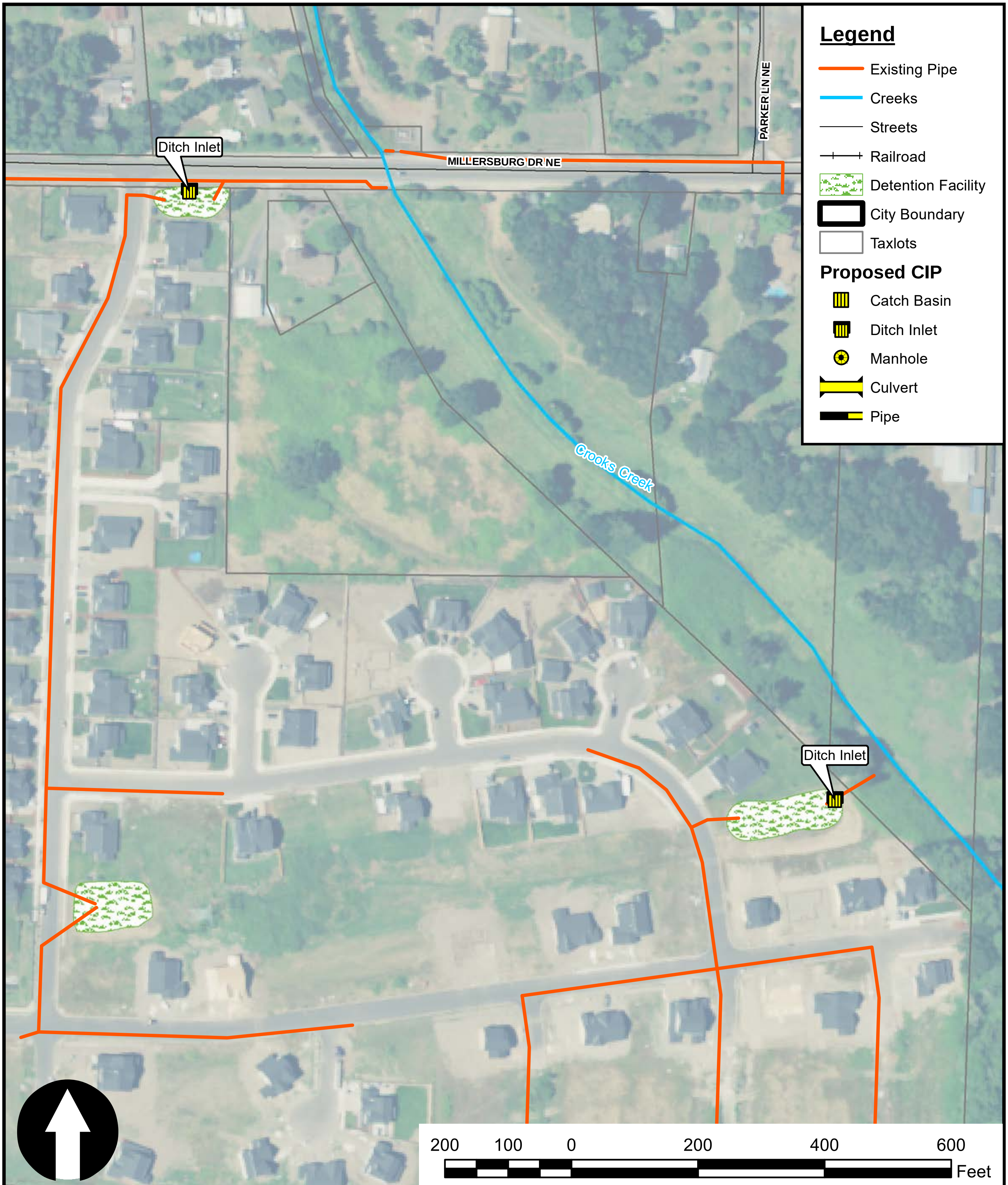
# HOFFMAN ESTATES STORMWATER CAPACITY INCREASE

