

PREPARED FOR:

IVINS CITY UTAH

PREPARED BY:

BOWEN COLLINS & ASSOCIATES

IVINS CITY STORM DRAIN MASTER PLAN

FEBRUARY 2024

DRAFT

IVINS CITY STORM DRAIN MASTER PLAN

FEBRUARY 2024

DRAFT

PREPARED FOR:

IVINS CITY UTAH

PREPARED BY:

BOWEN COLLINS & ASSOCIATES

TABLE OF CONTENTS

Page No.

Section 1 Introduction 1-1
1.1 Background 1-1
1.2 Scope of Services 1-1
1.3 Authorization 1-2
1.3.1 Project Staff 1-2
1.3.2 Ivins City Staff 1-2
1.3.3 Ivins City Council 1-2
Section 2 Existing Facilities 2-1
2.1 Introduction 2-1
2.2 Service Area and Existing Facilities 2-1
2.2.1 Storm Drainage Pipes 2-1
2.2.2 Flood Streets 2-1
2.2.3 Open Channels 2-2
2.2.4 Detention Basins 2-2
Section 3 Hydrologic Analysis 3-1
3.1 Subcatchment Delineation 3-1
3.2 Hydrologic Model Parameters 3-1
3.2.1 Hydrology Method 3-1
3.2.1.1 Subcatchment Width 3-1
3.2.1.2 Slope 3-2
3.2.2 Loss Method 3-2
3.2.3 Composite Curve Number 3-2
3.2.4 Directly-Connected Impervious Area 3-3
3.3 Design Storm Parameters 3-6
3.4 Hydrologic Modeling Assumptions 3-8
3.4.1 Existing Inlet Capacity Issues 3-8
3.5 Hydrologic Modeling Summary 3-8
Section 4 Hydraulic Modeling 4-1
4.1 Geometric Model Development 4-1
4.1.1 Modeled Conveyance 4-1
4.1.1.1 Condition of Existing Pipe 4-1
4.1.2 Detention Basins 4-2
Section 5 System Evaluation 5-1
5.1 Impervious Area Growth Projections 5-1
5.1.1 Population Growth 5-1
5.1.2 ERU Growth 5-1
5.2 Evaluation Criteria and Level of Service 5-1
5.2.1 Storm Drain Pipelines 5-2
5.2.2 Flood Streets 5-2
5.2.3 Open Channels 5-2
5.2.4 Culverts 5-2
5.2.5 Detention Basins 5-2
5.3 Existing Conveyance System Analysis 5-2
5.3.1 400 East/Flood Street Analysis 5-2
5.4 Future Conveyance System Analysis 5-3
Section 6 Recommended System improvements 6-1
6.1 Recommended Pipeline Improvements 6-1

6.2 Detention Basin Improvements 6-5
6.3 Culvert Improvements 6-5

LIST OF TABLES

No. Title Page No.
Table 2-1 Ivins Storm Drain Pipe Lengths 2-1
Table 3-1 SCS Curve Number 3-2
Table 3-2 Average Imperviousness Based on Land Use 3-3
Table 6-1 Storm Drain Trunkline Improvements 6-3

LIST OF FIGURES

No. Title Page No.
Figure 2-1: Existing Ivins City Storm Drain Infrastructure 2-3
Figure 3-1: Existing Land Use 3-4
Figure 3-2: Future Land Use 3-5
Figure 3-3: Hydrologic Model Design Storm Boundary 3-7
Figure 3-4: Hydrologic Modeling Results 3-9
Figure 4-1: Hydraulic Model 4-3
Figure 5-1: Existing Deficiencies 5-4
Figure 5-2: Hydrologic Design Flows 5-1
Figure 6-1: Recommended Projects 6-2

APPENDICES

Appendix A – Hydrologic Information
Appendix B – Cost Estimates

SECTION 1 INTRODUCTION

1.1 BACKGROUND

The City of Ivins (City) most recently updated their Storm Drain Master Plan in 2016. Since that time, multiple storm drain infrastructure projects and new residential and commercial developments have been built. The City retained Bowen Collins & Associates (BC&A) to prepare a new Storm Drain Master Plan that accounts for these recent changes. The primary purpose of this Storm Drain Master Plan is to provide recommended improvements to resolve existing deficiencies and plan for future growth in the City's storm drain system based on the adopted General Plan.

This document is a working document. Some of the recommended improvements identified in this report are based on the assumption that development and/or potential annexation will occur in a certain manner. If future growth or development patterns change significantly from those assumed and documented in this report, the recommendations may need to be revised. The status of development should be reviewed at least every five years. This report and the associated recommendations should also be updated every five years.

1.2 SCOPE OF SERVICES

The general scope of this project involved a thorough analysis of the City's storm drain system and its ability to meet the present and future storm drain needs of the City's residents. As part of this project, BC&A completed the following tasks:

Task A: Land Use/Population Analysis. Review land use and population projection data provided by Ivins City to update existing and future conditions in the City's InfoSWMM hydraulic model.

Task B: Hydrologic/Hydraulic Criteria. Review rainfall depths for the hydrologic model for storms with a 10% and 1% probability of occurring in any given year (10-yr and 100-yr Storm). The Farmer Fletcher Storm distribution was used for master planning purposes to simulate a cloudburst type storm. If needed, provide recommendations to update hydrologic/hydraulic criteria.

Task C: Existing Condition Analysis. Modify the existing Ivins City InfoSWMM model by incorporating new facilities that have been constructed since the preparation of the previous storm drain master plan. Update the City's InfoSWMM hydrologic computer model based on land use conditions, using City zoning and land use information, and modifying subcatchment boundaries and parameters as needed. Insert detention basins with the associated stage storage curves. Use this model to review existing deficiencies with City personnel and develop conceptual solutions.

Task D: Build-Out Condition Analysis. Modify Existing Conditions Hydraulic model (Task C) for future growth based on the City's zoning and land use information.

Task E: Capital Facilities Planning. Propose Capital Facilities improvements that resolve existing deficiencies and allow for planned future growth, including cost estimates and a phasing plan for implementing these improvements. Prepare a draft storm drain master plan. Incorporate comments and finalize master plan report.

Task F: Impact Fee Facilities Plan. Develop an Impact Fee Facility Plan (IFFP) based on the capital improvements identified as part of Task E for this report. Prepare a draft IFFP report to be reviewed with City personnel. Incorporate comments and finalize IFFP report.

Task G: Impact Fee Analysis. Prepare an Impact Fee Analysis (IFA) based on the IFFP projects identified in Task F. Prepare a draft IFA report to be reviewed with City personnel. Incorporate comments and finalize IFA report.

Task H: User Fee Analysis. Prepare a User Fee Analysis based on operation and maintenance information provided by the City and on the costs developed as part of the Capital Facilities Plan. Prepare a draft User Fee Analysis report to be reviewed with City personnel. Incorporate comments and finalize report.

This report is prepared as part of Task E.

1.3 AUTHORIZATION

Ivins City contracted the services of BC&A to prepare this Storm Drain Master Plan in August 2022.

1.3.1 PROJECT STAFF

The project work was performed by the BC&A team members listed below. Team members' roles on the project are also listed. The project was completed in BC&A's St. George, Utah office. Questions may be addressed to Todd Olsen, Project Manager at (435) 656-3299.

Todd Olsen	Principal-In-Charge/Project Manager
Cody Moultrie	Project Engineer
Mike Hilbert	Word Processing

1.3.2 IVINS CITY STAFF

City staff also worked closely with BC&A personnel in collecting data associated with this masterplan. The following City personnel were influential in the completion of this master plan.

Dale Coulam	City Manager
Cade Visser	Director of Finance
Chuck Gillette	Public Works Director/City Engineer
Tom Jorgensen	Assistant City Engineer
Shiloh Pentz	Assistant Public Works Director of Operations

1.3.3 IVINS CITY COUNCIL

The following elected officials participated in the review and approval of this masterplan:

Chris Hart	Mayor
Sharon Barton	Councilperson
Kevin Smith	Councilperson
Sharon Gillespie	Councilperson
Lance Anderson	Councilperson
Mike Scott	Councilperson

SECTION 2 EXISTING FACILITIES

2.1 INTRODUCTION

As part of this Master Plan, BC&A has assembled an inventory of existing storm drainage infrastructure within the City. The purpose of this chapter is to present a summary of the inventory of Ivins City's existing storm drain system that can be used as a reference for future studies.

2.2 SERVICE AREA AND EXISTING FACILITIES

The City of Ivins, which was first incorporated as a town in 1935, is located about 8 miles Northwest of St. George City in Washington County, Utah. The topography of the majority of the City slopes from North to South towards the Santa Clara River. There are three main washes, Coyote Wash, Kayenta Wash, and Tuacahn Wash, which convey stormwater through the City to the Santa Clara River. Figure 2-1 shows the approximate planning extent of Ivins along with the City's storm drain collection system components. For clarity, manholes and inlet boxes are not shown on this figure.

2.2.1 STORM DRAINAGE PIPES

There are just over 209,000 feet (39 miles) of storm drain pipe, over 300 manholes/cleanouts, and nearly 1,400 inlets in the Ivins City Storm Drain System that are cataloged in the GIS database. Table 2-1 contains a summary of the storm drain pipes for the Ivins City collection system.

Table 2-1
Ivins Storm Drain Pipe Lengths

Diameter (in)	Length (ft)	Length (mi)
12	69,127	13.1
15	8,873	1.7
18	40,748	7.7
24	49,652	9.5
30	16,258	3.1
36	8,987	1.7
42	3,765	0.7
48	4,882	0.9
60	4,345	0.8
72	2,622	0.5
Total	**209,604**	**39.7**

2.2.2 FLOOD STREETS

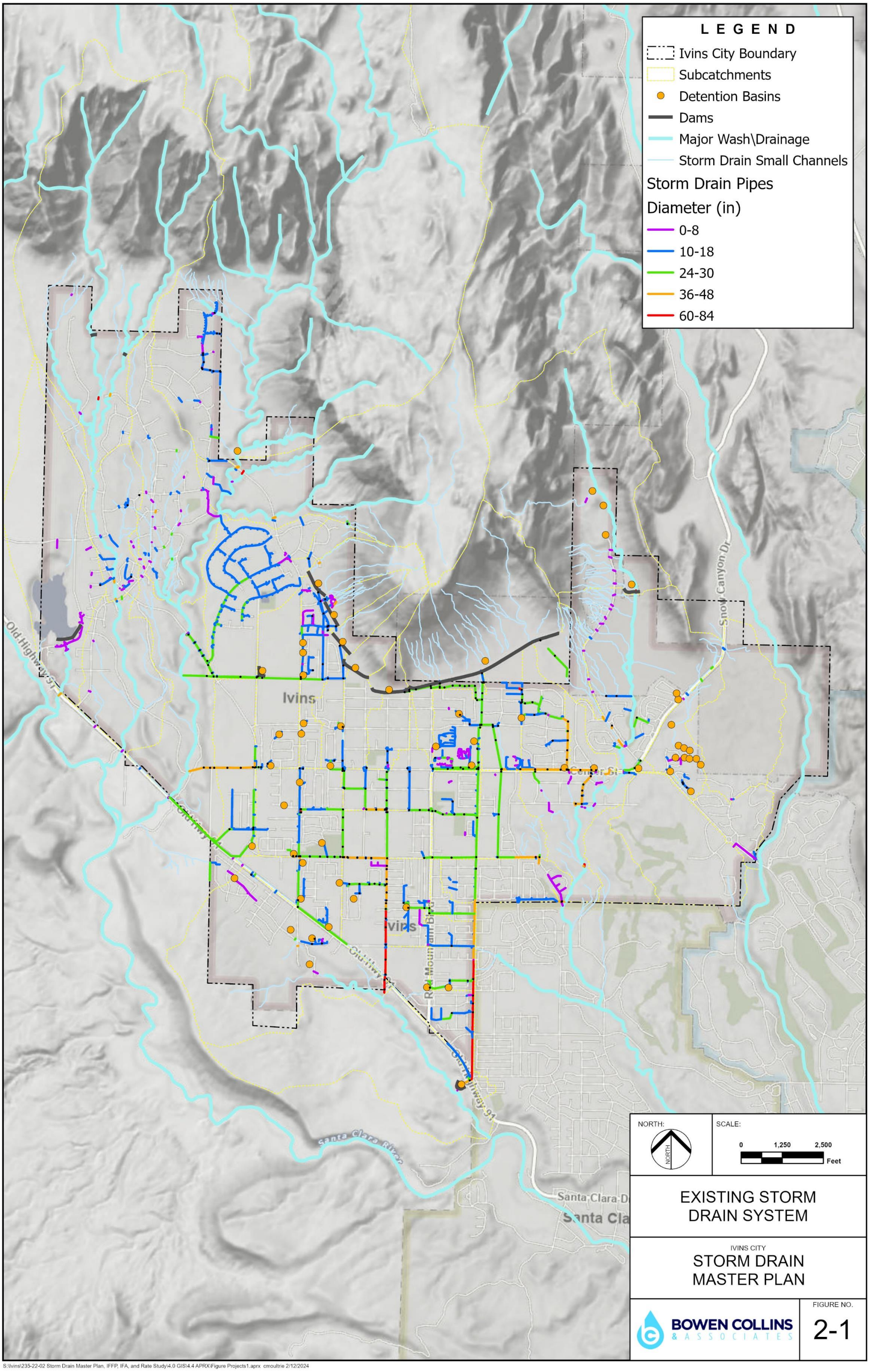
A 5,800 linear foot section of the 400 East roadway, between Center Street and 800 South, has been designated as a flood street in the storm drain system. The flood street consists of the v-shaped roadway that slopes to a waterway in the middle of the street. The waterway conveys flows to a series of inlets which collect stormwater into a network of small pipes. Flows exceeding the pipe capacity are conveyed in the roadway to the end of the street where a network of inlets allow flows to enter the trunkline system.

2.2.3 OPEN CHANNELS

There are over 54,000 feet (10 miles) of open channels which were modeled as part of the existing storm drain system. These open channels included natural and manmade/maintained channels. Open channels play a major role in conveying storm water from mountain watersheds to the Santa Clara River. They also act as an outlet for several storm drain pipes.

2.2.4 DETENTION BASINS

There are over 50 detention facilities in the existing storm drain system. The primary purpose of the detention facilities is to attenuate peak storm water discharges. Many of the detention facilities serve the dual purpose of a recreational park. The majority of these detention facilities are local detention basins and were not specifically modeled as part of this study. Figure 2-1 shows all of the detention facilities in the City's system. Figure 4-1 shows the detention basins modeled in the InfoSWMM model.



S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 2/12/2024

SECTION 3 HYDROLOGIC ANALYSIS

A hydrologic computer model was developed as part of the previous Master Plan in InfoSWMM, Suite 15.0, for the purpose of estimating storm water runoff volume and peak discharges generated by a design cloudburst event. The model was calibrated as part of the previous Master Plan by comparing the results of the model with the measured depths and flows of real rainfall events. It was found that the model correlated very well with the measured rainfall data. For this 2024 Master Plan update, these same hydrologic study area assumptions were maintained.

As part of this 2024 Master Plan update, facilities and parameters in the model were updated to reflect new storm drainage infrastructure and residential/commercial development that has been constructed in recent years. InfoSWMM uses an Environmental Protection Agency Storm Water Management Model (EPA-SWMM) engine to perform computations. As with EPA-SWMM, InfoSWMM has the capability to model the hydrologic and hydraulic components of storm water runoff and was used to model both in this study. This section summarizes the hydrologic parameters and methods used in the InfoSWMM model. See Section 4 for a description of the hydraulic modeling.

The model development process includes delineating drainage basins, estimating hydrologic parameters, developing a design storm and calibrating the model. Each one of these steps is described below. Results of the hydrologic analysis are provided in Appendix A.

3.1 SUBCATCHMENT DELINEATION

Subcatchments were delineated based on existing contours and feedback from Ivins City as part of the previous master plan. For this master plan update, a simplified 2-D Hydrologic Engineering Center River Analysis System (HEC-RAS) model was developed to model the flow of surface water during a rainfall event. The 2-D model highlighted how flow accumulates and flows through City, which helped to confirm the extents and interconnections of the delineated subcatchments. Approximately 63 subcatchments were included in the model and boundaries associated with the hydrologic model are shown in Figure A-1.

3.2 HYDROLOGIC MODEL PARAMETERS

The following hydrologic model parameters were used in the InfoSWMM computer model.

3.2.1 HYDROLOGY METHOD

In the InfoSWMM software there are multiple options for Hydrology Method. The EPA-SWMM non-linear reservoir method was used in this study and is the same method EPA SWMM uses. This method requires "subcatchment width" and slope as input parameters.

3.2.1.1 Subcatchment Width

The subcatchment width is the theoretical width of the overland flow and is conceptualized as the characteristic width of a subcatchment area divided by the average maximum overland flow length. For the purpose of this report the subcatchment width was estimated using the following empirical formula built-in to InfoSWMM to get reasonable unit discharges.

$$W = k * \text{Area}^{0.5}$$

Where:

W – Subcatchment Width

k – Coefficient (typically range between 0.1 - 0.5)

Area – Subcatchment Area (acres)

Generally speaking, smaller *k* values are associated with long narrow subcatchments and larger *k* values are associated with wider subcatchments, measured approximately perpendicular to the direction of flow. Calculating exact values of *k* is difficult. Instead, the *k* value is often selected to adjust the model runoff values to better match observed or measured runoff hydrographs.

Several values of *k* were used throughout the City. These values of k varied from 0.1 to 0.4, depending on the size and slope of the subcatchment, and were selected and adjusted as part of the calibration process of the previous master plan. Those same values apply in the updated InfoSWMM model as the size and shape of the subcatchments have not changed.

3.2.1.2 Slope

The average slope for each subcatchment was calculated using a Digital Elevation Model (DEM). Ivins City provided a 3-foot resolution DEM which extended to city limits. A 10-foot resolution DEM was used for areas outside of city limits. The Arc View GIS system was used to mosaic the two DEMs together. The average slope for each subcatchment was calculated using tools within InfoSWMM. Average slopes ranged throughout the city from 2.9% to 76%.

3.2.2 LOSS METHOD

The SCS Curve Number method was used in InfoSWMM to calculate infiltration losses (see Natural Resources Conservation Service (NRCS) TR-55 publication for additional information). This method requires the input of a composite Curve Number and the percent impervious for each subcatchment.