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

City of Millersburg

A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




Cardno

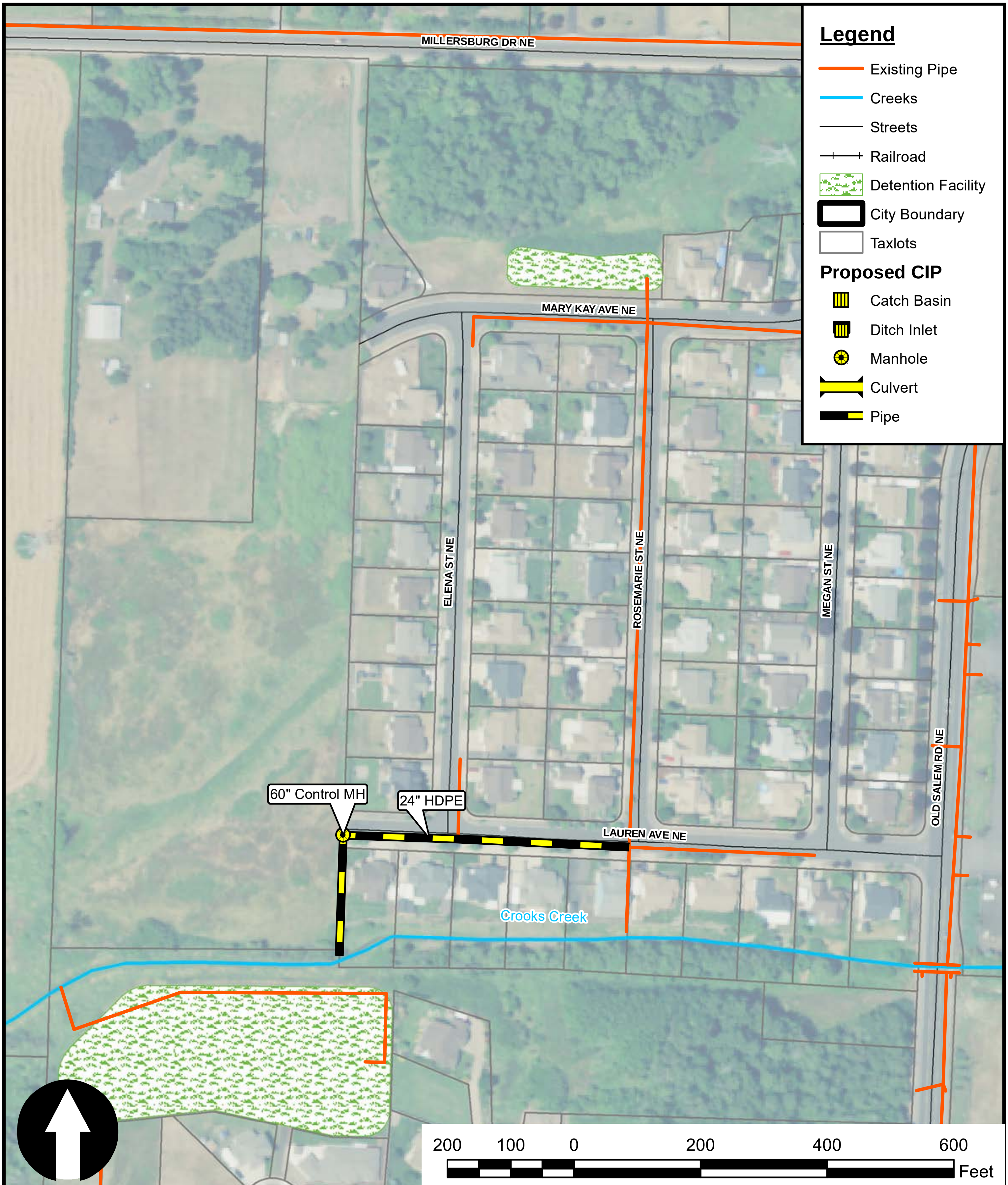
## BECKER RIDGE PONDS MODIFICATION

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

City of Millersburg

A COMMUNITY LINKING AGRICULTURE AND INDUSTRY

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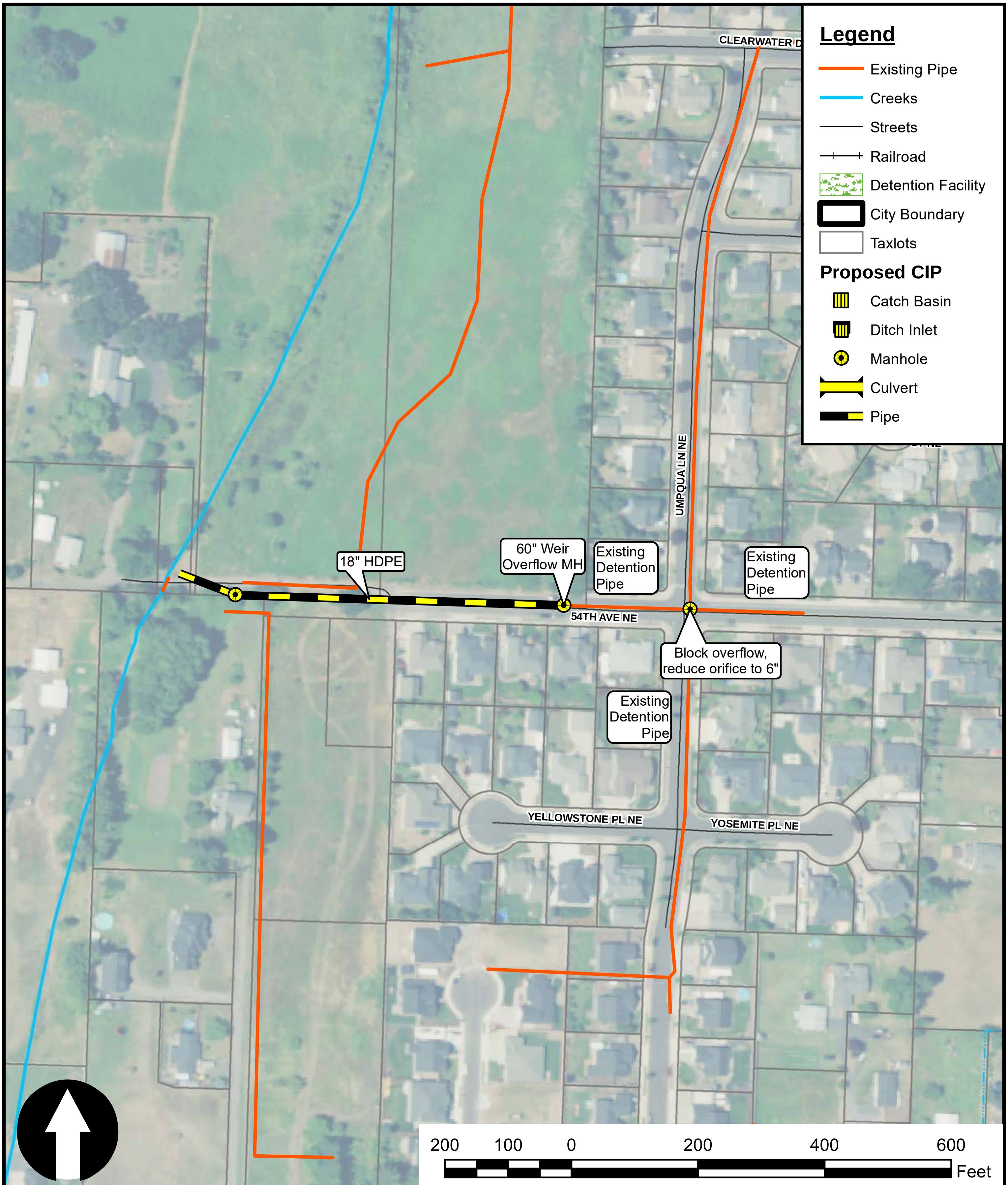
**MORNINGSTAR ESTATES**
**OUTFALL MODIFICATION**

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

City of Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY



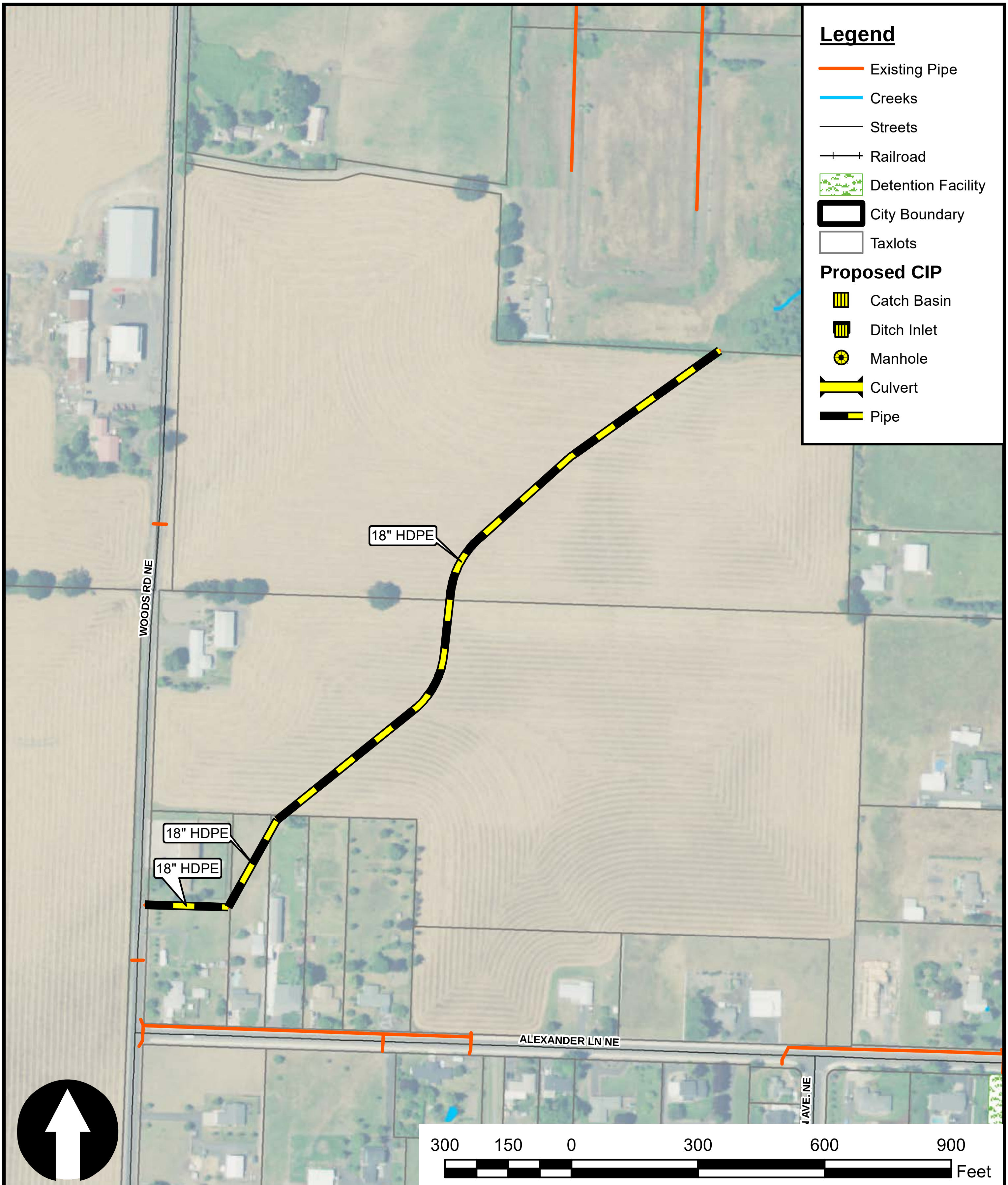

# UMPQUA LANE DETENTION PIPES MODIFICATION

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

Cardno

City of Millersburg — A Community Linking Agriculture and Industry

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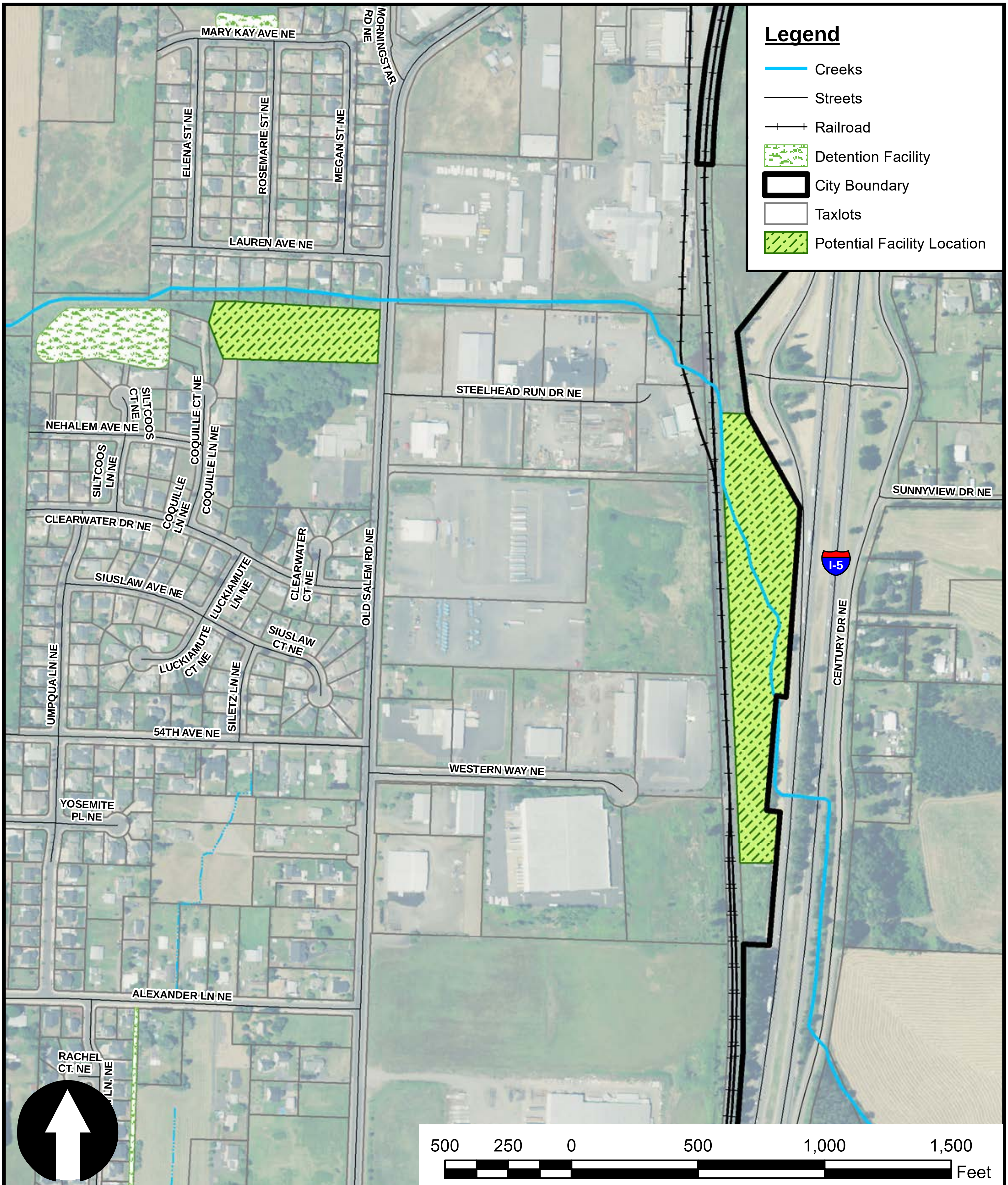
# WOODS ROAD DRAINAGE BUILD-OUT CONDITIONS CAPACITY INCREASE