3.2.3 COMPOSITE CURVE NUMBER

Curve Numbers were estimated for each subcatchment based on soil type and vegetative ground cover. The hydrologic soil type was obtained from the NRCS Soil Survey Geographic (SSURGO) dataset. In order to be more consistent, the NRCS recently updated the raw data for Tobler Fine Sandy Loam (T_c) from being a hydrologic soil type B to a type A. Based on past experience in the area the soil class was left as B soil type to better simulate historic runoff. Future masterplans developed in Ivins City will need to continue to classify the T_c soil type as Class B soil to match this masterplan and historic runoff. Table 3-1 shows the Curve Numbers used in this study, based on soil type and assumed vegetative ground cover for developed areas. See Figure A-2 for the location of the various soil types. Ivins has experienced multiple extreme storms where the storm distribution contained multiple peaks in a short period. For this reason, multiple Antecedent Moisture Content (AMC) conditions were considered. See Figure A-3 for boundaries where different AMC values were used.

Table 3-1
SCS Curve Number

Soil Type	Curve Number (AMC II)*	Curve Number (AMC III)**
A	63	80
B	77	89
C	85	94
D	88	95

From Table 2-2 in TR-55 "Desert Shrub (Poor Hydrologic Condition)"

* United States Department of Agriculture. (1988). *Urban Hydrology for Small Watersheds: TR-55.* Washington, D.C.: USDA.

** AMC III curve number were used in the mountain area†

3.2.4 DIRECTLY-CONNECTED IMPERVIOUS AREA

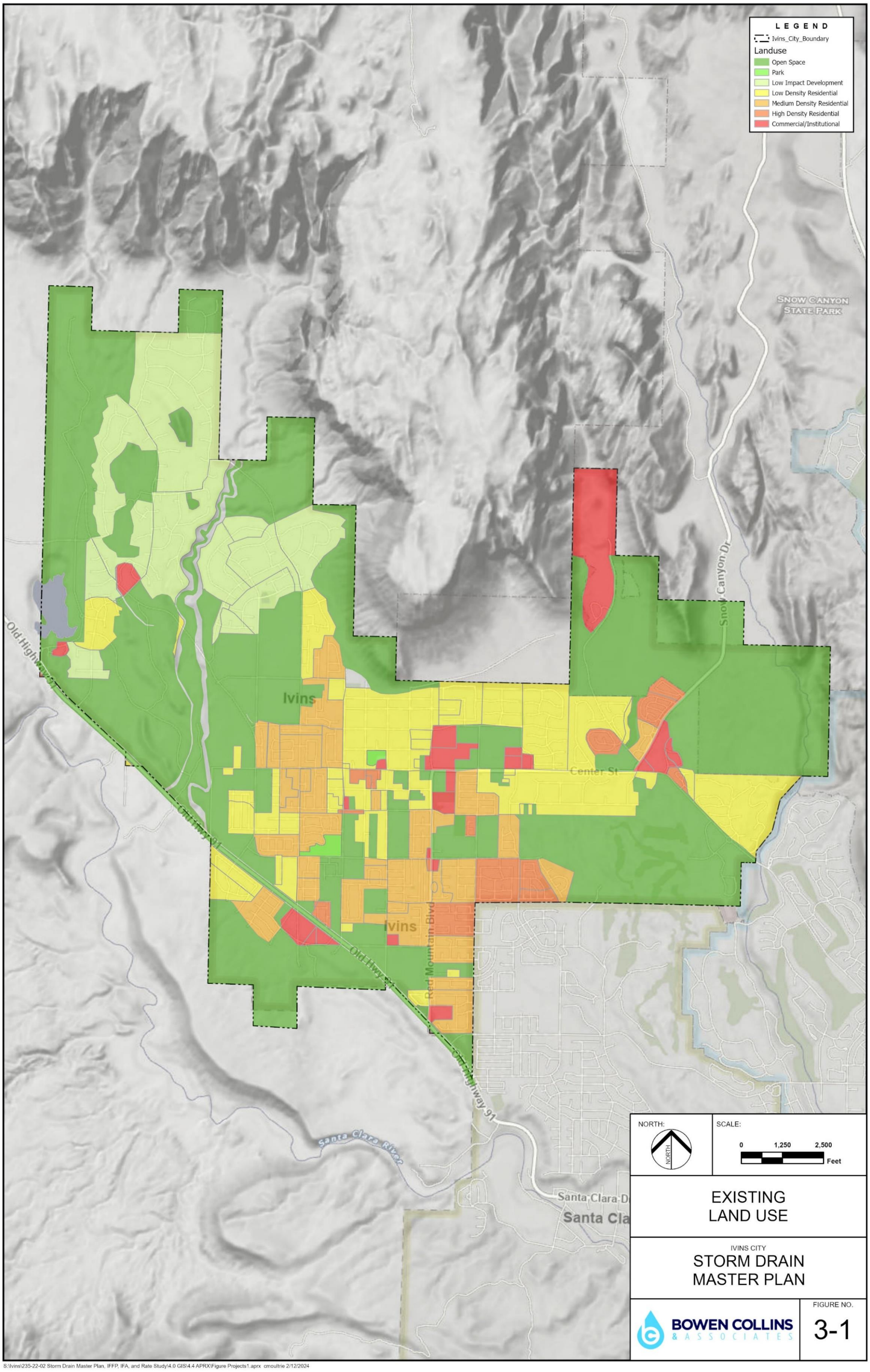
The amount of directly-connected impervious area for existing conditions was estimated using 2022 aerial imagery provided by Washington County. Impervious area parameters for subcatchments that saw significant development over the past several years were updated to reflect existing conditions. The amount of directly-connected impervious area was also estimated for full build-out conditions based on land use from the General Plan. Each Land Use type was analyzed and the estimated impervious area was recorded. For areas that are currently undeveloped, the General Plan was used in conjunction with Table 3-2 to estimate the impervious area. See Figures 3-1 and 3-2 for existing and buildout land use projections.

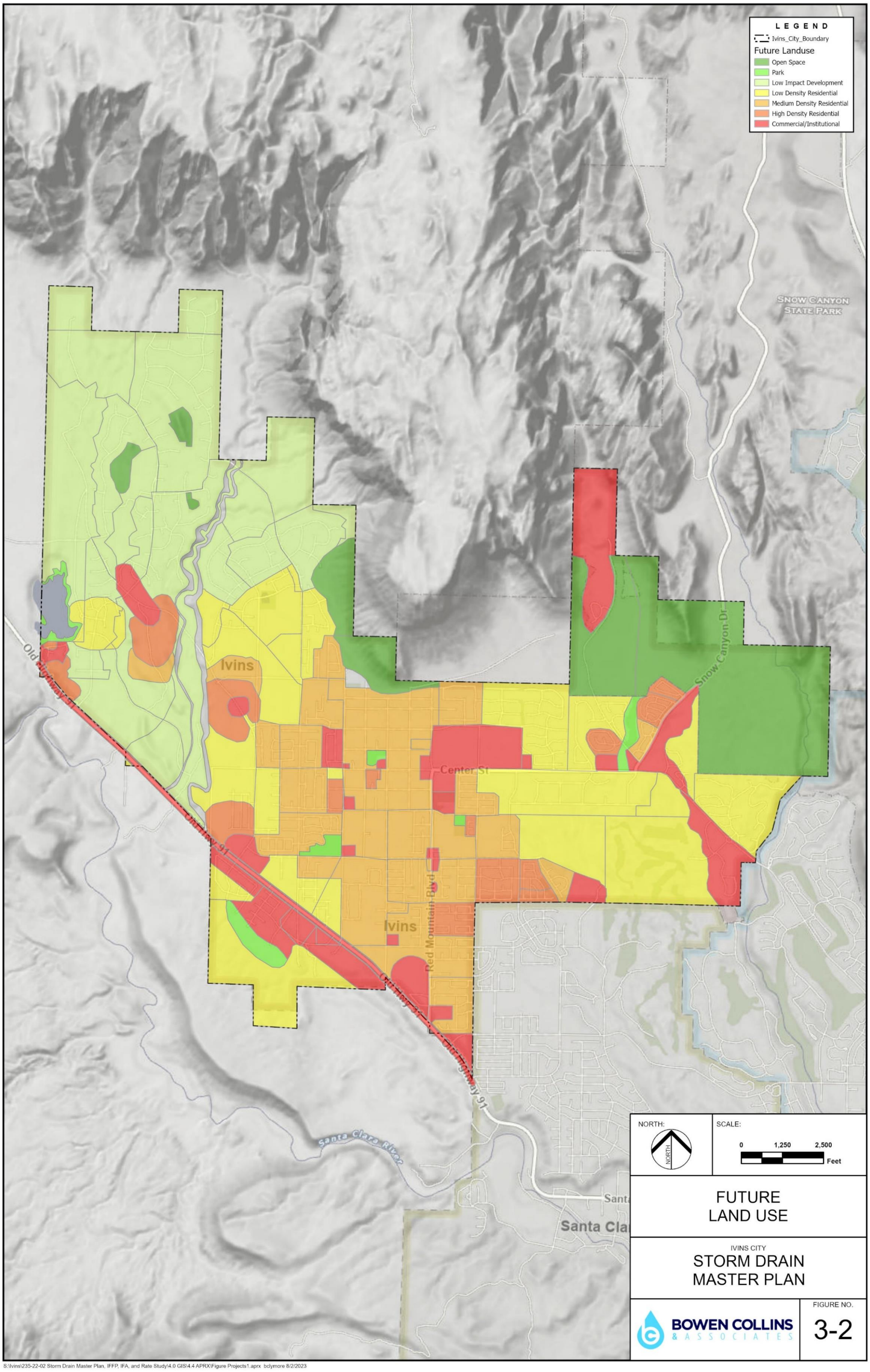
Table 3-2
Average Imperviousness Based on Land Use

General Plan Land Use Type	Directly Connected Imperviousness (Percent)
Open Space	0
Low Impact Development*	7-15
Low Density Residential (LDR)	18-25
Tuacahn Resort	20
Park	25
Medium Density Residential (MDR)	30-35
School	40
High Density Residential (HDR)	40-55
RMU - Village	55
Commercial/Light Manufacturing	70
Church	75
RMU-Town Center	85
Commercial	85
Commercial Neighborhood	85
Commercial Resort	85

* Note areas of Low Impact Development (LID) with a directly connected impervious area of 7 percent incorporated the use of cisterns, reducing the direct runoff to the system.

† United States Department of Agriculture. (2004). Part 630 Hydrology National Engineering Handbook. *Chapter 10: Estimation of Direct Runoff from Storm Rainfall.* Washington, D.C.: USDA.


LEGEND
Ivins_City_Boundary
Landuse
Open Space
Park
Low Impact Development
Low Density Residential
Medium Density Residential
High Density Residential
Commercial/Institutional
Snow Canyon State Park
Snow Canyon Dr
Old Highway 91
Ivins
Center St
Red Mountain Blvd
Old Highway 91
Santa Clara River
Santa Clara D
Santa Cla
NORTH:
NORTH
SCALE:
0
1,250
2,500
Feet
EXISTING
LAND USE
IVINS CITY
STORM DRAIN
MASTER PLAN
BOWEN COLLINS
& ASSOCIATES
FIGURE NO.
3-1


LEGEND
Ivins_City_Boundary
Future Landuse
Open Space
Park
Low Impact Development
Low Density Residential
Medium Density Residential
High Density Residential
Commercial/Institutional
Snow Canyon State Park
Ivins
Center St
Snow Canyon Dr
Old Highway 91
Old Highway 91
Red Mountain Blvd
Ivins
Santa Clara River
Santa
Santa Cla
NORTH:
NORTH
SCALE:
0
1,250
2,500
Feet
FUTURE
LAND USE
IVINS CITY
STORM DRAIN
MASTER PLAN
BOWEN COLLINS
& ASSOCIATES
FIGURE NO.
3-2

3.3 DESIGN STORM PARAMETERS

As part of the previous Master Plan, multiple design storm boundaries were used to best represent conditions experienced by the during storm events: a Mountain Watershed Study Area, a Central Study Area, and a Valley Study Area. The InfoSWMM model was developed using these three hydrologic conditions. The model was calibrated as part of the previous Master Plan by comparing the results of the model with the measured depths and flows of real rainfall events. It was found that the model correlated very well with the measured rainfall data. For this 2024 Master Plan update, these same hydrologic study area assumptions were maintained.

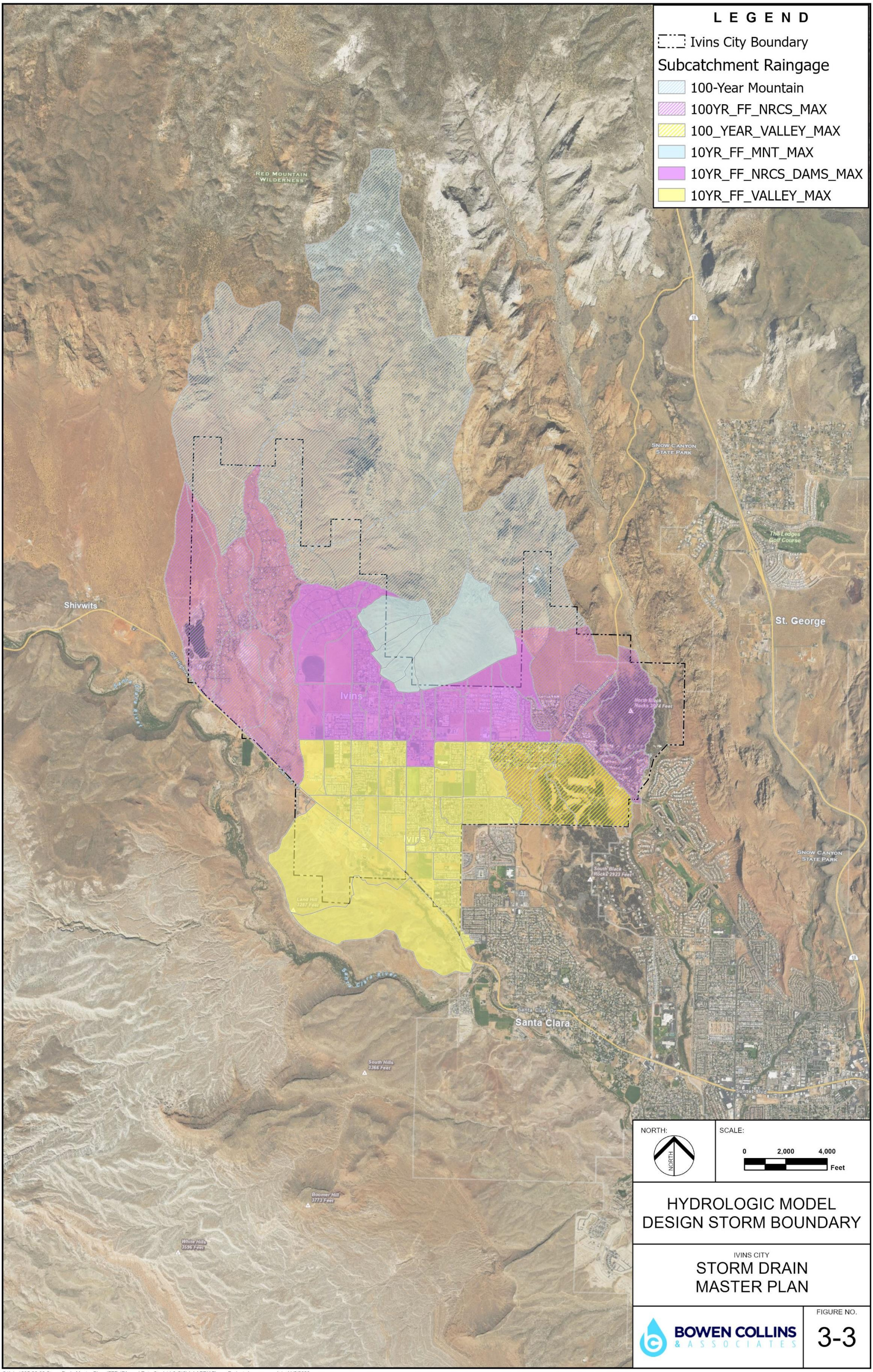
These design storm boundaries are shown on Figure 3-3. The parameters for the design storms are described below:

- Storm Duration: 3 Hours
- Storm Distribution: Modified Farmer and Fletcher
- Recurrence Interval:
    - City Drainage: 10-Year Storm
    - Mountain Drainage: 100-Year Storm
- Storm Depth (Upper Bound from NOAA Atlas 14)[‡]:

Mountain Area	100-Year	2.41 inches
Central Area	100-Year	2.19 inches
Central Area	10-Year	1.30 inches
Valley Area	10-Year	1.25 inches

General engineering practice is to use NOAA Atlas 14 average depths based on the design storm. Ivins City has experienced multiple extreme storms in recent years that have exceeded these average depths. The rainfall depths listed above represent Upper Bound depths. These depths were used in the model to yield results that more closely matched rainfall and runoff that was observed by City personnel in recent years. See Tables A-2 through A-4 for NOAA Atlas 14 depths.

[‡] NOAA's National Weather Service. (2015). *Hydrometeorological Design Studies Center Precipitation Frequency Data Server (PFDS)*.



HYDROLOGIC MODEL DESIGN STORM BOUNDARY

IVINS CITY

STORM DRAIN MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

3-3

S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 11/5/2023

3.4 HYDROLOGIC MODELING ASSUMPTIONS

The following assumptions were also made in completing the hydrologic analyses of the study area:

1. Rainfall return frequency is equal to associated runoff return frequency.
2. Design storm rainfall has a uniform spatial distribution over the watershed.
3. The hydrologic computer model adequately simulates watershed response to precipitation.
4. Hydrologic parameters for non-developable areas were assumed to have normal mid-summer vegetation cover, free from recent fire damage.
5. Runoff produced by the storm event can collect in each detention basin and eventually flow into the City Facilities.
6. No areal reduction factors were included.