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

City of Millersburg
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




# CROOKS CREEK SEDIMENT MAINTENANCE FACILITY

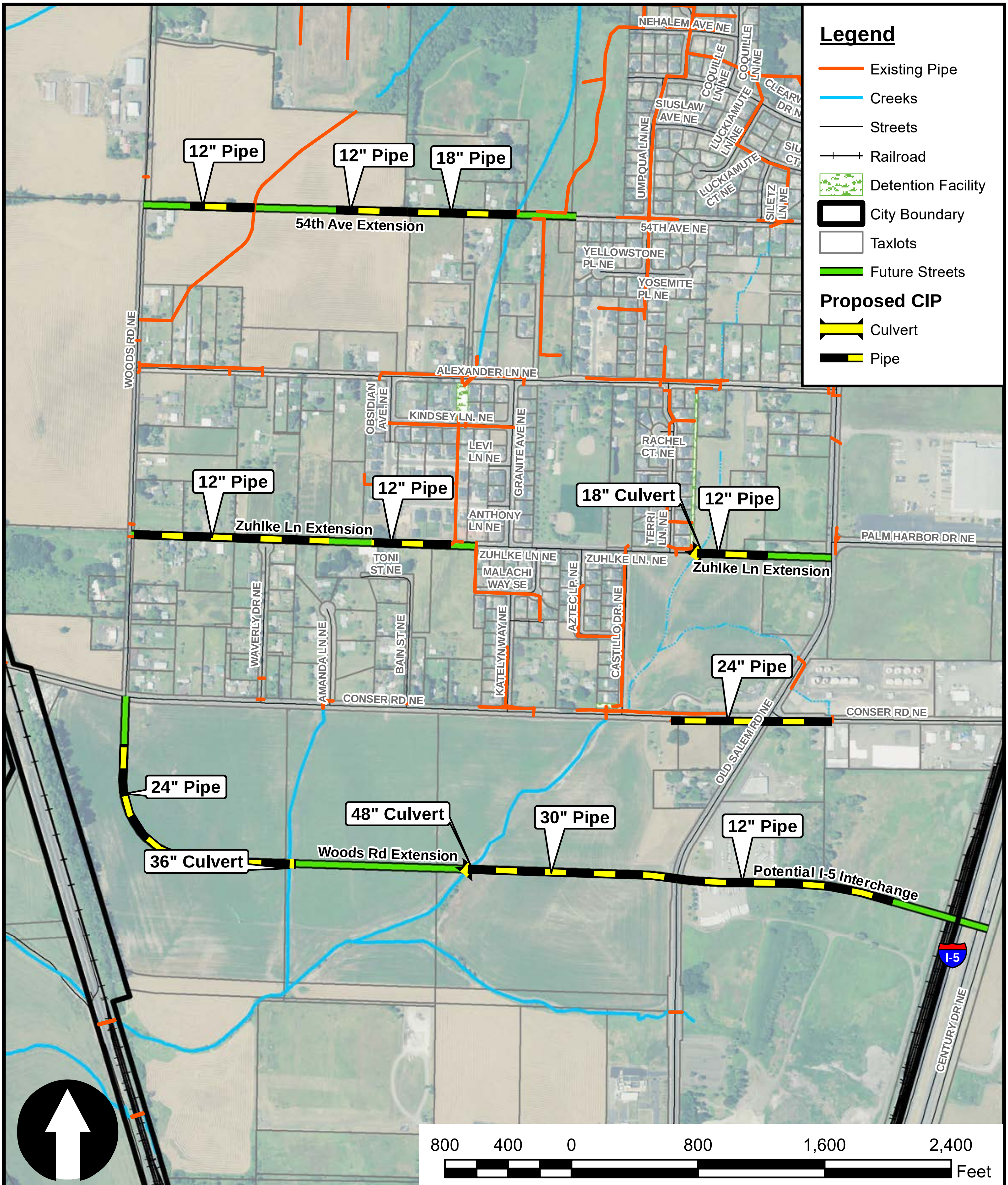
CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

Cardno

City of Millersburg

A COMMUNITY LINKING AGRICULTURE AND INDUSTRY



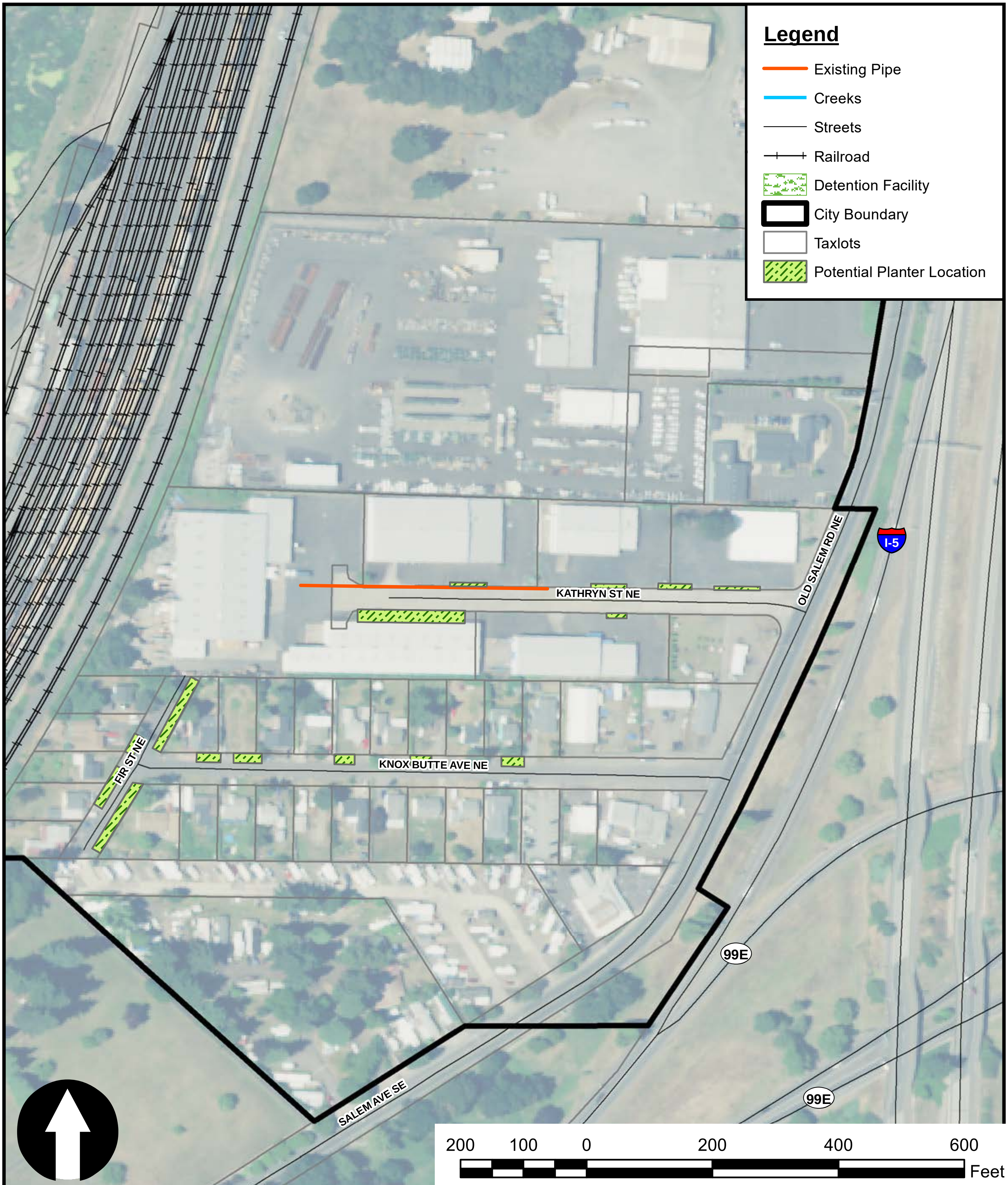

# TRANSPORTATION SYSTEM PLAN
# STORMWATER IMPROVEMENTS

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

CITY OF Millersburg

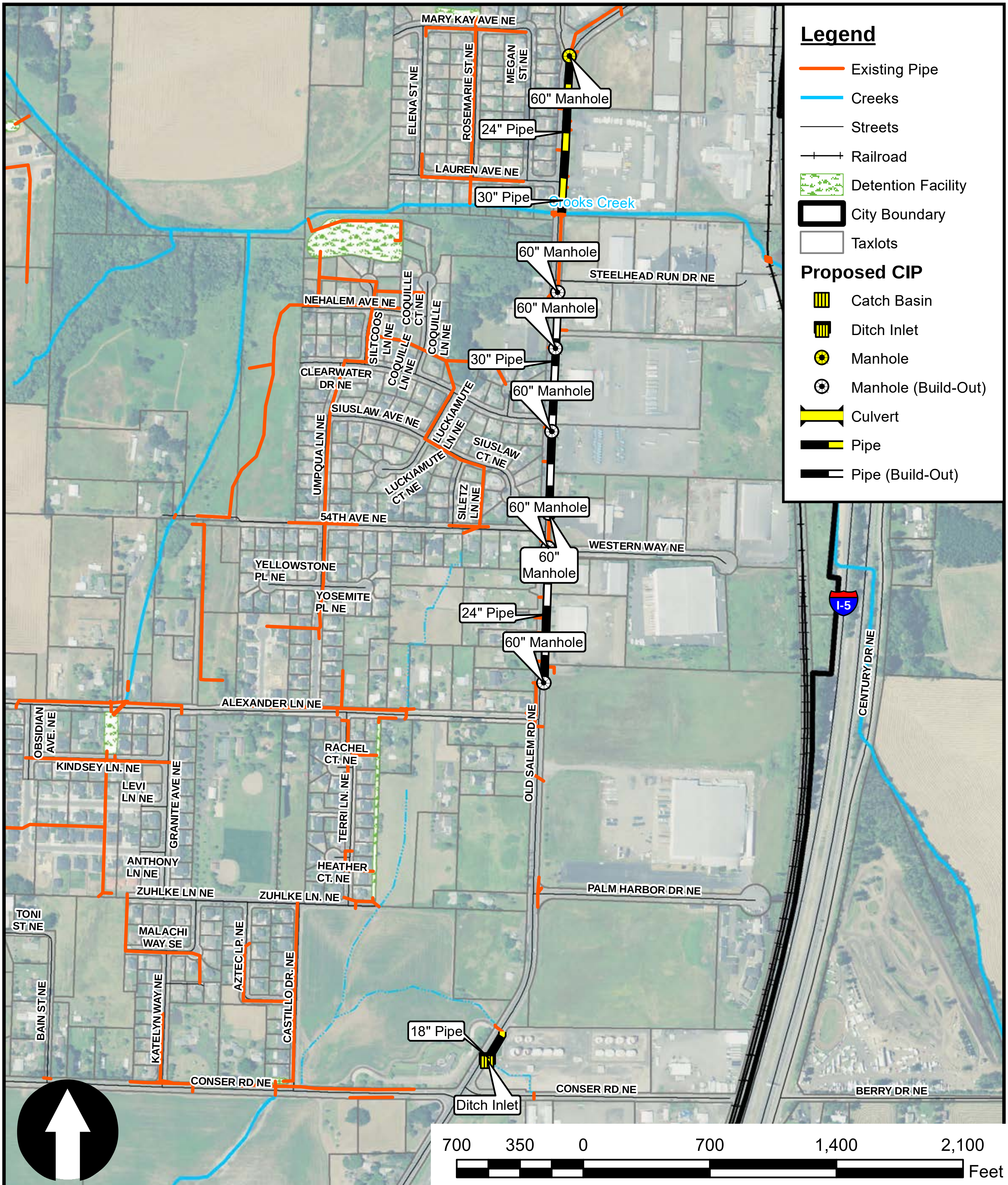
A COMMUNITY LINKING AGRICULTURE AND INDUSTRY




# KATHRYN ST & KNOX BUTTE AVE STORM IMRPROVEMENTS

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON




# OLD SALEM ROAD (LINN COUNTY) IMPROVEMENTS

CITY OF MILLERSBURG STORMWATER MASTER PLAN

MILLERSBURG, OREGON

# SUMMARY OF COST

***City of Millersburg, Oregon***

***Preliminary Estimate***

| *Prepared By:* | *Date:* |
|---|---|
| *DEC* | *14-Jan-19* |

| CAPITAL IMPROVEMENT PROJECTS | | | Cost |
|---|---|---|---|
| NORTH TRIBUTARY OF CROOKS CREEK IMPROVEMENTS | | | |
| Alternative 1 - Regrade Existing Creek System | | | $ 186,000 |
| Alternative 2 - Construct New Channel | | | $ 93,304 |
| | | | |
| HOFFMAN ESTATES CAPACITY INCREASE | | | |
| Replace pipe, install secondary overflow | | | $ 156,890 |
| | | | |
| BECKER RIDGE DETENTION PONDS MODIFICATION | | | |
| Install secondary overflows | | | $ 17,980 |
| | | | |
| MORNINGSTAR ESTATES OUTFALL MODIFICATION | | | |
| Replace outlet pipe and control structure | | | $ 203,725 |
| | | | |
| UMPQUA LANE DETENTION PIPES MODIFICATION | | | |
| Re-route overflow, reduce existing orifice | | | $ 109,910 |
| | | | |
| WOODS ROAD DRAINAGE CAPACITY INCREASE | | | |
| Upgrade existing pipe to accommodate build-out conditions | | | $ 559,004 |
| | | | |
| TRANSPORTATION SYSTEM PLAN STORMWATER IMPROVEMENTS | | | |
| Cost estimates for stormwater component of transportation system expansion | | | $ 2,082,500 |
| | | | |
| KATHRYN ST & KNOX BUTTE AVE STORM IMPROVEMENTS | | | |
| Construct street-side planters to manage Right-of-Way stormwater | | | $ 217,500 |
| | | | |
| OLD SALEM RD (LINN COUNTY) IMPROVEMENTS | | | |
| Upgrade exisitng pipe to accommodate existing conditions | | | $ 370,801 |
| Upgrade exisitng pipe to accommodate build-out conditions | | | $ 707,491 |

**General Notes and Assumptions:**

*All Bid items include labor, materials and equipment to complete Task.*

## *NORTH TRIBUTARY OF CROOKS CREEK IMPROVEMENT*

*ALTERNATIVE 1 - REGRADE EXISTING CHANNEL*

***City of Millersburg, Oregon***

Cardno

***Project Cost Estimate***

| *Prepared By:* | *Date:* |
|---|---|
| *DEC* | *14-Jan-19* |

| Item # | Description | Quantity Take-off | | Unit Price | | Estimated Cost |
|---|---|---|---|---|---|---|
| | Schedule A - Site Demolition & Erosion Control | | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ | 14,000 | 14,000 |
| A-2 | Clear and grub site limits. | 1 | LS | $ | 5,000 | 5,000 |
| A-3 | Install erosion and sediment control measures. | 1 | LS | $ | 4,000 | 4,000 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | | 23,000 |
| | | | | | | |
| | Schedule B - Channel Improvement | | | | | |
| B-1 | Excavation of channel: 2ft bottom with, 2:1 side slopes | 3,050 | LF | $ | 20 | 61,000 |
| B-2 | Wetland planting and Seeding | 680 | SY | $ | 20 | 13,600 |
| | Schedule B - Channel Improvement | | | | | 74,600 |
| | | | | | | |
| | Schedule C - Private Culvert Improvements | | | | | |
| C-1 | Replace 30-inch Culvert with HDPE pipe | 1 | LS | $ | 8,000 | 8,000 |
| C-2 | Remove culvert and dispose of offsite | 8 | EA | $ | 300 | 2,400 |
| C-3 | Install rocked creek crossing, 4" minus aggregate base | 6 | EA | $ | 2,000 | 12,000 |
| | Schedule C - Private Culvert Improvements | | | | | 22,400 |
| | | | | | | |
| | | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | | **$ 23,000** |
| | **Schedule B - Channel Improvement Subtotal** | | | | | **$ 74,600** |
| | **Schedule C - Private Culvert Improvements** | | | | | **$ 22,400** |
| | **25% Engineering & Administration** | | | | | **$ 30,000** |
| | **5% Permitting** | | | | | **$ 6,000** |
| | **25% Contingency** | | | | | **$ 30,000** |
| | CONSTRUCTION TOTAL | | | | | $ 186,000 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*