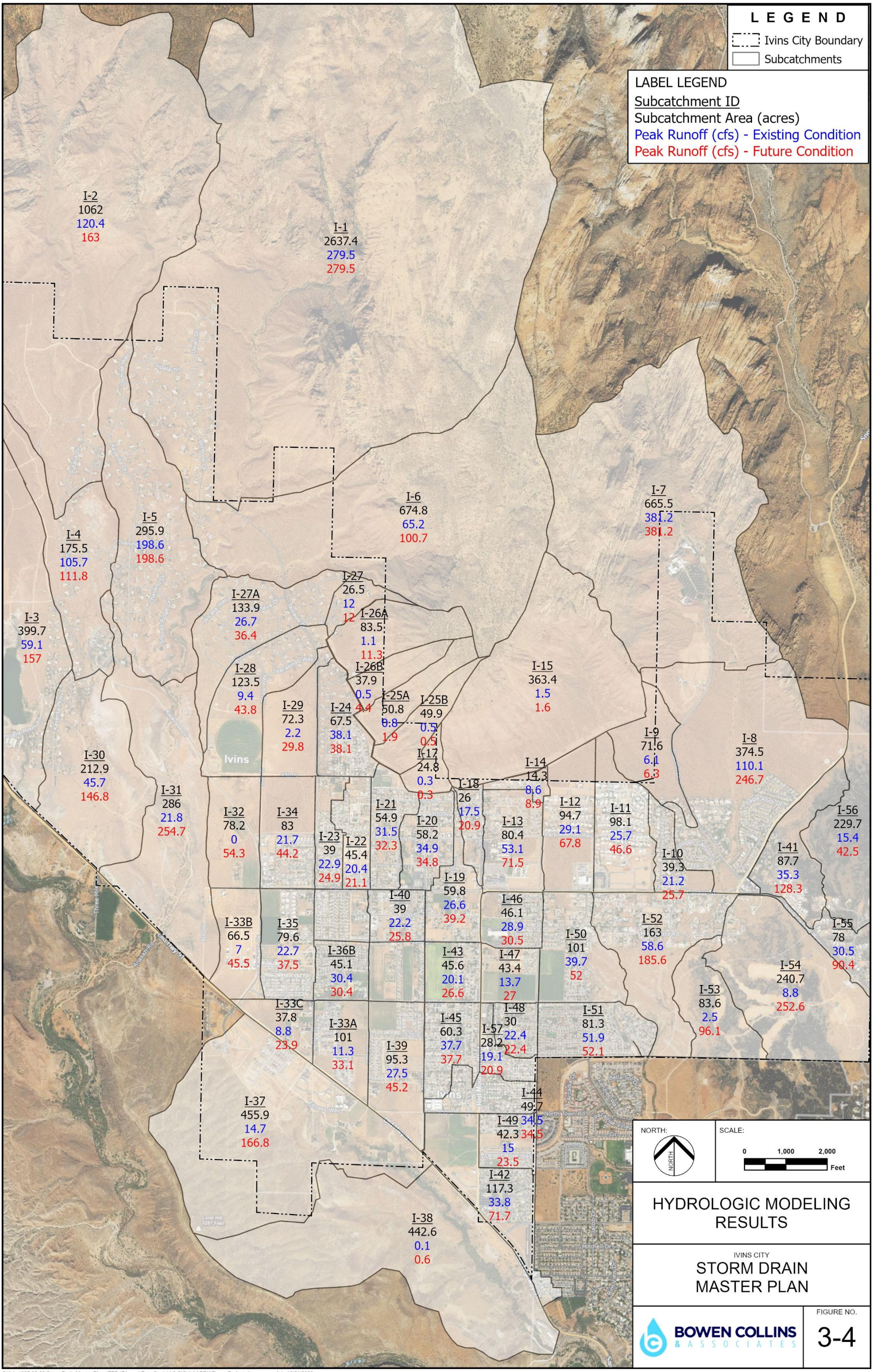
3.4.1 EXISTING INLET CAPACITY ISSUES

The collective assumption was made that there are enough existing storm water inlets in each subcatchment to collect runoff from a 10-year design storm event. In areas where ponding or flooding occurs, the inlet capacity should be evaluated and additional inlets should be added if necessary.

3.5 HYDROLOGIC MODELING SUMMARY

The parameters and assumptions described above were used in the hydrologic model to determine the peak runoff generated at each subcatchment under existing and buildout scenarios. Figure 3-4 shows subcatchment boundaries, with corresponding peak runoff values for the two scenarios. These runoff values account for the increase of impervious area in the buildout condition, but do not include future detention facilities that would attenuate the peak runoff at a given subcatchment. Table A-1 shows the runoff produced for each subcatchment.

New detention facilities and pipeline improvements are considered in Section 4, Hydraulic Modeling.



S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 10/21/2023

SECTION 4 HYDRAULIC MODELING

A hydraulic computer model of the study area was developed in InfoSWMM for the purpose of routing storm water runoff and estimating the capacity of the existing storm drain facilities. InfoSWMM uses an EPA-SWMM engine to perform hydraulic computations. As with EPA-SWMM, InfoSWMM can be used to model the hydrologic and hydraulic components of the study. See Chapter 3 for a description of the hydrologic modeling.

4.1 GEOMETRIC MODEL DEVELOPMENT

There are two major types of data required for a hydraulic model of a storm drain system: geometric data and flow data. Geometric data consists of all information in the model needed to represent the physical characteristics of the system, including pipelines, open channels and detention basins. Flow data is part of the hydrologic analysis reported in Chapter 3. A summary of the elements included in the previously developed hydraulic model, and updates made to the model as part of this study, are provided in the following sections.

4.1.1 MODELED CONVEYANCE

Only major storm drain trunklines were included in the hydraulic model. If more smaller pipes are added to the model, the more refined the analysis becomes, but this requires additional time, effort, and expense. Hence, it is important to consider the required accuracy and available budget when selecting the storm drain pipes to model. This analysis has correspondingly been limited to the major trunk lines (18" or larger) in the City servicing multiple developments. Project level improvements serving single developments have not been included at this time.

The InfoSWMM model was updated with information found in GIS files provided by Ivins City personnel. These files contained information regarding type, lengths, diameter, materials, and inverts for pipes. Rim elevation and invert elevation were also contained in a GIS file for manholes. This data was imported into the InfoSWMM model. Newer developments and storm drainage infrastructure information that was not reflected in the GIS data were added to the model based on as-built drawings.

It should be noted that all pipes were assumed to have a manning's roughness of 0.013 which is consistent with industry standard for concrete pipe. Open Channels were assumed to have manning's roughness of 0.035. Minor losses associated with each manhole were assumed to be 0.3.

4.1.1.1 Condition of Existing Pipe

Generally, any new storm drain pipes installed in Ivins City are reinforced concrete pipe (RCP) or corrugated high density polyethylene (HDPE). Some older sections of storm drain pipe are in poor condition due to deterioration or crushing of these pipes over time. The City hired a videographer to verify the condition of existing pipes in 400 East Street, 800 South Street, 600 South Street, 400 South Street, and 200 South Street to determine if the pipes were in need of repair or replacement.

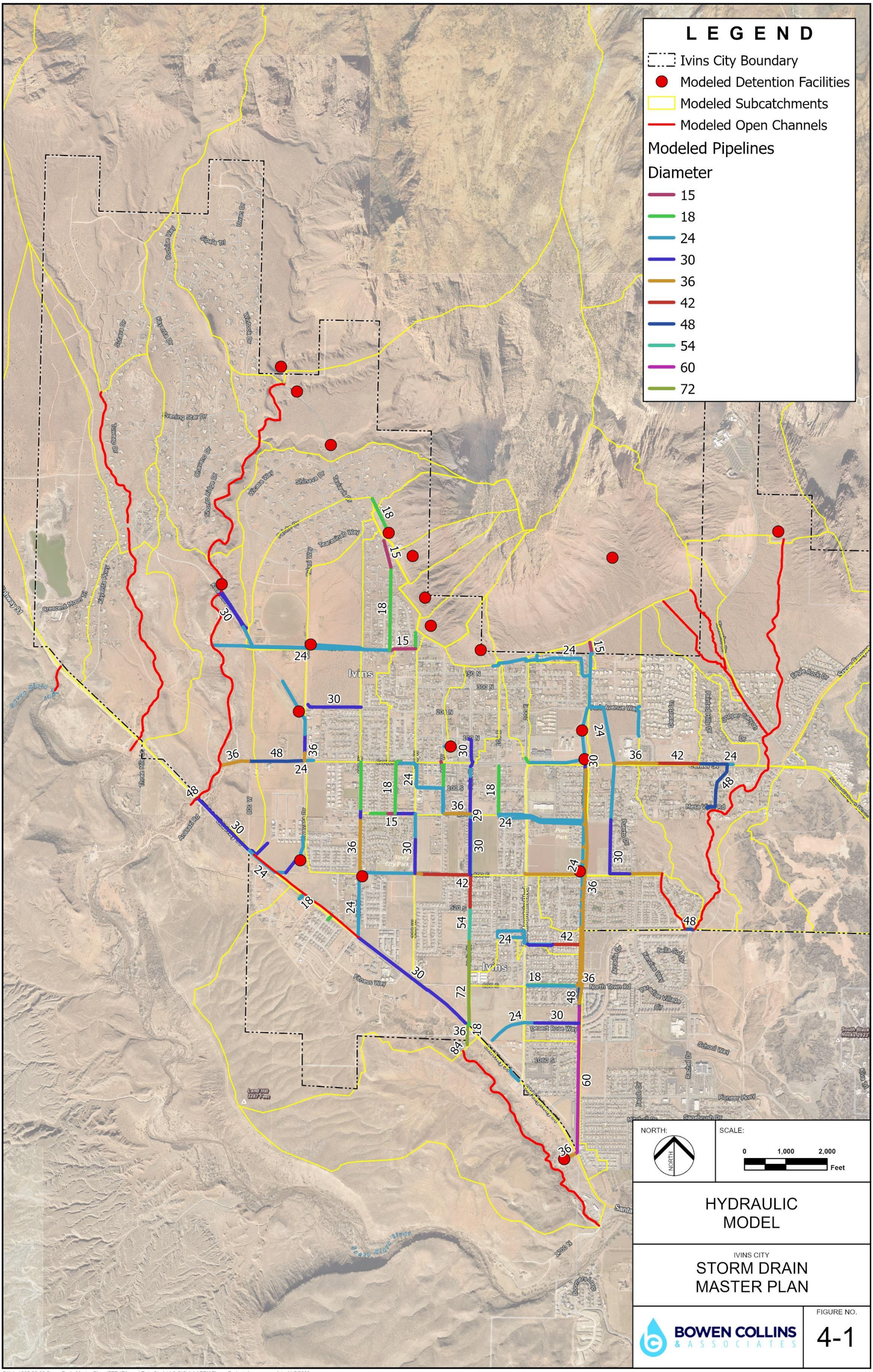
As part of the previous master plan, some projects were identified that would add a parallel storm drain pipe to increase flow capacity within a given drainage corridor. Based on the results of the videoing of the pipes, some of the existing pipes that were assumed to be in good condition were found to be in poor condition and in need of replacement. In those cases, projects that previously recommended a parallel pipe were updated to recommend the replacement of the existing pipe with a larger pipe to both remove the damaged existing pipe and to increase the flow capacity within the drainage corridor. These changes to the proposed pipeline project were reflected in the updated hydraulic model.

4.1.2 DETENTION BASINS

Stage-storage curves were provided by City personnel for existing detention basins and were entered into the model. Orifice information, including size, location, or lack thereof, was provided by the City, and was included in the existing conditions model. Future detention basins were modeled with a synthetic stage storage curve and an orifice to control the release rate. Figure 4-1 shows the facilities modeled in the InfoSWMM model, including existing and proposed detention basins and pipelines.

Detention facilities are either local or regional. The City's current policy is for future developments to detain runoff such that the flow exiting a given development during the 100-yr design storm event is 0.2 cfs/acre. This assumed detained flow rate was included in the future conditions model.

In some cases, the City will negotiate with the developer to build a regional detention facility in lieu of the developer providing local detention. The City identified some locations where regional detention facilities would likely be installed, and these detention basins were also included in the future condition model.



S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 11/5/2023

SECTION 5 SYSTEM EVALUATION

Using the updated hydraulic storm drain model, it is possible to simulate storm drain system operating conditions for both existing and future conditions. The purpose of this chapter is to document the hydraulic performance evaluation of the collection system and identify potential hydraulic deficiencies.

5.1 IMPERVIOUS AREA GROWTH PROJECTIONS

When planning for future storm drain infrastructure, the final buildout scenario was considered. The buildout scenario identifies the storm drainage infrastructure that will be required when the impervious area in the City is built out to the maximum extents based on development types defined in its future land use plan. Not all recommended projects can be built at once, so the timing of when each proposed project is completed is dependent on where and when growth of impervious areas occurs in the City. Population growth projections are helpful in determining the timing of construction of storm drain improvements.

5.1.1 POPULATION GROWTH

Ivins City personnel provided historic population growth data and population growth projections for reference in this analysis. The Ivins City population in 2024 was listed at 10,484 people. The estimated population at buildout is approximately 19,500 people. The timing of when that buildout scenario is realized depends on the growth rate assumed. Ivins City has historically grown on average 40% every 10 years. To project future growth in the City, City personnel have developed three projected growth curves based on a geometric growth rate, a linear growth rate, and a decelerating growth rate. Based on feedback from City personnel, the linear growth rate, where the population increases by the same number of people each year, was the preferred growth rate condition for the purpose of projecting growth in the City.

Using population projections only to predict how much impervious area will be developed is appropriate when the future development is expected to consist of the same density of impervious area as historic development. For Ivins City, most of its historic growth has been residential developments, with relatively few commercial/industrial developments. In projecting future growth in the City, it is anticipated that a higher portion of total development will be commercial/industrial when compared to historic growth. Commercial and industrial developments generally have a higher amount of impervious area compared to residential development. To account for the additional growth in impervious area due to the increased amount of future commercial and industrial development, equivalent residential unit (ERU) growth was considered.

5.1.2 ERU GROWTH

The linear population growth projection was used to determine the projected growth of residential ERUs in the City. City personnel provided the projected commercial/industrial ERU growth based on the latest water and sewer master plan updates. Total projected future ERUs were determined by adding the projected residential ERUs together with the projected commercial/industrial ERUs. These projections were used in determining the priority of proposed storm drain projects, as well as for projecting costs and revenues as part of the Impact Fee Analysis and Storm Drainage Fee Rate Study.

5.2 EVALUATION CRITERIA AND LEVEL OF SERVICE

To evaluate deficiencies in the system, the desired level of service for each of the storm drain components needs to be defined.

5.2.1 STORM DRAIN PIPELINES

Storm drain pipelines do not surcharge into the street during the 10-year storm event. It is important to note that roadways become the major storm water conveyance facility during storms that are larger than the 10-year design event.

5.2.2 FLOOD STREETS

Flood Streets are designed to convey the 10-year storm in the low flow pipe network underneath the roadway. In the 100-year event the flood streets are designed to fill such that a minimum of 1 lane or 10.5 feet in either direction is not submerged.

5.2.3 OPEN CHANNELS

Open channels should be designed to safely convey the 100-year design storm event.

5.2.4 CULVERTS

Culverts should be designed to safely convey the 100-year design storm event.

5.2.5 DETENTION BASINS

Detention facilities should be designed to have capacity for the 100-year design storm. Since pipes are designed for the 10-year design storm it is recommended that all detention facilities have a structure that allows flows from the streets to enter the detention facility. It is also recommended that all detention facilities have an emergency overflow that directs water away from private property in an event larger than the 100-year design storm.

5.3 EXISTING CONVEYANCE SYSTEM ANALYSIS

Figure 5-1 shows the deficiencies in the storm drain system under existing development conditions. As can be seen from the Figure, culverts, detention basins, and trunklines were found to be deficient.

Pipeline deficiencies were identified wherever the capacities of the existing pipe were insufficient to convey the design storm event flow rate. In the model, these situations are represented by flow exiting a pipeline by bubbling up through manhole lids or catch basin inlets.

5.3.1 400 EAST/FLOOD STREET ANALYSIS

The InfoSWMM model evaluated the existing capacity of the storm drain pipelines within 400 East. However, 400 East is a uniquely important drainage corridor as it is the only road designed as a flood street that is expected to convey significant flows during large storm events. For that reason, 400 East was evaluated in more detail using a spreadsheet model.

400 East is an inverted road where runoff primarily accumulates in the center of the road instead of along the curb and gutter. A concrete gutter is located in the center of the road to help convey the accumulated runoff. Grated inlet structures are located within this gutter at various locations to capture runoff during smaller storm events.