2)

3)

# NORTH TRIBUTARY OF CROOKS CREEK IMPROVEMENT

*ALTERNATIVE 2 - CONSTRUCT NEW CHANNEL*

***City of Millersburg, Oregon***

Cardno

***Project Cost Estimate***

| *Prepared By:* | | | | | *Date:* |
|---|---|---|---|---|---|
| *DEC* | | | | | *14-Jan-19* |
| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
| | Schedule A - Site Demolition & Erosion Control | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ 12,000 | 12,000 |
| A-2 | Clear and grub site limits. | 1 | LS | $ 6,000 | 6,000 |
| A-3 | Install erosion and sediment control measures. | 1 | LS | $ 4,000 | 4,000 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | 22,000 |
| | | | | | |
| | Schedule B - Channel Improvement | | | | |
| B-1 | Excavation of channel: 2ft bottom with, 2:1 side slopes | 1,150 | LF | $ 20 | 23,000 |
| B-2 | Grass seeding | 1,150 | LF | $ 2.5 | 2,875 |
| B-3 | Wetland planting | 122 | SY | $ 20 | 2,440 |
| | Schedule B - Channel Improvement | | | | 28,315 |
| | | | | | |
| | Schedule C - Private Culvert Improvements | | | | |
| C-1 | Replace 30-inch Culvert with HDPE pipe | 1 | LS | $ 8,000 | 8,000 |
| | Schedule C - Private Culvert Improvements | | | | 8,000 |
| | | | | | |
| | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | **$ 22,000** |
| | **Schedule B - Channel Improvement Subtotal** | | | | **$ 28,315** |
| | **Schedule C - Private Culvert Improvements** | | | | **$ 8,000** |
| | **25% Engineering & Administration** | | | | **$ 14,579** |
| | **10% Permitting** | | | | **$ 5,832** |
| | **25% Contingency** | | | | **$ 14,579** |
| | CONSTRUCTION TOTAL | | | | $ 93,304 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*

2)

3)

## HOFFMAN ESTATES CAPACITY INCREASE

*REPLACE PIPE, INSTALL SECONDARY OVERFLOW*

***City of Millersburg, Oregon***

***Preliminary Estimate***

| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
|---|---|---|---|---|---|
| *Prepared By:* | | | | | *Date:* |
| *DEC* | | | | | *14-Jan-19* |
| | Schedule A - Site Demolition & Erosion Control | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ 12,000 | 12,000 |
| A-2 | Install erosion and sediment control measures. | 1 | LS | $ 4,000 | 4,000 |
| A-3 | Removal of existing storm piping, including disposal of material off site | 500 | LF | $ 80 | 40,000 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | 56,000 |
| | | | | | |
| | Schedule B - Storm Improvement | | | | |
| B-1 | Install 18" HDPE Storm Sewer piping including: trenching, backfill, paving | 500 | LF | $ 100 | 50,000 |
| B-2 | Install ODOT Ditch Inlet including: excavation, backfill | 1 | EA | $ 2,200 | 2,200 |
| | Schedule B - Storm Improvement | | | | 52,200 |
| | | | | | |
| | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | **$ 56,000** |
| | **Schedule B - Storm Improvement Subtotal** | | | | **$ 52,200** |
| | **20% Engineering & Administration** | | | | **$ 21,640** |
| | **25% Contingency** | | | | **$ 27,050** |
| | CONSTRUCTION TOTAL | | | | $ 156,890 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*

2)

3)

**BECKER RIDGE DETENTION PONDS MODIFICATION**

*INSTALL SECONDARY OVERFLOWS*

***City of Millersburg, Oregon***

***Preliminary Estimate***

| *Prepared By:* | | | | | *Date:* |
|---|---|---|---|---|---|
| *DEC* | | | | | *14-Jan-19* |
| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
| | Schedule A - Site Demolition & Erosion Control | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ 5,000 | 5,000 |
| A-2 | Install erosion and sediment control measures. | 1 | LS | $ 3,000 | 3,000 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | 8,000 |
| | | | | | |
| | Schedule B - Storm Improvement | | | | |
| B-1 | Install ODOT Ditch Inlet including: excavation, backfill | 2 | EA | $ 2,200 | 4,400 |
| | Schedule B - Storm Improvement | | | | 4,400 |
| | | | | | |
| | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | **$ 8,000** |
| | **Schedule B - Storm Improvement Subtotal** | | | | **$ 4,400** |
| | **20% Engineering & Administration** | | | | **$ 2,480** |
| | **25% Contingency** | | | | **$ 3,100** |
| | CONSTRUCTION TOTAL | | | | $ 17,980 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*
2)
3)

# MORNINGSTAR ESTATES OUTFALL MODIFICAITON

*REPLACE OUTLET PIPE AND CONTROL STRUCTURE*

***City of Millersburg, Oregon***

***Preliminary Estimate***

| *Prepared By:* | | | | | *Date:* |
|---|---|---|---|---|---|
| *DEC* | | | | | *14-Jan-19* |
| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
| | Schedule A - Site Demolition & Erosion Control | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ 7,000 | 7,000 |
| A-2 | Install erosion and sediment control measures. | 1 | LS | $ 4,000 | 4,000 |
| A-3 | Removal of existing storm piping, including disposal of material off site | 275 | LF | $ 80 | 22,000 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | 33,000 |
| | | | | | |
| | Schedule B - Storm Improvement | | | | |
| B-1 | Install 24" HDPE Storm Sewer piping including: trenching, backfill, paving | 650 | LF | $ 150 | 97,500 |
| B-2 | Install 60" Storm Sewer flow control manhole including: excavation, backfill | 1 | EA | $ 6,000 | 6,000 |
| B-3 | Modify existing 48" Storm Sewer manhole | 2 | EA | $ 2,000 | 4,000 |
| | Schedule B - Storm Improvement | | | | 107,500 |
| | | | | | |
| | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | **$ 33,000** |
| | **Schedule B - Storm Improvement Subtotal** | | | | **$ 107,500** |
| | **20% Engineering & Administration** | | | | **$ 28,100** |
| | **25% Contingency** | | | | **$ 35,125** |
| | CONSTRUCTION TOTAL | | | | $ 203,725 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*

2)

3)