The spreadsheet model used LiDAR data to calculate the roads capacity to convey runoff while maintaining water levels low enough to allow a 10.5-foot traffic lane on both sides of the flow. 400 East Street is not completely built yet, and under current conditions runoff conveyed down 400 East would spill out onto adjacent undeveloped property. As these properties are developed, the road will eventually be completed, and this future scenario was also modeled. It was found that the existing pipelines are sufficient to convey the 10-year design storm event. However, during the 100-year design flood event, runoff flows do exceed the capacity of the 400 East Street in places. For this

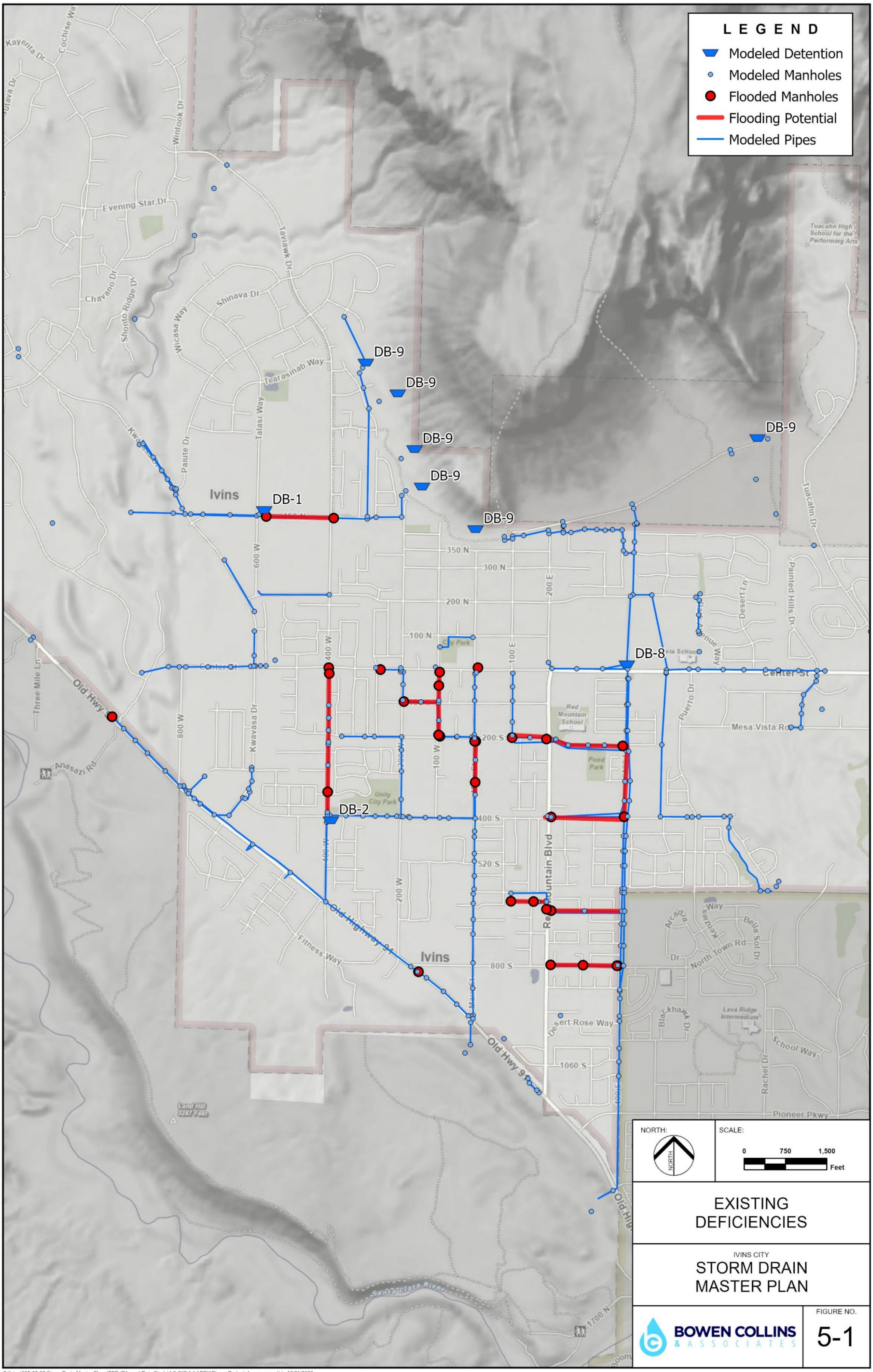
reason, it is recommended to upsize the storm drain pipeline in 400 East as the area continues to develop. By upsizing this pipeline, more water can be captured and conveyed through the pipeline, freeing up additional space in the 400 East inverted street to better convey runoff during large storm events while maintaining adequate traffic lane widths so transportation is impeded as little as possible.

5.4 FUTURE CONVEYANCE SYSTEM ANALYSIS

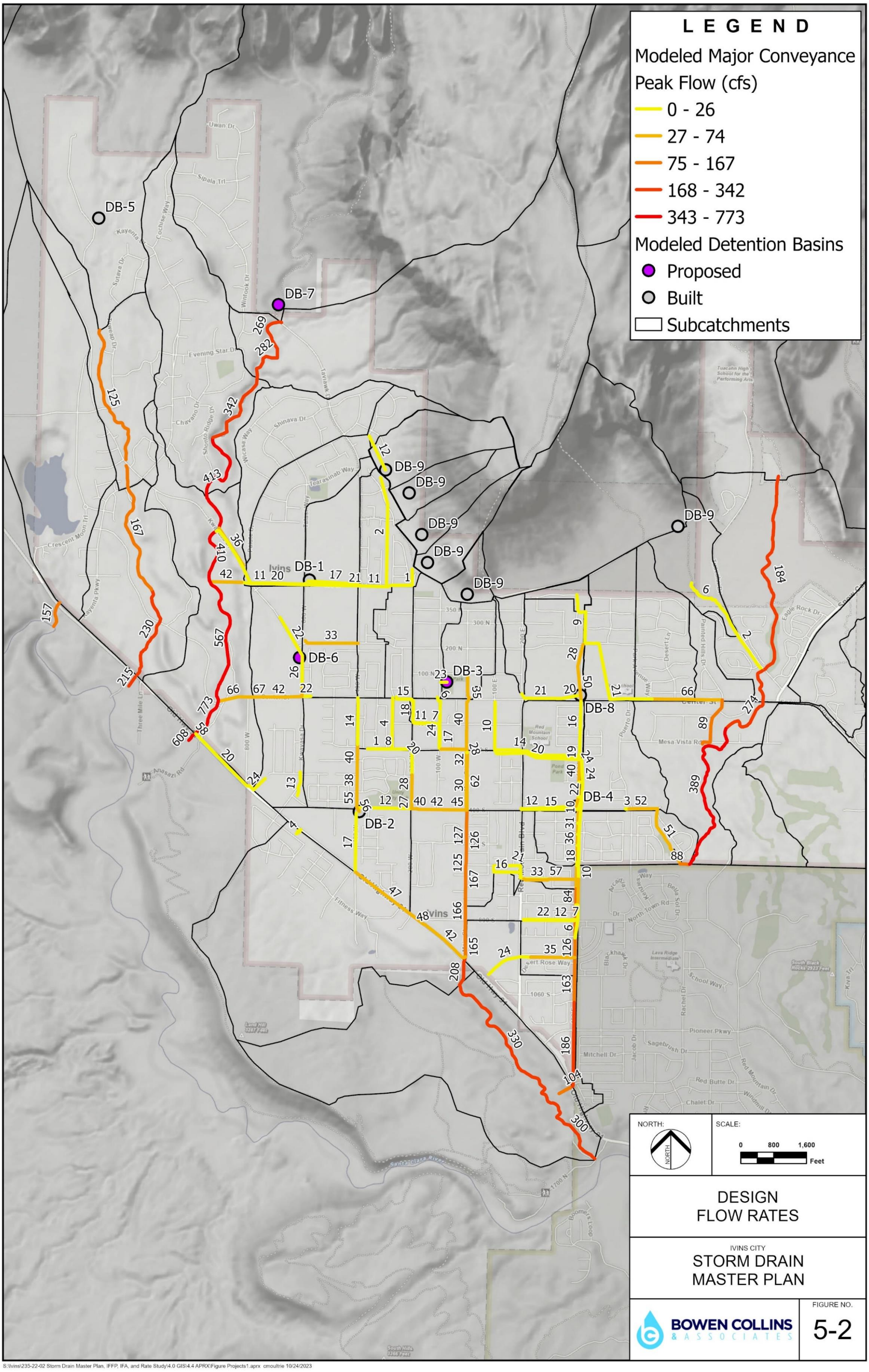
A few of the existing storm drain collection trunklines in Ivins are undersized for ultimate development conditions. Additional trunklines will need to be constructed for future development. Also, there are several detention basins that need to be constructed or modified to help alleviate flood and conveyance pressure on the existing storm drain system.

Design flow rates for sizing storm drain pipes were determined by referencing both the existing condition and future buildout model results. Figure 5-2 shows these design flow rates for the trunklines modeled as part of this master plan.

Chapter 6 discusses conceptual improvements that will be needed to fix existing deficiencies and allow for planned future growth.



S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 10/21/2023



S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 10/24/2023

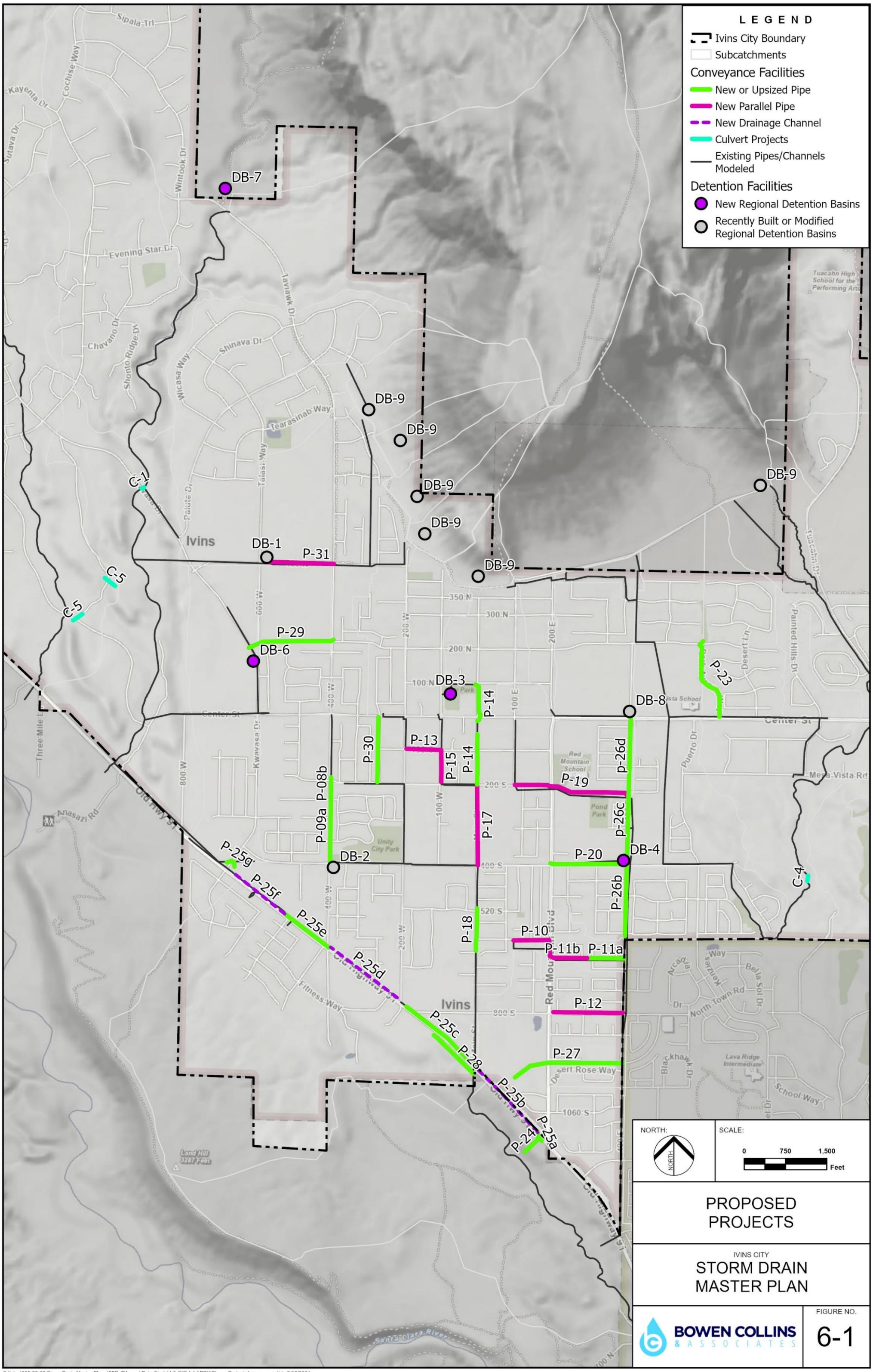
SECTION 6 RECOMMENDED SYSTEM IMPROVEMENTS

The results of the InfoSWMM model were used to evaluate various alternatives for mitigating the identified existing deficiencies and sizing future storm drain facilities under projected future development conditions. This chapter describes the storm drain improvements, based on estimated runoff and ground slopes.

6.1 RECOMMENDED PIPELINE IMPROVEMENTS

Figure 6-1 shows the location of recommended pipeline improvements that are needed to meet future growth in Ivins City. A total cost for each project has been provided. Unit costs associated with the total project costs were developed based on past projects, master planning experience, and coordination with City personnel. A table showing these unit costs can be seen in Appendix B.

As can be seen in Figure 6-1 a combination of parallel and replacement pipeline projects are proposed. Whether a parallel pipe or replacement was recommended was based on conversations with City personnel, as well as the size, material, condition, and age of the existing pipes. Table 6-1 summarizes the cost of the proposed pipe improvements in 2023 dollars. Costs for all projects have been divided into two priority groups. Priority 1 projects are planned to be constructed in the next 10-years, whereas priority 2 projects are lower priority projects and are planned for some time after 2033. Conversations with City personnel were critical in identifying which projects had a higher priority.



S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 2/12/2024

Table 6-1
Storm Drain Trunkline Improvements

Project ID	Project Location	Priority 1 (immediate) Estimated Cost	Priority 2 (future) Estimated Cost	Existing Pipe Size (in)	Future Pipe Size (in)	Existing Parallel Pipe Flow (cfs)	Future Flow/Release Rate (cfs)	Total Future Flow (cfs)	Description
P-08b	400 W & 200 S	$64,808	-	18	30	-	40	40	Replace existing 18" with 30" pipe
P-09a	400 W & 400 S	$452,238	-	18-24	36	-	55	55	Replace existing 18"-24" with 36" pipe
P-10	160 E & 625 S	-	$280,488	24	24	16	21	37	Future parallel 24" pipe
P-11a	285 E & 650 S	-	$262,704	24	42	-	55	55	Replace 24" pipe in poor condition with 42" pipe
P-11b	285 E & 650 S		$168,355	24	30	24	32	56	Future parallel 30" pipe
P-12	320 E & 800 S	-	$331,798	18	24	12	22	34	Future parallel 24" pipe
P-13	150 W & 100 S	-	$174,487	24	24	7	11	18	Future parallel 24" pipe
P-14	100 N & Main Str.	-	$498,193	18-24	30	-	40	40	Replace existing 18"-24" with 30" pipe
P-15	100 W & 150 S	-	$160,941	24	24	16	23	39	Future parallel 24" pipe
P-17	350 S & Main Str.	-	$449,502	24	30	30	60	90	Future parallel 36" pipe
P-18	490 S & Main Str.	-	$372,882	42	54	-	124	124	Replace 42” with 54” pipe
P-19	250 E & 200 S	$593,046	-	24	24	14	20	34	Future parallel 24" pipe
P-20	250 E & 400 S	$472,655	-	24	36	-	26	26	Replace deteriorated 24" pipe with new 36" pipe
P-23	Park Avenue Way	$436,881	-	-	24	-	11	11	New 24" pipe to help control debris flows
P-24	Hwy 91 & Red Mtn. Blvd.	$70,000	-	-	24	-	8	8	New 24" pipe to discharge to wash
P-25a	Hwy 91 (400 W to 550 W)	$70,700	-	-	24	-	8	8	New 24" pipe
P-25c	Hwy 91 (200 W to Main St.)	$318,150	-	-	36	-	43	43	New 30" to 36" pipes (built with Hwy 91 road project)

Project ID	Project Location	Priority 1 (immediate) Estimated Cost	Priority 2 (future) Estimated Cost	Existing Pipe Size (in)	Future Pipe Size (in)	Existing Parallel Pipe Flow (cfs)	Future Flow/Release Rate (cfs)	Total Future Flow (cfs)	Description
P-25e	Hwy 91 (500 W to 400 W.)	$247,450	-	-	36	-	18	18	New 30" to 36" pipes (built with Hwy 91 road project)
P-25g	Hwy 91 (Kwavasa Dr.)	$70,700	-	-	18	-	6	6	New 18" pipe for collection near Kwavasa Dr.
P-26b*	400 East (400 S to 580 S)	$609,403	-	24	42	-	51	51	Replace existing 24" pipe with new 42" pipe and concrete waterway
P-26c*	400 East (200 S to 400 S)	-	$367,722	24	42	-	61	61	Replace existing 24" pipe with new 42" pipe and concrete waterway
P-26d*	400 East (Center St to 200 S)	-	$518,416	24	36	-	20	20	Replace existing 24" pipe with new 36" pipe and concrete waterway
P-27	Western Corridor	-	$561,660	-	30	-	34	34	Future 30" pipe
P-28	RV Park @ Hwy 91	$70,000	-	-	18	-	12	12	Future 18" pipe
P-29	200 North	$318,698	-	-	30	-	33	33	Future 30" pipe
P-30	265 West Dirt Road	$190,115	-	-	18	-	6	6	Future 18" pipe
P-31	450 North Pipeline	-	$216,496	24	18	20	17	37	Future parallel 24" pipe
P-31a	450 North Inlets	$50,000	-	-	-	-	-	-	Catch basins to increase inlet capacity to 450 North pipeline
	Trunkline Total**	**$4,034,844**	**$4,363,644**						

* Project 26 is located in 400 East (Flood Street) which is an inverted street that acts as a major drainage corridor for both 10-yr and 100-yr floods. Modeling indicated that 400 East does not have sufficient capacity to convey the 100-yr storm event while maintaining travel lanes in both directions. The recommended P-26 pipes are oversized so that excess water in the street during the 100-yr event can instead be conveyed through the buried pipeline network.

** These totals include the proposed conveyance projects only. Ivins City intends to build a new public works yard, and 5% of the cost of that facility is attributable to storm drain operation and maintenance.

6.2 DETENTION BASIN IMPROVEMENTS

Figure 6-1 shows the location of recommended detention basin improvements that are needed to meet future growth in Ivins City. Table 6-2 lists the recommended detention volumes and costs for detention facilities in Ivins City.

Table 6-2
Required Capacity at Detention Basins

Project ID	Project Location	Priority 1 (immediate) Estimated Cost	Priority 2 (future) Estimated Cost	Future Release Rate (cfs)	Storage Volume (ac-ft)	Description
DB-3	City Park Baseball Field	-	$275,000	9	4.2	New 4.2 AF Detention Facility. Install inlets in 100 West to convey flows to detention facility
DB-4	400 E & 400 S	$445,000	-	24	3.4	New 3.4 AF Detention Facility
DB-6	600 W & 200 N	$272,000	-	6	1.8	New 1.8 Detention Facility
DB-7	Taviawk Dr.	-	$85,000	-	0	Construct Emergency Spillway at existing road crossing
	Detention Total	**$717,000**	**$360,000**			

6.3 CULVERT IMPROVEMENTS

Figures 6-1 shows the location of recommended culvert improvements that are needed to meet future growth in Ivins City. Table 6-3 lists the recommended culvert sizes and costs needed in Ivins City.