## *UMPQUA LANE DETENTION PIPES MODIFICATION*

*RE-ROUTE OVERFLOW, RESIZE EXISTING 8" ORIFICE AND BLOCKING EXISING OVERFLOW*

***City of Millersburg, Oregon***

***Preliminary Estimate***

| *Prepared By:* | | | | | *Date:* |
|---|---|---|---|---|---|
| *DEC* | | | | | *14-Jan-19* |
| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
| | Schedule A - Site Demolition & Erosion Control | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ 12,000 | 12,000 |
| A-2 | Install erosion and sediment control measures. | 1 | LS | $ 4,000 | 4,000 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | 16,000 |
| | | | | | |
| | Schedule B - Storm Improvement | | | | |
| B-1 | Install 18" HDPE Storm Sewer piping including: trenching, backfill, paving | 420 | LF | $ 100 | 42,000 |
| B-2 | Modify existing 60" Storm Sewer flow control manhole | 1 | EA | $ 2,000 | 2,000 |
| B-3 | Install concrete weir in existing 60" Storm Sewer Manhole | 1 | EA | $ 2,000 | 2,000 |
| | Schedule B - Storm Improvement | | | | 46,000 |
| | | | | | |
| | Scheule C - Water Line Adjustment | | | | |
| C-1 | Adjust existing 10" DIP water line under storm line | 1 | LS | $ 12,000 | 12,000 |
| C-2 | CLSM backfill around sanitary line | 6 | CY | $ 300 | 1,800 |
| | Scheule C - Water Line Adjustment | | | | 13,800 |
| | | | | | |
| | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | **$ 16,000** |
| | **Schedule B - Storm Improvement Subtotal** | | | | **$ 46,000** |
| | **Schedule C - Water Line Adjustment Subtotal** | | | | **$ 13,800** |
| | **20% Engineering & Administration** | | | | **$ 15,160** |
| | **25% Contingency** | | | | **$ 18,950** |
| | CONSTRUCTION TOTAL | | | | $ 109,910 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*

2)

3)

## *WOODS ROAD DRAINAGE CAPACITY INCREASE*

*UPGRADE EXISTING PIPE 12" PIPE TO ACCOMMODATE BUILD-OUT CONDITIONS*

***City of Millersburg, Oregon***

Cardno

***Preliminary Estimate***

| *Prepared By:* | | | | | *Date:* |
|---|---|---|---|---|---|
| *DEC* | | | | | *14-Jan-19* |
| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
| | Schedule A - Site Demolition & Erosion Control | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ 12,000 | 12,000 |
| A-2 | Install erosion and sediment control measures. | 1 | LS | $ 4,000 | 4,000 |
| A-3 | Removal of existing storm piping, including disposal of material off site | 2,024 | LF | $ 80 | 161,920 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | 177,920 |
| | | | | | |
| | Schedule B - Storm Improvement | | | | |
| B-1 | Install 18" HDPE Storm Sewer piping including: trenching, backfill, paving | 2,024 | LF | $ 100 | 202,400 |
| B-2 | Modify existing 48" Storm Sewer manhole | 2 | EA | $ 2,000 | 4,000 |
| B-3 | Modify existing Ditch Inlet | 1 | EA | $ 1,200 | 1,200 |
| | Schedule B - Storm Improvement | | | | 207,600 |
| | | | | | |
| | | | | | |
| | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | **$ 177,920** |
| | **Schedule B - Storm Improvement Subtotal** | | | | **$ 207,600** |
| | **20% Engineering & Administration** | | | | **$ 77,104** |
| | **25% Contingency** | | | | **$ 96,380** |
| | CONSTRUCTION TOTAL | | | | $ 559,004 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*

2)

3)

# TRANSPORTATION SYSTEM PLAN STORMWATER IMPROVEMENTS

*COST ESTIMATES FOR STORMWATER COMPONENT OF TRANSPORTATION SYSTEM EXPANSION*

***City of Millersburg, Oregon***

***Preliminary Estimate***

| *Prepared By:* | *Date:* |
|---|---|
| *DEC* | *14-Jan-19* |

| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
|---|---|---|---|---|---|
| | Schedule A - Woods Road Extension | | | | |
| A-1 | Install 12" HDPW Storm Sewer piping including: trenching, backfill, paving | 1800 | LF | $ 170 | 306,000 |
| A-2 | Install 24" HDPW Storm Sewer piping including: trenching, backfill, paving | 1700 | LF | $ 200 | 340,000 |
| A-3 | Install 30" HDPW Storm Sewer piping including: trenching, backfill, paving | 1400 | LF | $ 320 | 448,000 |
| A-4 | Install 36" HDPW Storm Sewer piping including: trenching, backfill, paving | 80 | LF | $ 350 | 28,000 |
| A-5 | Install 48" HDPW Storm Sewer piping including: trenching, backfill, paving | 80 | LF | $ 500 | 40,000 |
| | Schedule A - Woods Road Extension | | | | 1,162,000 |
| | | | | | |
| | Schedule B - Zuhlke Lane Extension | | | | |
| B-2 | Install 12" HDPW Storm Sewer piping including: trenching, backfill, paving | 2,410 | LF | $ 170 | 409,700 |
| B-3 | Install 18" HDPW Storm Sewer piping including: trenching, backfill, paving | 60 | LF | $ 180 | 10,800 |
| | Schedule B - Zuhlke Lane Extension | | | | 420,500 |
| | | | | | |
| | Schedule C - 54th Avenue Extension | | | | |
| C-1 | Install 12" HDPW Storm Sewer piping including: trenching, backfill, paving | 1,000 | LF | $ 170 | 170,000 |
| C-2 | Install 18" HDPW Storm Sewer piping including: trenching, backfill, paving | 700 | LF | $ 180 | 126,000 |
| | Schedule C - 54th Avenue Extension | | | | 296,000 |
| | | | | | |
| | Schedule D - Conser Road Improvements | | | | |
| D-1 | Install 24" HDPW Storm Sewer piping including: trenching, backfill, paving | 1,020 | LF | $ 200 | 204,000 |
| | Schedule D - Conser Road Improvements | | | | 204,000 |
| | | | | | |
| | | | | | |
| | **Schedule A - Woods Road Extension Subtotal** | | | | **$ 1,162,000** |
| | **Schedule B - Zuhlke Lane Extension Subtotal** | | | | **$ 420,500** |
| | **Schedule C - 54th Avenue Extension Subtotal** | | | | **$ 296,000** |
| | **Schedule D - Conser Road Improvements Subtotal** | | | | **$ 204,000** |
| | CONSTRUCTION TOTAL | | | | $ 2,082,500 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*
2) *All Bid items include 20% engineering & administration cost, and 25% contingency cost*
3) *All Bid items assume manholes every 400' with curb inlets*

***KATHRYN STREET & KNOX BUTTE AVENUE STORM IMPROVEMENTS***

*CONSTRUCT STREET-SIDE PLANTERS TO MANAGE R.O.W. STORMWATER*

***City of Millersburg, Oregon***

***Preliminary Estimate***

| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
|---|---|---|---|---|---|
| *Prepared By:* | | | | | *Date:* |
| *DEC* | | | | | *14-Jan-19* |
| | Schedule A - Storm Improvements | | | | |
| A-1 | Kathryn Street Stormwater Planters | 2000 | SF | $ 25 | 50,000 |
| A-2 | Knox Butte Avenue Stormwater Planters | 4000 | SF | $ 25 | 100,000 |
| | Schedule A - Storm Improvements | | | | 150,000 |
| | | | | | |
| | | | | | |
| | | | | | |
| | **Schedule A - Storm Improvements** | | | | **$ 150,000** |
| | **20% Engineering & Administration** | | | | **$ 30,000** |
| | **25% Contingency** | | | | **$ 37,500** |
| | CONSTRUCTION TOTAL | | | | $ 217,500 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*
2)
3)