Table 6-3
Required Capacity at Culverts

Project ID	Project Location	Priority 1 (immediate) Estimated Cost	Priority 2 (future) Estimated Cost	Future Flow Rate (cfs)	Future Culvert Size (ft)	Existing Culvert Size (ft)	Project ID
C-1*	Kwavasa Dr. Culvert	-	$175,000	833	54”	8'	New parallel 54” culvert
C-4	Remove SITLA Culverts	$100,000	-	-	-	-	Remove existing culverts to restore natural wash channel capacity
C-5	Kayenta Box Culverts	$200,000	-	230	10'x4'	-	Two new box culverts to be installed when new road is built
	Culvert Total	**$300,000**	**$175,000**				

* Developer responsible for the upsize of the culvert.

For a detailed cost estimate of each of the recommended improvements, see Appendix B.

APPENDIX A – HYDROLOGIC INFORMATION

Table A1: Subcatchment Runoff

		Peak Runoff (cfs)		
ID	Subcatchment Area (ac)	Existing Model Output	Future Model Output	Limited to 0.2 cfs/acre
I-1	2637.4	279.5	279.5	527.5
I-10	39.3	21.2	25.7	7.9
I-11	98.1	25.7	46.6	19.6
I-12	94.7	29.1	67.8	18.9
I-13	80.4	53.1	71.5	16.1
I-14	14.3	8.6	8.9	2.9
I-15	363.4	1.5	1.6	72.7
I-17	24.8	0.3	0.3	5.0
I-18	26.0	17.5	20.9	5.2
I-19	59.8	26.6	39.2	12.0
I-2	1062.0	120.4	163.0	212.4
I-20	58.2	34.9	34.8	11.6
I-21	54.9	31.5	32.3	11.0
I-22	45.4	20.4	21.1	9.1
I-23	39.0	22.9	24.9	7.8
I-24	67.5	38.1	38.1	13.5
I-25A	50.8	0.8	1.9	10.2
I-25B	49.9	0.5	0.5	10.0
I-26A	83.5	1.1	11.3	16.7
I-26B	37.9	0.5	4.4	7.6
I-27	26.5	12.0	12.0	5.3
I-27A	133.9	26.7	36.4	26.8
I-28	123.5	9.4	43.8	24.7
I-29	72.3	2.2	29.8	14.5
I-3	399.7	59.1	157.0	79.9
I-30	212.9	45.7	146.8	42.6
I-31	286.0	21.8	254.7	57.2
I-32	78.2	0.0	54.3	15.6
I-33A	63.2	11.3	33.1	12.6
I-33B	66.5	7.0	45.5	13.3
I-33C	37.8	8.8	23.9	7.6
I-34	83.0	21.7	44.2	16.6
I-35	79.6	22.7	37.5	15.9
I-36A	36.2	20.5	24.6	7.2
I-36B	45.1	30.4	30.4	9.0
I-37	455.9	14.7	166.8	91.2
I-38	442.6	0.1	0.6	88.5
I-39	95.3	27.5	45.2	19.1
I-4	175.5	105.7	111.8	35.1
I-40	39.0	22.2	25.8	7.8
I-40B	44.9	11.6	27.8	9.0
I-41	87.7	35.3	128.3	17.5
I-42	117.3	33.8	71.7	23.5
I-43	45.6	20.1	26.6	9.1
I-44	49.7	34.5	34.6	9.9
I-45	60.3	37.7	37.7	12.1
I-46	46.1	28.9	30.5	9.2
I-47	43.4	13.7	27.0	8.7
I-48	30.0	22.4	22.4	6.0
I-49	42.3	15.0	23.5	8.5
I-5	295.9	198.6	198.6	59.2
I-50	101.0	39.7	52.0	20.2
I-51	81.3	51.9	52.1	16.3
I-52	163.0	58.6	185.6	32.6
I-53	83.6	2.5	96.1	16.7
I-54	240.7	8.8	252.6	48.1
I-55	78.0	30.5	90.4	15.6
I-56	229.7	15.4	42.5	45.9
I-57	28.2	19.1	20.9	5.6
I-6	674.8	65.2	100.7	135.0
I-7	665.5	381.2	381.2	133.1
I-8	374.5	110.1	246.7	74.9
I-9	71.6	6.1	6.3	14.3

Table A-2: Valley Depths

Precipitation Frequency Data Server

NOAA Atlas 14, Volume 1, Version 5
Location name: Ivins, Utah, US*
Latitude: 37.1640°, Longitude: -113.6699°
Elevation: 3020 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.134 (0.115-0.159)	0.173 (0.148-0.206)	0.234 (0.199-0.278)	0.288 (0.244-0.344)	0.372 (0.309-0.442)	0.443 (0.363-0.528)	0.526 (0.422-0.629)	0.620 (0.484-0.746)	0.764 (0.573-0.935)	0.890 (0.648-1.10)
10-min	0.205 (0.175-0.242)	0.263 (0.226-0.313)	0.356 (0.303-0.424)	0.438 (0.371-0.524)	0.565 (0.470-0.673)	0.674 (0.553-0.804)	0.801 (0.642-0.958)	0.943 (0.736-1.14)	1.16 (0.872-1.42)	1.35 (0.987-1.67)
15-min	0.254 (0.216-0.300)	0.326 (0.279-0.388)	0.442 (0.376-0.525)	0.543 (0.460-0.649)	0.701 (0.583-0.834)	0.836 (0.685-0.996)	0.993 (0.796-1.19)	1.17 (0.912-1.41)	1.44 (1.08-1.76)	1.68 (1.22-2.07)
30-min	0.341 (0.291-0.404)	0.439 (0.376-0.522)	0.595 (0.507-0.708)	0.732 (0.619-0.874)	0.943 (0.785-1.12)	1.13 (0.923-1.34)	1.34 (1.07-1.60)	1.57 (1.23-1.90)	1.94 (1.46-2.37)	2.26 (1.65-2.79)
60-min	0.423 (0.361-0.500)	0.543 (0.466-0.646)	0.736 (0.627-0.876)	0.906 (0.766-1.08)	1.17 (0.972-1.39)	1.39 (1.14-1.66)	1.65 (1.33-1.98)	1.95 (1.52-2.35)	2.40 (1.80-2.94)	2.80 (2.04-3.45)
2-hr	0.513 (0.447-0.595)	0.644 (0.562-0.749)	0.846 (0.736-0.981)	1.02 (0.886-1.19)	1.30 (1.10-1.50)	1.53 (1.28-1.77)	1.79 (1.47-2.08)	2.08 (1.67-2.45)	2.53 (1.96-3.02)	2.92 (2.20-3.53)
3-hr	0.570 (0.505-0.653)	0.713 (0.632-0.819)	0.920 (0.813-1.05)	1.10 (0.963-1.25)	1.36 (1.18-1.55)	1.58 (1.35-1.81)	1.83 (1.53-2.11)	2.11 (1.73-2.46)	2.54 (2.03-3.05)	2.93 (2.28-3.56)
6-hr	0.709 (0.631-0.806)	0.888 (0.795-1.01)	1.13 (1.01-1.28)	1.33 (1.18-1.52)	1.62 (1.42-1.84)	1.86 (1.60-2.12)	2.12 (1.81-2.43)	2.41 (2.02-2.79)	2.86 (2.33-3.36)	3.24 (2.58-3.85)
12-hr	0.866 (0.779-0.971)	1.09 (0.975-1.22)	1.37 (1.22-1.54)	1.60 (1.43-1.80)	1.91 (1.69-2.15)	2.15 (1.88-2.43)	2.40 (2.08-2.73)	2.67 (2.29-3.06)	3.05 (2.55-3.53)	3.40 (2.79-3.97)
24-hr	1.02 (0.947-1.10)	1.27 (1.18-1.37)	1.59 (1.48-1.71)	1.84 (1.71-1.98)	2.19 (2.02-2.35)	2.45 (2.26-2.63)	2.73 (2.50-2.93)	3.00 (2.73-3.23)	3.38 (3.04-3.65)	3.67 (3.27-4.00)
2-day	1.13 (1.05-1.21)	1.41 (1.32-1.51)	1.76 (1.64-1.88)	2.04 (1.90-2.18)	2.41 (2.24-2.58)	2.71 (2.51-2.89)	3.00 (2.77-3.22)	3.31 (3.04-3.56)	3.72 (3.38-4.01)	4.04 (3.64-4.37)
3-day	1.22 (1.14-1.30)	1.52 (1.42-1.63)	1.89 (1.77-2.02)	2.19 (2.05-2.34)	2.59 (2.42-2.77)	2.91 (2.70-3.10)	3.23 (2.98-3.45)	3.55 (3.27-3.81)	3.99 (3.63-4.30)	4.33 (3.91-4.69)
4-day	1.30 (1.22-1.40)	1.63 (1.53-1.74)	2.03 (1.90-2.17)	2.35 (2.20-2.50)	2.77 (2.60-2.95)	3.11 (2.90-3.32)	3.45 (3.20-3.69)	3.80 (3.50-4.07)	4.26 (3.89-4.59)	4.63 (4.18-5.00)
7-day	1.51 (1.41-1.63)	1.89 (1.76-2.03)	2.35 (2.19-2.52)	2.71 (2.53-2.90)	3.20 (2.97-3.42)	3.56 (3.30-3.81)	3.94 (3.63-4.21)	4.30 (3.95-4.63)	4.79 (4.36-5.17)	5.16 (4.66-5.59)
10-day	1.68 (1.56-1.81)	2.10 (1.95-2.26)	2.62 (2.44-2.81)	3.02 (2.81-3.24)	3.56 (3.30-3.81)	3.96 (3.66-4.24)	4.36 (4.02-4.68)	4.76 (4.37-5.13)	5.29 (4.81-5.71)	5.68 (5.14-6.17)
20-day	2.12 (1.96-2.28)	2.65 (2.46-2.85)	3.27 (3.04-3.51)	3.73 (3.46-4.00)	4.30 (3.99-4.61)	4.71 (4.36-5.05)	5.11 (4.71-5.48)	5.48 (5.03-5.89)	5.93 (5.43-6.40)	6.25 (5.70-6.76)
30-day	2.53 (2.34-2.73)	3.17 (2.94-3.42)	3.92 (3.64-4.22)	4.48 (4.15-4.82)	5.18 (4.80-5.58)	5.69 (5.26-6.13)	6.19 (5.70-6.67)	6.66 (6.11-7.20)	7.24 (6.61-7.85)	7.66 (6.96-8.33)
45-day	3.02 (2.78-3.28)	3.79 (3.49-4.11)	4.72 (4.34-5.11)	5.40 (4.97-5.85)	6.28 (5.77-6.78)	6.91 (6.34-7.47)	7.52 (6.88-8.14)	8.11 (7.40-8.79)	8.82 (8.02-9.59)	9.32 (8.45-10.2)
60-day	3.44 (3.16-3.75)	4.32 (3.97-4.71)	5.38 (4.94-5.84)	6.15 (5.64-6.67)	7.14 (6.53-7.74)	7.84 (7.16-8.51)	8.52 (7.76-9.26)	9.16 (8.32-9.97)	9.96 (9.00-10.9)	10.5 (9.46-11.5)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

Table A-3: Central Depths

Precipitation Frequency Data Server

NOAA Atlas 14, Volume 1, Version 5
Location name: Dammeron Valley, Utah, US*
Latitude: 37.1795°, Longitude: -113.6790°
Elevation: 3767 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.140 (0.120-0.166)	0.180 (0.154-0.215)	0.244 (0.208-0.291)	0.300 (0.253-0.360)	0.386 (0.320-0.461)	0.460 (0.376-0.550)	0.545 (0.436-0.654)	0.641 (0.499-0.774)	0.789 (0.591-0.969)	0.919 (0.668-1.14)
10-min	0.214 (0.182-0.253)	0.274 (0.235-0.327)	0.372 (0.316-0.444)	0.457 (0.385-0.548)	0.587 (0.488-0.702)	0.700 (0.572-0.837)	0.829 (0.663-0.995)	0.975 (0.760-1.18)	1.20 (0.900-1.47)	1.40 (1.02-1.73)
15-min	0.265 (0.226-0.313)	0.340 (0.291-0.406)	0.461 (0.392-0.550)	0.567 (0.478-0.679)	0.728 (0.604-0.870)	0.867 (0.709-1.04)	1.03 (0.823-1.23)	1.21 (0.942-1.46)	1.49 (1.11-1.83)	1.73 (1.26-2.15)
30-min	0.356 (0.304-0.422)	0.458 (0.392-0.546)	0.620 (0.527-0.741)	0.762 (0.643-0.914)	0.981 (0.814-1.17)	1.17 (0.955-1.40)	1.38 (1.11-1.66)	1.63 (1.27-1.97)	2.00 (1.50-2.46)	2.33 (1.70-2.89)
60-min	0.441 (0.376-0.522)	0.567 (0.485-0.676)	0.768 (0.653-0.917)	0.944 (0.796-1.13)	1.21 (1.01-1.45)	1.45 (1.18-1.73)	1.71 (1.37-2.06)	2.02 (1.57-2.43)	2.48 (1.86-3.04)	2.89 (2.10-3.58)
2-hr	0.530 (0.461-0.617)	0.666 (0.580-0.776)	0.874 (0.759-1.02)	1.06 (0.912-1.23)	1.34 (1.14-1.55)	1.58 (1.32-1.83)	1.85 (1.51-2.16)	2.15 (1.72-2.54)	2.61 (2.02-3.12)	3.01 (2.26-3.64)
3-hr	0.592 (0.523-0.679)	0.742 (0.655-0.852)	0.955 (0.841-1.10)	1.14 (0.997-1.30)	1.41 (1.22-1.62)	1.64 (1.39-1.88)	1.90 (1.59-2.19)	2.18 (1.79-2.55)	2.63 (2.09-3.15)	3.03 (2.35-3.68)
6-hr	0.737 (0.655-0.839)	0.922 (0.824-1.05)	1.18 (1.04-1.33)	1.38 (1.22-1.58)	1.68 (1.47-1.92)	1.93 (1.66-2.21)	2.20 (1.87-2.53)	2.50 (2.09-2.90)	2.96 (2.41-3.48)	3.35 (2.67-3.98)
12-hr	0.903 (0.811-1.01)	1.13 (1.01-1.27)	1.43 (1.27-1.60)	1.67 (1.48-1.88)	1.99 (1.76-2.24)	2.24 (1.96-2.54)	2.51 (2.17-2.85)	2.78 (2.38-3.19)	3.18 (2.66-3.68)	3.54 (2.91-4.14)
24-hr	1.07 (0.992-1.16)	1.34 (1.24-1.44)	1.67 (1.55-1.80)	1.94 (1.80-2.09)	2.30 (2.13-2.48)	2.58 (2.38-2.78)	2.87 (2.63-3.09)	3.17 (2.88-3.42)	3.56 (3.21-3.86)	3.87 (3.46-4.20)
2-day	1.19 (1.11-1.28)	1.49 (1.39-1.60)	1.86 (1.74-2.00)	2.16 (2.01-2.31)	2.57 (2.38-2.75)	2.88 (2.66-3.09)	3.21 (2.95-3.45)	3.54 (3.24-3.81)	3.99 (3.61-4.32)	4.34 (3.90-4.72)
3-day	1.29 (1.21-1.39)	1.62 (1.51-1.74)	2.02 (1.89-2.17)	2.34 (2.19-2.51)	2.78 (2.59-2.98)	3.13 (2.90-3.35)	3.48 (3.20-3.73)	3.84 (3.51-4.13)	4.33 (3.92-4.68)	4.71 (4.23-5.11)
4-day	1.39 (1.30-1.50)	1.74 (1.63-1.87)	2.18 (2.04-2.33)	2.53 (2.36-2.70)	3.00 (2.79-3.21)	3.37 (3.13-3.61)	3.75 (3.46-4.02)	4.14 (3.79-4.45)	4.66 (4.23-5.04)	5.07 (4.56-5.50)
7-day	1.63 (1.51-1.75)	2.03 (1.89-2.19)	2.54 (2.36-2.73)	2.94 (2.73-3.16)	3.49 (3.22-3.74)	3.90 (3.59-4.18)	4.32 (3.96-4.64)	4.74 (4.32-5.11)	5.30 (4.79-5.75)	5.73 (5.14-6.24)
10-day	1.81 (1.68-1.95)	2.27 (2.10-2.45)	2.84 (2.63-3.06)	3.29 (3.04-3.53)	3.88 (3.58-4.17)	4.32 (3.98-4.66)	4.78 (4.38-5.16)	5.23 (4.77-5.66)	5.83 (5.28-6.34)	6.28 (5.65-6.87)
20-day	2.29 (2.12-2.47)	2.88 (2.67-3.11)	3.56 (3.30-3.84)	4.07 (3.77-4.37)	4.70 (4.34-5.06)	5.16 (4.76-5.56)	5.61 (5.15-6.04)	6.03 (5.52-6.52)	6.56 (5.97-7.11)	6.93 (6.28-7.53)
30-day	2.75 (2.54-2.98)	3.45 (3.19-3.74)	4.29 (3.96-4.63)	4.91 (4.54-5.30)	5.70 (5.26-6.16)	6.28 (5.77-6.79)	6.84 (6.26-7.40)	7.38 (6.73-8.01)	8.06 (7.31-8.77)	8.55 (7.72-9.34)
45-day	3.28 (3.02-3.58)	4.13 (3.79-4.50)	5.16 (4.73-5.61)	5.92 (5.43-6.44)	6.90 (6.32-7.50)	7.62 (6.96-8.28)	8.32 (7.57-9.06)	9.00 (8.16-9.82)	9.85 (8.88-10.8)	10.5 (9.40-11.5)
60-day	3.76 (3.44-4.10)	4.73 (4.33-5.16)	5.90 (5.40-6.44)	6.76 (6.18-7.37)	7.87 (7.17-8.57)	8.67 (7.87-9.45)	9.45 (8.55-10.3)	10.2 (9.19-11.1)	11.1 (9.98-12.2)	11.8 (10.5-13.0)

[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

Table A-4: Mountain Depths

Precipitation Frequency Data Server

NOAA Atlas 14, Volume 1, Version 5
Location name: Dammeron Valley, Utah, US*
Latitude: 37.2389°, Longitude: -113.7011°
Elevation: 5037 ft*
* source: Google Maps

POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

PF_tabular | PF_graphical | Maps_&_aerials

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.154 (0.130-0.184)	0.198 (0.168-0.239)	0.268 (0.225-0.322)	0.329 (0.274-0.397)	0.420 (0.345-0.507)	0.499 (0.404-0.603)	0.589 (0.468-0.714)	0.691 (0.534-0.844)	0.848 (0.632-1.05)	0.987 (0.714-1.24)
10-min	0.235 (0.199-0.281)	0.302 (0.256-0.363)	0.407 (0.343-0.491)	0.500 (0.417-0.605)	0.639 (0.526-0.772)	0.759 (0.615-0.918)	0.896 (0.712-1.09)	1.05 (0.814-1.28)	1.29 (0.962-1.60)	1.50 (1.09-1.88)
15-min	0.291 (0.247-0.348)	0.374 (0.317-0.450)	0.505 (0.425-0.609)	0.621 (0.517-0.750)	0.793 (0.651-0.958)	0.941 (0.763-1.14)	1.11 (0.882-1.35)	1.30 (1.01-1.59)	1.60 (1.19-1.98)	1.86 (1.35-2.33)
30-min	0.392 (0.332-0.468)	0.504 (0.427-0.606)	0.680 (0.572-0.820)	0.836 (0.696-1.01)	1.07 (0.877-1.29)	1.27 (1.03-1.53)	1.50 (1.19-1.81)	1.75 (1.36-2.14)	2.15 (1.61-2.67)	2.51 (1.81-3.14)
60-min	0.485 (0.411-0.580)	0.624 (0.528-0.751)	0.842 (0.709-1.01)	1.03 (0.862-1.25)	1.32 (1.09-1.60)	1.57 (1.27-1.90)	1.85 (1.47-2.25)	2.17 (1.68-2.65)	2.67 (1.99-3.31)	3.10 (2.25-3.89)
2-hr	0.577 (0.500-0.678)	0.728 (0.627-0.855)	0.953 (0.818-1.12)	1.15 (0.982-1.35)	1.45 (1.22-1.71)	1.71 (1.41-2.00)	2.00 (1.62-2.36)	2.32 (1.84-2.77)	2.81 (2.16-3.39)	3.24 (2.42-3.95)
3-hr	0.652 (0.573-0.754)	0.818 (0.716-0.945)	1.05 (0.916-1.21)	1.25 (1.08-1.44)	1.54 (1.32-1.78)	1.79 (1.51-2.08)	2.07 (1.72-2.41)	2.38 (1.94-2.79)	2.85 (2.27-3.43)	3.28 (2.55-3.99)
6-hr	0.814 (0.719-0.934)	1.02 (0.905-1.17)	1.29 (1.14-1.48)	1.52 (1.33-1.75)	1.85 (1.60-2.12)	2.12 (1.81-2.44)	2.40 (2.04-2.78)	2.73 (2.28-3.19)	3.23 (2.63-3.81)	3.65 (2.90-4.35)
12-hr	1.00 (0.897-1.13)	1.26 (1.12-1.42)	1.58 (1.41-1.79)	1.85 (1.64-2.10)	2.21 (1.94-2.50)	2.49 (2.17-2.83)	2.78 (2.40-3.19)	3.09 (2.63-3.56)	3.53 (2.95-4.10)	3.92 (3.22-4.61)
24-hr	1.20 (1.11-1.29)	1.50 (1.40-1.62)	1.88 (1.75-2.03)	2.19 (2.03-2.35)	2.60 (2.40-2.80)	2.93 (2.69-3.14)	3.26 (2.98-3.50)	3.59 (3.26-3.87)	4.05 (3.64-4.38)	4.41 (3.92-4.77)
2-day	1.35 (1.26-1.46)	1.70 (1.58-1.83)	2.13 (1.99-2.29)	2.49 (2.31-2.67)	2.97 (2.75-3.19)	3.35 (3.09-3.60)	3.74 (3.43-4.03)	4.15 (3.78-4.48)	4.71 (4.24-5.10)	5.14 (4.60-5.60)
3-day	1.49 (1.39-1.60)	1.87 (1.74-2.01)	2.36 (2.19-2.53)	2.75 (2.55-2.95)	3.28 (3.04-3.52)	3.70 (3.41-3.98)	4.14 (3.79-4.46)	4.59 (4.17-4.95)	5.20 (4.68-5.64)	5.68 (5.07-6.19)
4-day	1.63 (1.51-1.75)	2.04 (1.90-2.20)	2.58 (2.40-2.77)	3.01 (2.79-3.23)	3.59 (3.32-3.86)	4.06 (3.73-4.36)	4.53 (4.15-4.88)	5.03 (4.57-5.43)	5.69 (5.12-6.18)	6.22 (5.54-6.79)
7-day	1.93 (1.78-2.08)	2.42 (2.24-2.62)	3.06 (2.82-3.30)	3.56 (3.28-3.84)	4.25 (3.90-4.58)	4.78 (4.37-5.15)	5.32 (4.83-5.75)	5.88 (5.30-6.38)	6.63 (5.92-7.22)	7.21 (6.39-7.89)
10-day	2.16 (1.99-2.34)	2.72 (2.51-2.95)	3.43 (3.17-3.71)	3.99 (3.67-4.30)	4.73 (4.34-5.11)	5.30 (4.84-5.74)	5.88 (5.34-6.38)	6.47 (5.84-7.04)	7.25 (6.50-7.92)	7.86 (6.99-8.63)
20-day	2.78 (2.56-3.01)	3.50 (3.23-3.79)	4.36 (4.01-4.71)	4.99 (4.59-5.39)	5.79 (5.31-6.26)	6.38 (5.83-6.90)	6.95 (6.33-7.54)	7.50 (6.80-8.15)	8.21 (7.40-8.94)	8.71 (7.82-9.51)
30-day	3.36 (3.09-3.66)	4.24 (3.90-4.62)	5.30 (4.88-5.77)	6.10 (5.59-6.64)	7.12 (6.52-7.76)	7.87 (7.18-8.59)	8.62 (7.82-9.41)	9.34 (8.44-10.2)	10.3 (9.22-11.3)	11.0 (9.79-12.1)
45-day	4.02 (3.67-4.41)	5.08 (4.64-5.57)	6.38 (5.82-7.00)	7.36 (6.70-8.07)	8.63 (7.83-9.47)	9.58 (8.66-10.5)	10.5 (9.48-11.6)	11.5 (10.3-12.6)	12.7 (11.3-14.0)	13.6 (12.0-15.1)
60-day	4.64 (4.22-5.10)	5.87 (5.34-6.45)	7.38 (6.70-8.10)	8.48 (7.69-9.30)	9.90 (8.94-10.9)	10.9 (9.85-12.0)	12.0 (10.7-13.2)	13.0 (11.6-14.3)	14.3 (12.7-15.8)	15.2 (13.4-16.9)

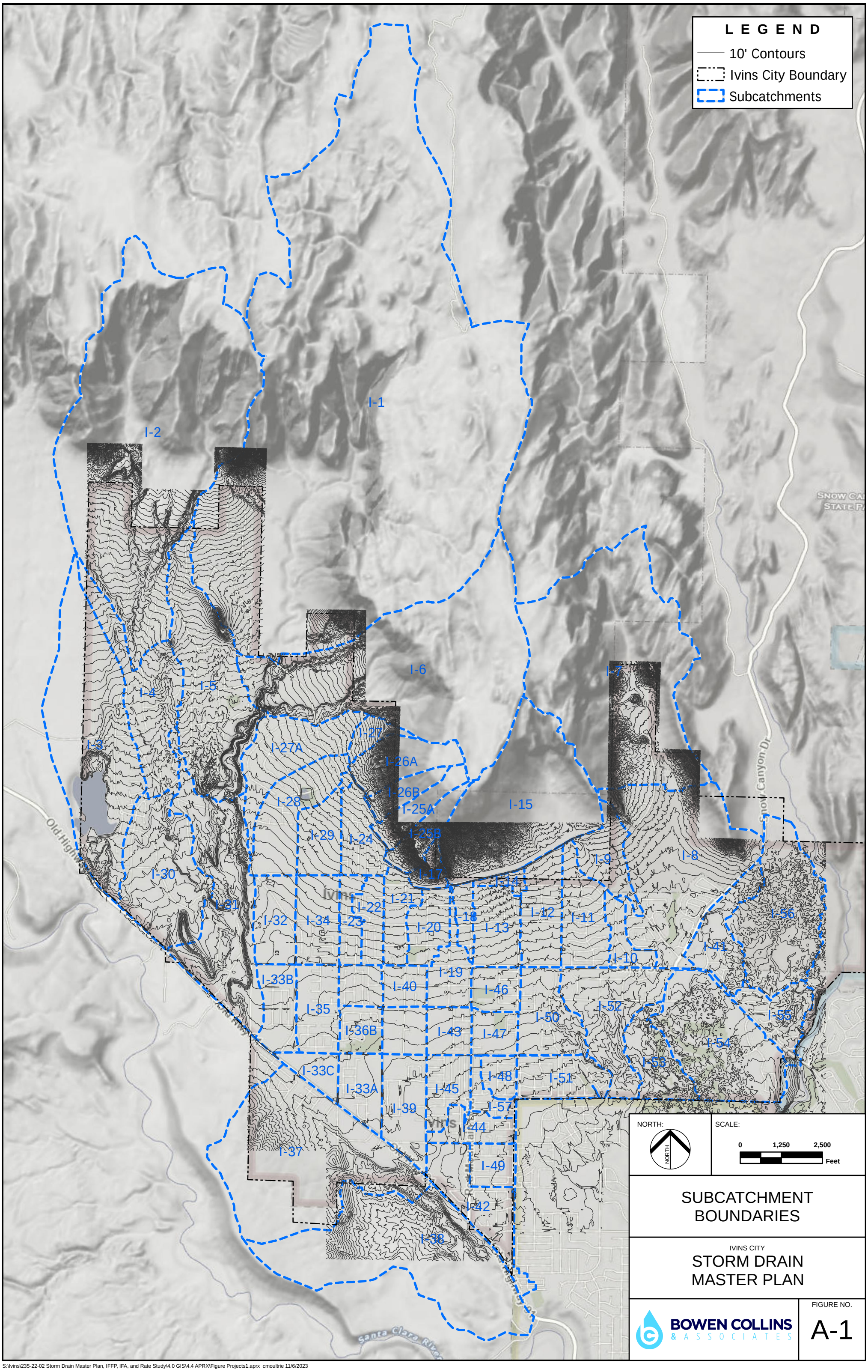
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical



S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 11/6/2023

L E G E N D

Ivins City Boundary

Subcatchments

Hydrologic Soil Class

- A
- B
- C
- D

NORTH:

SCALE: 0 1,250 2,500 Feet

HYDROLOGIC SOIL GROUP

IVINS CITY

STORM DRAIN MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO. A-2

L E G E N D

Ivins City Boundary

Subcatchments

Antecedant Moisture Condition

AMC II

AMC III

NORTH:

SCALE:

0 1,250 2,500 Feet

ANTECEDENT MOISTURE CONDITION

IVINS CITY

STORM DRAIN MASTER PLAN

BOWEN COLLINS & ASSOCIATES

FIGURE NO.

A-3

S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 11/6/2023

APPENDIX B – COST ESTIMATES

Table B-1
Conceptual Cost Estimate Unit Cost Summary
Ivins City Storm Drain Master Plan

Description	Unit	Unit Cost[1,2]
Detention Basins		
Property Acquisition	Acre	$162,600
Excavation and Hauling	Cubic Yard	$18
Landscaping (Irrigated Turfgrass)	Square Foot	$4.24
Inlet Structure	Lump Sum	$19,800
Outlet Structure	Lump Sum	$22,700
SCADA & Actuators	Lump Sum	$35,400
Emergency Spillway	Lump Sum	$7,100
Storm Drain Pipelines		
Permanent Easement Acquisition	Acre	$16,300
18-inch RCP	Linear Foot	$130
24-inch RCP	Linear Foot	$150
30-inch RCP	Linear Foot	$170
36-inch RCP	Linear Foot	$210
42-inch RCP	Linear Foot	$260
48-inch RCP	Linear Foot	$310
54-inch RCP	Linear Foot	$360
60-inch RCP	Linear Foot	$410
66-inch RCP	Linear Foot	$460
72-inch RCP	Linear Foot	$510
78-inch RCP	Linear Foot	$600
Manhole	Each	$5,700
Catch Basin	Each	$4,000
Asphalt	Square Yard	$59
Traffic Control	Linear Foot	$23
Storm Drain Culvert Road Crossings for Creeks and Washes		
Pipe Culvert	See RCP Storm Drain Costs Above	
4' X 8' Box Culvert (2-5 feet of cover)	Linear Foot	$1,200
Headwalls	Lump Sum	$6,800
Riprap	Lump Sum	$50,000
Traffic Control	Lump Sum	$7,500
Channel Construction		
Excavation and Hauling	Cubic Yard	$18
Riprap	Cubic Yard	$75
Other		
Contingency	20 Percent of Construction Cost	
Engineering, Legal, and Administration	15 Percent of Construction Cost w/ Contingency	

(1) - Costs are in 2023 Dollars

(2) - These costs were used to estimate future project costs. In some cases, detailed cost estimates provided by the City supercede these estimated costs.

IVINS CITY STORM DRAIN IMPACT FEE FACILITIES PLAN

FEBRUARY 2024

DRAFT

PREPARED FOR:

IVINS CITY UTAH

PREPARED BY:

BOWEN COLLINS & ASSOCIATES

TABLE OF CONTENTS

Page No.

EXECUTIVE SUMMARY ES-1
Introduction ES-1
Why is an IFFP Needed? ES-1
Projected Future Growth ES-1
Existing Capacity to Serve Future Growth ES-1
Required System Improvements ES-1

SECTION 1 - INTRODUCTION 1-1

SECTION 2 - EXISTING LEVEL OF SERVICE - 11-36A-302(1)(A)(I) 2-1
Performance Standard 2-1
Storm Drain Conveyance 2-1
Detention Basins 2-1
Design Storm Parameters 2-1
Unit of Demand 2-2

SECTION 3 - PROPOSED LEVEL OF SERVICE - 11-36A-302(1)(A)(II) 3-1

SECTION 4 - EXCESS CAPACITY TO ACCOMMODATE FUTURE GROWTH - 11-36A-302(1)(A)(III) 4-1
Existing Storm Drain Infrastructure 4-1
Existing Demand and Determination of Excess Capacity 4-1

SECTION 5 - DEMANDS PLACED ON FACILITIES BY NEW DEVELOPMENT - 11-36A-302(1)(A)(IV) 5-1
Conversion of Growth and Development Projections to Impervious Acres 5-1

SECTION 6 - INFRASTRUCTURE REQUIRED TO MEET DEMANDS OF NEW DEVELOPMENT - 11-36A-302(1)(A)(V) 6-1
10-Year Improvement Plan 6-1
Project Cost Attributable to Future Growth 6-4
Project Cost Attributable to 10-Year Growth 6-5
Basis of Construction Cost Estimates 6-5

SECTION 7 - ADDITIONAL CONSIDERATIONS 7-1
Manner of Financing - 11-36a-302(2) 7-1
Federal and State Grants and Donations 7-1
Bonds 7-1
Interfund Loans 7-1
Impact Fees 7-1
Developer Dedications and Exactions 7-1
Necessity of Improvements to Maintain Level of Service - 11-36a-302(3) 7-2

TABLE OF CONTENTS
(continued)

Page No.

School Related Infrastructure – 11-36a-302(2) 7-2
Noticing and Adoption Requirements – 11-36a-502 7-2

SECTION 8 - IMPACT FEE CERTIFICATION - 11-36A-306(1) 8-1

LIST OF TABLES

No.	Title	On or Following Page No.
ES-1	Projected 10- Year Developed Acreage (Impervious Acres)	ES-1
ES-2	Impact Fee Facilities Plan – Costs Required for Future Growth	ES-2
5-1	Projected 10-Year Growth	5-1
5-2	Developed Acreage for Existing and Future Development (Impervious Acres)	5-1
6-1	Summary of Future Storm Drain Impact Fee Facility Improvements	6-3
6-2	Impact Fee Facilities Plan – Costs Required for Future Growth	6-5

LIST OF FIGURES

No.	Title	On or Following Page No.
6-1	IFFP Projects	6-2

EXECUTIVE SUMMARY

INTRODUCTION

Ivins City (City) has retained Bowen Collins & Associates (BC&A) to prepare an Impact Fee Facility Plan (IFFP) for the storm drain utility. The purpose of an IFFP is to identify demands placed upon City facilities by future development and evaluate how these demands will be met by the City. The IFFP is also intended to outline the improvements which may be funded through impact fees.

WHY IS AN IFFP NEEDED?

The IFFP provides a technical basis for assessing updated impact fees throughout the City. This document will address the future infrastructure needed to serve the City with regard to current land use planning. The existing and future capital projects documented in this IFFP will ensure that level of service standards are maintained for all existing and future residents who reside within the service area. Local governments must pay strict attention to the required elements of the Impact Fee Facilities Plan which are enumerated in the Impact Fees Act.

PROJECTED FUTURE GROWTH

To evaluate the use of existing capacity and the need for future capacity, it is first necessary to calculate the demand associated with existing development and projected growth. Using available information for existing development and expected growth, projected growth in impervious developed acreage for the City's 10-year growth projections are summarized in Table ES-1.

Table ES-1
Projected 10-Year Developed Acreage
(Impervious Acres)

Development Type	Acreage
Existing Development	530
10-Year Development	271
Greater than 10-Year Development	268
Total Developed Impervious Acreage at Buildout	**1,070**

EXISTING CAPACITY AVAILABLE TO SERVE FUTURE GROWTH

Projected future growth will be met through a combination of available excess capacity in existing facilities and construction of additional capacity in new facilities. The calculated percentage of existing capacity currently in use by existing development is 48.1 percent. Growth during the next 10 years is calculated to use an additional 27.2 percent, with the remaining 24.6 percent of existing capacity to be used by growth beyond the 10-year planning window.

REQUIRED SYSTEM IMPROVEMENTS

Beyond available existing capacity, additional improvements required to serve new growth are summarized in Table ES-2.

Table ES-2
Impact Fee Facilities Plan - Costs Required for Future Growth

Project ID	Project Location	Construction Year	Estimated 2023 Construction Cost	Percent of Cost Attributable to:		
				Existing	10-Year Growth	Growth Beyond 10 Years
P-08	400 West, Center St.	2032	$517,000	66.2%	5.6%	28.1%
P-15	100 West/200 South	2026	$50,000	85.0%	9.6%	5.4%
P-19	250 East, 200 South	2034	$593,000	77.2%	15.2%	7.6%
P-20	250 East, 400 South	2028	$473,000	47.7%	7.4%	44.9%
P-23	Park Avenue Way	2030	$437,000	42.6%	10.5%	47.0%
P-24	Hwy 91 and Red Mtn. Blvd.	2026	$70,000	20.9%	56.0%	23.1%
P-25	Hwy 91 and Red Mtn. Blvd.	2024	$707,000	20.9%	56.0%	23.1%
P-26	Flood Street (400 East)	2027	$609,000	80.5%	3.5%	15.9%
P-28	RV Park @ Hwy 91	2033	$70,000	0.0%	100.0%	0.0%
P-29	200 North, 400 West	2031	$319,000	20.0%	30.0%	50.0%
P-30	265 West, Center Street	2026	$190,000	50.0%	25.0%	25.0%
DB-4	400 East, 400 South	2029	$445,000	47.7%	7.4%	44.9%
DB-6	600 West, 200 North	2026	$272,000	0.0%	32.9%	67.1%
C-4	450 South, Wash	2033	$100,000	0.0%	100.0%	0.0%
C-5	Dry Wash (West Side)	2033	$200,000	0.0%	50.0%	50.0%
Inlets	450 North, 400 West	2026	$50,000	100.0%	0.0%	0.0%
PW	Public Works Yard*	2025	$603,000	45.3%	27.5%	27.1%
		Total	**$5,705,000**	**45.6%**	**23.9%**	**30.5%**

* Cost for Public Works Yard is based on the portion of the total project that is attributable to storm drain (5%).

To satisfy the requirements of state law, Table ES-2 provides a breakdown of the percentage of the project costs attributed to existing and future users. For future use, capacity has been divided between capacity to be used by growth within the 10-year planning window of this IFFP and capacity that will be available for growth beyond the 10-year window.

SECTION 1
INTRODUCTION

Ivins City (City) has retained Bowen Collins & Associates (BC&A) to prepare an Impact Fee Facility Plan (IFFP) for storm drain services provided by the City. The purpose of an IFFP is to determine the public facilities required to serve development resulting from new development activity. The IFFP is also intended to outline the improvements which may be funded through impact fees.

Much of the analysis forming the basis of this IFFP has been taken from the City's storm drain master plan. The master plan was prepared by BC&A in 2024. For the purposes of this report, subsequent references to the master plan will simply be identified as the "Storm Drain Master Plan". The reader should refer to the City's 2024 Storm Drain Master Plan for additional discussion of planning and evaluation methodology beyond what is contained in this IFFP.

Requirements for preparing an IFFP are outlined in Title 11, Chapter 36a of the Utah Code (the Impact Fees Act). Under these requirements, an IFFP shall accomplish the following for each facility:

1. Identify the existing level of service
2. Establish a proposed level of service
3. Identify excess capacity to accommodate future growth at the proposed level of service
4. Identify demands placed upon existing public facilities by new development
5. Identify the means by which demands from new development will be met
6. Consider the following additional issues
    a. revenue sources to finance required system improvements
    b. necessity of improvements to maintain the proposed level of service
    c. need for facilities relative to planned locations of schools

The following sections of this report have been organized to address each of these requirements.

SECTION 2
EXISTING LEVEL OF SERVICE - 11-36a-302(1)(a)(i)

Level of service is defined in the Impact Fees Act as "the defined performance standard or unit of demand for each capital component of a public facility within a service area". This section discusses the level of service currently provided to existing users.

PERFORMANCE STANDARD

The performance standard defines the level of service the City has established to satisfy City and/or State performance requirements. There is no minimum State standard for storm drain as there are with some other utilities. Every city desires to protect their residents and infrastructure from flooding and attempts to balance the cost of storm drainage improvements with the amount of flow in the streets. The evaluation criteria for this study were provided by Ivins City personnel as documented in their Storm Drain Master Plan. The level of service adopted by Ivins City is similar to the level of service provided by neighboring cities.

STORM DRAIN CONVEYANCE

Storm drain pipelines are not allowed to flood into the street during the 10-year storm event. If storm water discharge is greater than the 10-year event, the pipes will pressurize and eventually flood into the streets. It is important to note that roadways become the major storm water conveyance facility during storms that are larger than the 10-year design event and should be designed to convey flows up to the 100-year event. Storm drain pipe materials and minimum sizes are defined in the "Ivins City's Standard Specifications".

While the City does use some open channels for storm drain conveyance, no open channel costs are proposed to be recovered as part of impact fees. As a result, open channels will not be considered further as part of this IFFP.

Culverts should be designed to safely convey the 100-year storm event. Design standards required for culverts including minimum size can be found in Ivins City's Standard Specifications.

DETENTION BASINS

Detention facilities are routinely used in the City to reduce maximum flow rates. In Ivins City, both regional and local detention facilities are used. Regional basins need to have capacity for the 100-year storm and are used to detain flows from all types of developments. Local detention basins have been designated as project level improvements to be constructed by a single developer or consortium of neighboring developers. Local detention is required for areas having an impervious area greater than the typical single lot residential unit. This allows for similar rates of runoff for all development. All detention basins should have an emergency overflow designed to convey runoff from storms larger than the design storm event. The overflow should direct water toward secondary conveyance facilities, such as a right-of-way or open channel, and away from private property and areas of potential property damage.

DESIGN STORM PARAMETERS

The design storm defines how much precipitation falls and at what rate for a projected precipitation event. Rainfall data for system evaluation is based on the National Oceanic and Atmospheric Administration (NOAA) Atlas 14. This data is commonly used by professionals in the industry and

has been shown to produce accurate results in studies conducted in neighboring communities. The Farmer Fletcher Storm distribution was used to simulate a cloudburst event which is typical for cities in Southern Utah.

UNIT OF DEMAND

Impact fees will be calculated based on total impervious acreage. This approximately reflects the potential volume of runoff associated with each property.

SECTION 3
PROPOSED LEVEL OF SERVICE - 11-36a-302(1)(a)(ii)

The proposed level of service is the performance standard used to evaluate system needs in the future. The Impact Fee Act indicates that the proposed level of service may:

1. diminish or equal the existing level of service; or
2. exceed the existing level of service if, independent of the use of impact fees, the City implements and maintains the means to increase the level of service for existing demand within six years of the date on which new growth is charged for the proposed level of service.

No changes in the level of service are proposed for Ivins City. Future facilities will be constructed to meet the same performance standards identified for the existing level of service.

SECTION 4
EXCESS CAPACITY TO ACCOMMODATE FUTURE GROWTH - 11-36a-302(1)(a)(iii)

Projected future growth will be met through a combination of available excess capacity in existing facilities and construction of additional capacity in new facilities.

EXISTING STORM DRAIN INFRASTRUCTURE

Existing storm drain infrastructure in Ivins City includes conveyance pipelines, open channels, culverts, and detention basins. As noted previously, no improvements to open channels were recommended and will not be included in the calculation of impact fees. In areas where existing facilities exist, future growth will utilize a portion of excess capacity in existing facilities.

EXISTING DEMAND AND DETERMINATION OF EXCESS CAPACITY

To calculate the percentage of existing capacity to be used by future growth in existing facilities, existing and future development patterns were examined. The method used to calculate excess capacity available for use by future development is as follows:

- **Group Facilities as Necessary for Analysis –** While Ivins has good records of past projects and can document actual expenditures for many storm drain facilities, the available records do not identify the specific locations of all projects. As a result, it is necessary to group some facilities for analysis purposes.
- **Calculate Potential Drainage Area of the Facilities –** The drainage area contributing to each facility or group of facilities was calculated for both existing and future development scenarios (see Section 5). Land use was then analyzed for each drainage area to determine the impervious areas for both existing and future development scenarios.
- **Identify Existing Development –** Based on GIS records and available aerial photography, existing impervious areas within each drainage area have been identified.
- **Identify 10-year Growth** – Population projections were made for Ivins City through buildout. Projects selected for the next 10 years are based on areas where projected growth is expected.
- **Calculate Percent of Excess Capacity Used by Growth** – The percent of excess capacity being used in each facility was calculated by dividing the growth in use in the facility (growth in developed impervious area less existing impervious area) by the maximum use of capacity at buildout (total impervious drainage area for the facilities).
- **Calculate Cost Weighted Average for System** – Each facility in the system has a different quantity of excess capacity to be used by future growth. To develop an estimate of excess capacity for the system as a whole, the capacities of each of these facilities and their contribution to the system must be considered. To do this, each component has been weighted based on its calculated actual cost. The capacity of the system as a whole is then calculated as the sum of the weighted capacity used by future growth divided by the sum of total weighted capacity in the system.

Based on the method described above, the calculated percentage of existing capacity currently in use by existing development is 48.1 percent. Growth during the next 10 years is calculated to use an additional 27.2 percent, with the remaining 24.6 percent of existing capacity to be used by growth beyond the 10-year planning window.

In considering available capacity in existing storm drain facilities, it should be remembered that available capacity can only serve growth in the areas for which it was constructed. In other words, an existing pipeline that has available capacity for future growth in one area of the City can provide no benefit for projected growth in another area of the City. Thus, it is common for projects to be needed in one area, even though available capacity may exist in another area. By following the procedure to calculate use of capacity as described above, only the existing capacity that will actually be used by 10-year growth has been identified as reimbursable through impact fees.

SECTION 5
DEMANDS PLACED ON FACILITIES BY NEW DEVELOPMENT - 11-36a-302(1)(a)(iv)

The planning period to be used for this IFFP is 10 years. Table 5-1 lists the population projections for the City for the 10-year planning window. The population projections are based on a report provided by Ivins City personnel which uses projections from the Governor's Office of Management and Budget (GOMB). Growth in Ivins will come in the form of both residential and n commercial/industrial grwoth. It is anticipated that a larger proportion of growth in the near future will be commercial/industrial compared to the historic development distribution in Ivins City. Commercial/industrial poperties generally have a higher proportion of impervious area when compared to residential properties. For these reasons, it is important that growth be deifined in terms of Equivalent Residential Units (ERUs) and not just population. This provides a better representation of growth in impervious area in the City. Projected ERUs based on both residential and commercial/industrial growth are provided in Table 5-1.

Table 5-1
Projected 10-Year Growth

Year	Ivins City Population Projection	ERU Growth Projection
2023	10,484	5,011
2033	13,500	8,019
2050	19,500	11,051

CONVERSION OF GROWTH AND DEVELOPMENT PROJECTIONS TO IMPERVIOUS ACRES

To evaluate the use of existing capacity and the need for future capacity, it is first necessary to calculate the impervious acreage associated with existing development and projected growth. Using available information for existing development, BC&A calculated the average impervious acreage associated with existing and future development. Using ERU projections, the impervious acreages for 10-year and greater than 10-year growth were estimated. Table 5-2 lists the impervious acreage associated with existing, 10-year, and greater than 10-year growth.

Table 5-2
Developed Acreage for Existing and Future Development (Impervious Acres)

Development Type	Impervious Acreage
Existing Development	530
10-Year Development	271
Greater than 10-Year Development	268
Total Developed Impervious Acreage at Buildout	**1,070**

As shown in Table 5-2, it is projected that approximately 271 impervious acres of new development will occur over the next 10 years. It should be emphasized that this is impervious acreage directly associated with developed lots and does not include public roads. Inherent to land development is

the creation of impervious areas, such as parking lots, driveways, and rooftops which make up the calculated impervious areas. This will be accounted for separately.

SECTION 6
INFRASTRUCTURE REQUIRED TO MEET DEMANDS OF NEW DEVELOPMENT - 11-36a-302(1)(a)(v)

To satisfy the requirements of state law, demand placed upon system facilities by future development was projected using the process outlined below.

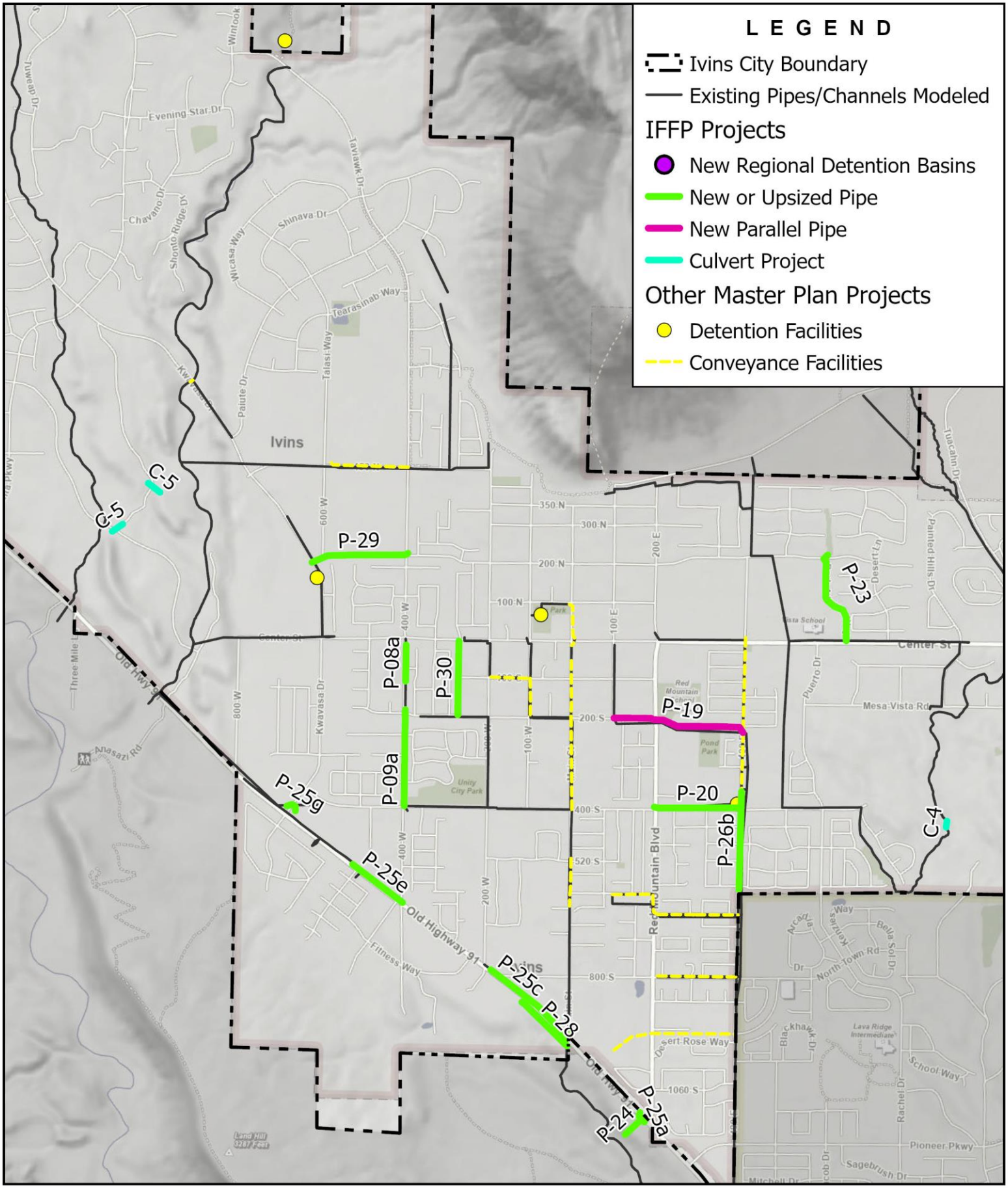
1. **Existing Capacity** – The capacities of the existing facilities were evaluated using a hydraulic storm water model as part of the master plan.
2. **Existing Deficiencies** – Existing deficiencies in the system were identified by comparing defined levels of service against calculated capacities.
3. **Future Demand** - The demand that future development will place on the system was estimated based on development projections as discussed in Section 5.
4. **Future Deficiencies** - Future deficiencies in the storm drain infrastructure were identified based on the defined level of service.
5. **Recommended Improvements** – Needed storm drain improvements were identified to resolve the projected deficiencies.

The steps listed above describe the "demands placed upon existing public facilities by new development activity at the proposed level of service; and… the means by which the political subdivision or private entity will meet those growth demands" (Section 11-36a-302-1.a of the Utah Code).

10-YEAR IMPROVEMENT PLAN

Planned improvements to satisfy level of service requirements for projected demands at build out have been identified in the City's Storm Drain Master Plan. These improvements will be constructed in phases as development occurs. Only infrastructure to be constructed within a ten-year horizon will be considered in the calculation of these impact fees to avoid uncertainty surrounding improvements further into the future.

To identify improvements to be built within the 10-year window, prioritization of projects was based on the likelihood of flooding and the extents of the damage which could occur. The highest priority projects were added to the City's 10-year improvement plan. Table 6-1 summarizes the projects that are projected to be needed within the next ten years. The location of these projects is shown in Figure 6-1.



S:\Ivins\235-22-02 Storm Drain Master Plan, IFFP, IFA, and Rate Study\4.0 GIS\4.4 APRX\Figure Projects1.aprx cmoultrie 10/23/2023

Table 6-1
Summary of Future Storm Drain Impact Fee Facility Improvements

Project ID	Project Location	Year	Pipe Length (ft)	Diameter (in)	Volume (ac-ft)	Project Expense - 2023 Dollars	Construction Year Expense
P-08, P-09	400 West, Center St.	2032	2,120	30, 36, 42	-	$517,000	$675,000
P-15	100 West/200 South	2026	580	24		$50,000	$55,000
P-19	250 East, 200 South	2034	2,140	24	-	$593,000	$821,000
P-20	250 East, 400 South	2028	1390	36	-	$473,000	$549,000
P-23	Park Avenue Way	2030	1.58	24	-	$437,000	$538,000
P-24	Hwy 91 and Red Mtn. Blvd.	2026	360	24	-	$70,000	$77,000
P-25	Hwy 91 and Red Mtn. Blvd.	2024	3,100	18, 24, 30, 36	-	$707,000	$729,000
P-26b	Flood Street (400 East)	2027	1,560	42	-	$609,000	$686,000
P-28	RV Park @ Hwy 91	2033	1,000	18	-	$70,000	$95,000
P-29	200 North, 400 West	2031	1,570	18	-	$319,000	$405,000
P-30	265 West, Center Street	2026	1180	18	-	$190,000	$208,000
DB-4	400 East, 400 South	2029	-	-	3.4	$445,000	$532,000
DB-6	600 West, 200 North	2026	-	-	1.8	$272,000	$298,000
C-4	450 South, Wash	2033	-	-	-	$100,000	$135,000
C-5	Dry Wash (West Side)	2033	-	-	-	$200,000	$269,000
Inlets	450 North, 400 West	2026	-	-	-	$50,000	$55,000
PW	Public Works Yard*	2025	-	-	-	$603,000	$640,000
					Total Project Cost	**$5,705,000**	**$6,767,000**

*Cost for Public Works Yard is based on the portion of the total project that is attributable to storm drain (5%).