# OLD SALEM ROAD (LINN COUNTY) IMPROVEMENTS (EXISTING CONDITION)

*UPGRADE EXISTING STORMWATER PIPES TO ACCOMMODATE EXISTING CONDITIONS*

***City of Millersburg, Oregon***

***Preliminary Estimate***

| *Prepared By:* | | | | | *Date:* |
|---|---|---|---|---|---|
| *DEC* | | | | | *14-Jan-19* |
| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
| | Schedule A - Site Demolition & Erosion Control | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ 7,000 | 7,000 |
| A-2 | Install erosion and sediment control measures. | 1 | LS | $ 4,000 | 4,000 |
| A-3 | Removal of existing storm piping, including disposal of material off site | 955 | LF | $ 80 | 76,400 |
| A-4 | Removal of existing storm manhole, including disposal of material off site | 1 | EA | $ 2,500 | 2,500 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | 89,900 |
| | | | | | |
| | Schedule B - Existing Capacity Storm Improvements | | | | |
| B-1 | Install 18" HDPE Storm Sewer piping including: trenching, backfill, paving | 185 | LF | $ 100 | 18,500 |
| B-2 | Install 24" HDPE Storm Sewer piping including: trenching, backfill, paving | 455 | LF | $ 150 | 68,250 |
| B-3 | Install 30" HDPE Storm Sewer piping including: trenching, backfill, paving | 315 | LF | $ 225 | 70,875 |
| B-4 | Install 60" Storm Sewer manhole including: excavation, backfill | 1 | EA | $ 6,000 | 6,000 |
| B-5 | Install ODOT Ditch Inlet including: excavation, backfill | 1 | EA | $ 2,200 | 2,200 |
| | Schedule B - Existing Capacity Storm Improvements | | | | 165,825 |
| | | | | | |
| | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | **$ 89,900** |
| | **Schedule B - Storm Improvement Subtotal** | | | | **$ 165,825** |
| | **20% Engineering & Administration** | | | | **$ 51,145** |
| | **25% Contingency** | | | | **$ 63,931** |
| | CONSTRUCTION TOTAL | | | | $ 370,801 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*

2)

3)

# OLD SALEM ROAD (LINN COUNTY) IMPROVEMENTS (BUILD-OUT CONDITION)

*UPGRADE EXISTING STORMWATER PIPES TO ACCOMMODATE BUILD-OUT CONDITIONS*

***City of Millersburg, Oregon***

***Preliminary Estimate***

| *Prepared By:* | | | | | *Date:* |
|---|---|---|---|---|---|
| *DEC* | | | | | *14-Jan-19* |
| Item # | Description | Quantity Take-off | | Unit Price | Estimated Cost |
| | Schedule A - Site Demolition & Erosion Control | | | | |
| A-1 | Mobilization & General Conditions | 1 | LS | $ 7,000 | 7,000 |
| A-2 | Install erosion and sediment control measures. | 1 | LS | $ 4,000 | 4,000 |
| A-3 | Removal of existing storm piping, including disposal of material off site | 1560 | LF | $ 80 | 124,800 |
| A-4 | Removal of existing storm manhole, including disposal of material off site | 6 | EA | $ 2,500 | 15,000 |
| | Schedule A - Site Demolition & Erosion Control Subtotal | | | | 150,800 |
| | | | | | |
| | Schedule B - Storm Improvements | | | | |
| B-2 | Install 24" HDPE Storm Sewer piping including: trenching, backfill, paving | 665 | LF | $ 150 | 99,750 |
| B-3 | Install 30" HDPE Storm Sewer piping including: trenching, backfill, paving | 895 | LF | $ 225 | 201,375 |
| B-4 | Install 60" Storm Sewer manhole including: excavation, backfill | 6 | EA | $ 6,000 | 36,000 |
| | Schedule B -Storm Improvements | | | | 337,125 |
| | | | | | |
| | | | | | |
| | **Schedule A - Site Demolition & Erosion Control Subtotal** | | | | **$ 150,800** |
| | **Schedule B - Storm Improvement Subtotal** | | | | **$ 337,125** |
| | **20% Engineering & Administration** | | | | **$ 97,585** |
| | **25% Contingency** | | | | **$ 121,981** |
| | CONSTRUCTION TOTAL | | | | $ 707,491 |

**General Notes and Assumptions:**

1) *All Bid items include labor, materials and equipment to complete Task.*
2)
3)

www.cardno.com

## RESOLUTION NO. 2019-144

## A RESOLUTION ADOPTING THE FINAL REPORT OF THE CITY OF MILLERSBURG STORMWATER MASTER PLAN DATED JANUARY 2019 AND INCORPORATING ITS ANALYSIS INTO FUTURE GROWTH AND PLANNING DECISIONS FOR THE CITY OF MILLERSBURG

**WHEREAS,** the City of Millersburg needs a clear understanding of existing stormwater infrastructure in order to provide an outline of stormwater projects to address both existing and future system capacity needs and to identify potential improvements to standards needed to protect and improve water quality; and,

**WHEREAS,** a Stormwater Master Plan includes the development of stormwater system mapping, modeling of the system to develop an understanding of the existing system and the potential impacts of future development, a list of Capital Improvement Projects (CIPs) to address existing problem areas, and a strategy for expanding the system to safely accommodate future development; and,

**WHEREAS,** in 2018 the Millersburg City Council authorized the hiring of Cardno, Inc. to prepare a Stormwater Master Plan for the City of Millersburg; and,

**WHEREAS,** Cardno, Inc. has delivered to the City of Millersburg the Final Report of the City of Millersburg Stormwater Master Plan dated January 2019 which is specific to the City of Millersburg's development of stormwater system mapping, modeling of the system to develop an understanding of the existing system and the potential impacts of future development, a list of Capital Improvement Projects (CIPs) to address existing problem areas, and a strategy for expanding the system to safely accommodate future development,

**WHEREAS,** the Final Report of the City of Millersburg Stormwater Master Plan dated January 2019 provides essential analysis into future growth and planning decisions of the City of Millersburg;

**NOW, THEREFORE, BE IT RESOLVED BY THE COUNCIL OF THE CITY OF MILLERSBURG AS FOLLOWS:** The City of Millersburg hereby adopts the City of Millersburg Final Report of the City of Millersburg Stormwater Master Plan prepared by Cardno, Inc. and dated January 2019;

**FURTHERMORE,** the City of Millersburg will use the Final Report of the City of Millersburg Stormwater Master Plan dated January 2019 in future growth and planning decisions for the City of Millersburg.

**Effective Date**. This Resolution shall be effective upon its approval and adoption.

**Duly passed** by the City Council this 22nd day of January, 2019.

________________________________

Jim Lepin, Mayor
City of Millersburg, Oregon

ATTEST:

________________________________

Kimberly Wollenburg
City Recorder