It should be noted that Table 6-1 only includes those projects with components of cost that are eligible to be included in the impact fee calculation. Other storm drain projects that may be completed over the next ten years but have not been shown in the table include: projects for maintenance and repair (to be paid for by existing users), enclosure of historic open channels for property owner

convenience (to be paid for by property owner), and project level improvements (to be paid for by individual developers).

PROJECT COST ATTRIBUTABLE TO FUTURE GROWTH

To satisfy the requirements of state law, Table 6-2 provides a breakdown of the impact fee facility projects and the percentage of the project costs attributed to existing and future users. As defined in Section 11-36-304, the impact fee facilities plan should only include "the proportionate share of the costs of public facilities [that] are reasonably related to the new development activity." While some projects from the capital facilities plan are required to meet future growth, some projects also provide benefit to existing users. Projects that benefit existing users include those projects addressing existing capacity deficiencies, maintenance related projects, or projects increasing the level of service for existing users.

For some projects, the division of costs between existing and future users is easy because 100 percent of the project costs can be attributed to one category or the other (e.g., infrastructure needed solely to serve new development can be 100 percent attributed to new growth). For projects needed to address both existing deficiencies and new growth, the costs were divided based on the area the pipe serves. For example, if a pipe is to be replaced and will cost $100,000 and it serves an area that was 80 percent developed. Existing users would be responsible to pay $80,000, while future users would be responsible for $20,000.

The method used to calculate flows associated with each type of development is as follows:

- **Calculate Potential Drainage Area of the Facilities –** The total drainage area contributing to each project at buildout was calculated.
- **Identify Existing Development –** Based on GIS records and available aerial photography, existing impervious areas within each drainage area were identified.
- **Identify 10-year Growth** – Using population projections, the impervious area associated with growth in the 10-year window has been calculated.
- **Calculate Percent of Excess Capacity Used by Future Growth** – The percent of capacity being used in each facility was calculated by dividing the impervious area of each type (existing, 10-year, and beyond 10-year) contributing to each facility by the total impervious area for the project.

Table 6-2
Impact Fee Facilities Plan - Costs Required for Future Growth

Project ID	Project Location	Construction Year	Estimated 2023 Construction Cost	Percent of Cost Attributable to:		
				Existing	10-Year Growth	Growth Beyond 10 Years
P-08	400 West, Center St.	2032	$517,000	66.2%	5.6%	28.1%
P-15	100 West/200 South	2026	$50,000	85.0%	9.6%	5.4%
P-19	250 East, 200 South	2034	$593,000	77.2%	15.2%	7.6%
P-20	250 East, 400 South	2028	$473,000	47.7%	7.4%	44.9%
P-23	Park Avenue Way	2030	$437,000	42.6%	10.5%	47.0%
P-24	Hwy 91 and Red Mtn. Blvd.	2026	$70,000	20.9%	56.0%	23.1%
P-25	Hwy 91 and Red Mtn. Blvd.	2024	$707,000	20.9%	56.0%	23.1%
P-26	Flood Street (400 East)	2027	$609,000	80.5%	3.5%	15.9%
P-28	RV Park @ Hwy 91	2033	$70,000	0.0%	100.0%	0.0%
P-29	200 North, 400 West	2031	$319,000	20.0%	30.0%	50.0%
P-30	265 West, Center Street	2026	$190,000	50.0%	25.0%	25.0%
DB-4	400 East, 400 South	2029	$445,000	47.7%	7.4%	44.9%
DB-6	600 West, 200 North	2026	$272,000	0.0%	32.9%	67.1%
C-4	450 South, Wash	2033	$100,000	0.0%	100.0%	0.0%
C-5	Dry Wash (West Side)	2033	$200,000	0.0%	50.0%	50.0%
Inlets	450 North, 400 West	2026	$50,000	100.0%	0.0%	0.0%
PW	Public Works Yard*	2025	$603,000	45.3%	27.5%	27.1%
		Total	**$5,705,000**	**45.6%**	**23.9%**	**30.5%**

* Cost for Public Works Yard is based on the portion of the total project that is attributable to storm drain (5%).

It should be noted that Table 6-2 does not include bond costs related to paying for impact fee eligible improvements. These costs, if any, should be added as part of the impact fee analysis.

PROJECT COST ATTRIBUTABLE TO 10 YEAR GROWTH

Included in Table 6-2 is a breakdown of capacity associated with growth through the next 10 years and for growth beyond 10 years. A challenge with Storm Drain infrastructure is that it is not cost effective to add capacity in small increments. Once a pipeline is being built, it needs to be built to satisfy long-term capacity needs. As a result, the improvements proposed in the impact fee facility plan will include capacity for growth beyond the 10-year planning window. To most accurately evaluate the cost of providing service for growth during the next ten years, added consideration has been given to evaluating how much of each improvement will be used in the next 10 years. This has been done following the same methodology as described above.

BASIS OF CONSTRUCTION COST ESTIMATES

The costs of construction for projects to be completed within ten years have been estimated based on past BC&A experience with projects of a similar nature. Pipeline project costs are based on average per foot costs for pipes of a similar nature. Costs include consideration of other components of the storm drain system including manholes, catch basins, and surface restoration as appropriate for each project.

SECTION 7
ADDITIONAL CONSIDERATIONS

MANNER OF FINANCING - 11-36a-302(2)

The City may fund the infrastructure identified in this IFFP through a combination of different revenue sources.

FEDERAL AND STATE GRANTS AND DONATIONS

Impact fees cannot reimburse costs funded or expected to be funded through federal grants and other funds that the City has received for capital improvements without an obligation to repay. Ivins City has received federal funding for past projects, but none of the projects listed in this Impact Fee Facility plan are anticipated to be funded by federal or state grants or donations.

BONDS

None of the costs contained in this IFFP include the cost of bonding. The cost of bonding required to finance impact fee eligible improvements identified in the IFPP may be added to the calculation of the impact fee. This will be considered in the impact fee analysis.

INTERFUND LOANS

Because infrastructure must generally be built ahead of growth, there often arise situations in which projects must be funded ahead of expected impact fee revenues. In some cases, the solution to this issue will be bonding. In others, funds from existing user rate revenue will be loaned to the impact fee fund to complete initial construction of the project and will be reimbursed later as impact fees are received. Consideration of potential interfund loans will be included in the impact fee analysis and should also be considered in subsequent accounting of impact fee expenditures.

IMPACT FEES

It is recommended that impact fees be used to fund growth-related capital projects as they help to maintain the proposed level of service and prevent existing users from subsidizing the capital needs for new growth. Based on this IFFP, an impact fee analysis will be able to calculate a fair and legal fee that new growth should pay to fund the portion of the existing and new facilities that will benefit new development.

DEVELOPER DEDICATIONS AND EXACTIONS

Developer exactions are not the same as grants. Developer exactions may be considered in the inventory of current and future infrastructure. If a developer constructs a system improvement or dedicates land for a system improvement identified in this IFFP, or dedicates a public facility that is recognized to reduce the need for a system improvement, the developer will be entitled to an appropriate credit against that developer's impact fee liability or a proportionate reimbursement.

If the value of the credit is less than the development's impact fee liability, the developer will owe the balance of the liability to the City. If the recognized value of the improvements/land dedicated is more than the development's impact fee liability, the City must reimburse the difference to the developer.

It should be emphasized that the concept of impact fee credits pertains to system level improvements only. For project level improvement (i.e., projects not identified in the impact fee facility plan),

developers will be responsible for the construction of the improvements without credit against the impact fee. No developer dedications are expected for storm drain infrastructure.

NECESSITY OF IMPROVEMENTS TO MAINTAIN LEVEL OF SERVICE - 11-36a-302(3)

According to State statute, impact fees cannot be used to correct deficiencies in the City's system and must be necessary to maintain the proposed level of service established for all users. Only those facilities or portions of facilities that are required to maintain the proposed level of service for future growth have been included in this IFFP. This will result in an equitable fee as future users will not be expected to fund any portion of the facilities that will benefit existing residents.

SCHOOL RELATED INFRASTRUCTURE - 11-36a-302(2)

As part of the noticing and data collection process for this plan, information was gathered regarding future school district and charter school development. Where the City is aware of the planned location of a school, required public facilities to serve the school have been included in the impact fee analysis.

NOTICING AND ADOPTION REQUIREMENTS - 11-36a-502

The Impact Fees Act requires that entities must publish a notice of intent to prepare or modify any IFFP. If an entity prepares an independent IFFP rather than include a capital facilities element in the general plan, the actual IFFP must be adopted by enactment. Before the IFFP can be adopted, a reasonable notice of the public hearing must be published in a local newspaper at least 10 days before the actual hearing. A copy of the proposed IFFP must be made available in each public library within the City during the 10-day noticing period for public review and inspection. Utah Code requires that the City must post a copy of the ordinance in at least three places. These places may include the City offices and the public libraries within the City's jurisdiction. Following the 10-day noticing period, a public hearing will be held, after which the City may adopt, amend and adopt, or reject the proposed IFFP.

SECTION 8
IMPACT FEE CERTIFICATION - 11-36a-306(1)

This IFFP has been prepared in accordance with Utah Code Title 11, Chapter 36a (the "Impact Fees Act"), which prescribes the laws pertaining to the imposition of impact fees in Utah. The accuracy of this report relies upon the planning, engineering, and other source data, which was provided by the City and their designees.

In accordance with Utah Code Annotated, 11-36a-306(1), Bowen Collins & Associates makes the following certification:

I certify that this impact fee facility plan:

1. Includes only the costs of public facilities that are:
    a. allowed under the Impact Fees Act; and
    b. actually incurred; or
    c. projected to be incurred or encumbered within six years after the day on which each impact fee is paid;
2. Does not include:
    a. costs of operation and maintenance of public facilities;
    b. costs for qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that is supported by existing residents; or
    c. an expense for overhead, unless the expense is calculated pursuant to a methodology that is consistent with generally accepted cost accounting practices and the methodological standards set forth by the federal Office of Management and Budget for federal grant reimbursement; and
3. Complies in each and every relevant respect with the Impact Fees Act.

_____

Cody Moultrie, P.E.

IVINS CITY
STORM DRAIN
IMPACT FEE ANALYSIS

FEBRUARY 2024

DRAFT

PREPARED FOR:

IVINS CITY, UTAH

PREPARED BY:

BOWEN COLLINS & ASSOCIATES

TABLE OF CONTENTS

Page No.

EXECUTIVE SUMMARY ES-1
Introduction ES-1
Why Assess an Impact Fee? ES-1
How are Impact Fees Calculated? ES-1
Impact Fee Calculation ES-1
Recommended Impact Fee ES-2

SECTION 1 - INTRODUCTION 1-1

SECTION 2 - IMPACT ON SYSTEM - 11-36A-304(1)(a)(b) 2-1

SECTION 3 - RELATION OF IMPACTS TO ANTICIPATED DEVELOPMENT - 11-36A-304(1)(c) 3-1

SECTION 4 - PROPORTIONATE SHARE ANALYSIS - 11-36A-304(d) 4-1
Excess Capacity to Accommodate Future Growth 4-1
Existing System Infrastructure Costs 4-1
Reimbursement Agreements 4-1
Future Improvements 4-2

SECTION 5 - IMPACT FEE CALCULATION - 11-36A-304(1)(e) 5-1
Bonding Interest Costs 5-1
Credit for User Fees 5-2
Impact Fee Studies 5-2
Recommended Impact Fee 5-3

SECTION 6 - ADDITIONAL CONSIDERATIONS - 11-36A-304(2) 6-1
Manner of Financing – 11-36a-304(20(a-e) 6-1
User Charges 6-1
Special Assessments 6-1
Bonds 6-1
General Taxes 6-1
Federal and State Grants and Donations 6-1
Dedication of System Improvements - 11-36A-304(2)(f) 6-2
Extraordinary Costs - 11-36a-304(2)(g) 6-2
Time-Price Differential - 11-36a-304(2)(h) 6-2
Noticing and Adoption Requirements – 11-36a-504 6-2

SECTION 7 – IMPACT FEE CERTIFICATION - 11-36A-306(2) 7-1

LIST OF TABLES

No.	Title	On or Following Page No.
ES-1	Impact Fee Calculation per Impervious Area	ES-2
ES-2	Recommended Impact Fee – Single Family Residential ($/unit)	ES-3
ES-3	Recommended Impact Fee – Other Zoning Types ($/acre based on total lot size)	ES-3
2-1	Average Developed Acreage for Existing and Future Development (Impervious Acres)	2-1
4-1	Use of Existing Capacity	4-1
4-2	Impact Fee Eligible Capital Projects	4-2
5-1	Impact Fee Calculation per Gross Acre	5-1
5-2	Credit for User Fees Paid Toward Existing	5-2
5-3	Recommended Impact Fee	5-3
5-4	Sample Impact Fee Calculation Based on 2016	5-4
5-5	Recommended Impact Fee – Single Family Residential ($/unit)	5-4
5-6	Recommended Impact Fee – Other Zoning Types ($/acre based on total lot size)	5-4

EXECUTIVE SUMMARY

INTRODUCTION

Ivins City has retained Bowen Collins & Associates (BC&A) to prepare an Impact Fee Analysis (IFA) for its storm drain system based on a recently completed Impact Fee Facility Plan (IFFP). An impact fee is a one-time fee, not a tax, imposed upon new development activity as a condition of development approval to mitigate the impact of the new development on public infrastructure. The purpose of an IFA is to calculate the allowable impact fee that may be assessed to new development in accordance with Utah code.

WHY ASSESS AN IMPACT FEE?

As new users join a system, they add demands that must be satisfied through new facilities or use of excess capacity in existing facilities. Until all required projects are completed and new development is utilizing the full capacity of existing facilities, the City can assess an impact fee to recover its cost of latent capacity available to serve the future development. The general impact fee methodology divides the available capacity of existing and future capital projects between existing and future users based on their projected demands.

HOW ARE IMPACT FEES CALCULATED?

A fair impact fee is calculated by dividing the cost of existing and future facilities by the amount of new growth that will benefit from the unused capacity. Only the capacity that is needed to serve the projected growth within the next ten years is included in the fee. Costs used in the calculation of impact fees include:

- New facilities required to maintain (but not exceed) the proposed level of service identified in the IFFP; only those expected to be built within ten years are considered in the final calculations of the impact fee.
- Historic costs of existing facilities that will serve new development
- Cost of professional services for engineering, planning, and preparation of the impact fee facilities plan and impact fee analysis

Costs not used in the impact fee calculation

- Operational and maintenance costs
- Cost of facilities constructed beyond 10 years
- Cost of facilities funded by grants, developer contributions, or other funds which the City is not required to repay
- Cost of renovating or reconstructing facilities which do not provide new capacity or needed enhancement of services to serve future development

IMPACT FEE CALCULATION

Impact fees for this analysis were calculated by dividing the proportional cost of facilities required to service 10-year growth by the amount of growth expected over the next 10 years. This is done for each of the major component categories in the system.

To facilitate calculation, impact fees are often defined in terms of impervious acre. Calculated impact fees by component are summarized in Table ES-1.

Table ES-1
Impact Fee Calculation per Impervious Area

Storm Drain Collection System Components	Total Cost of Component	% Serving 10-year Growth	Cost Serving 10-year Growth	10-year Impervious Acres Served	Cost Per Impervious Acre
Collection Facilities					
Existing Facilities	$8,873,241	27.2%	$2,415,888	271	$8,902.05
Existing Facilities Interest Costs	$1,161,989	34.9%	$405,135	271	$1,492.84
10-year Projects	$5,705,000	23.9%	$1,362,966	271	$5,022.25
Subtotal	**$15,740,230**		**$4,183,988**		**$15,417.14**
Other					
Credit For User Fees Paid Toward Existing	($656,696.92)	100%	($656,696.92)	271	($2,419.79)
Impact Fee Studies	$40,000.00	100%	$40,000.00	271	$147.39
Subtotal	**($616,696.92)**		**($616,696.92)**		**($2,272.40)**
Total	**$15,123,533**		**$3,567,291**		**$13,144.74**

The total impact fee per developed impervious area can be calculated by adding up the fee for each type of system component. This is separate from any additional charges levied by the City for hookup costs or for other reasonable permit and application fees. Please note that Table ES-1 calculates the fee per impervious acre for 2024 only. The fee will change gradually in future years as the credit for user fees paid slowly decreases. See the main body of the report for additional details.

RECOMMENDED IMPACT FEE

The total calculated impact fee is summarized in Tables ES-2 and ES-3. This is the legal maximum amount that may be charged as an impact fee. A lower amount may be adopted if desired, but a higher fee is not allowable under the requirements of Utah Code.

Table ES-2
Recommended Impact Fee – Single Family Residential
($/unit)

Zoning Type	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029
Low Impact Development (LID)	$920.13	$943.09	$964.35	$984.08	$1,002.42	$1,019.49
Low Density Residential	$1,659.69	$1,701.11	$1,739.46	$1,775.03	$1,808.11	$1,838.91
Medium Density Residential	$1,373.02	$1,407.28	$1,439.00	$1,468.44	$1,495.80	$1,521.28
High Density Residential	$980.73	$1,005.20	$1,027.86	$1,048.88	$1,068.43	$1,086.63

*To qualify as LID development, a property may have no more than 15 percent impervious and must have sufficient detention/retention to reduce the effective impervious area to no greater than 7 percent.

Table ES-3
Recommended Impact Fee – Other Zoning Types
($/1000 Impervious SF)

Zoning Type	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029
Non-Residential	$301.76	$309.29	$316.26	$322.73	$328.75	$334.35

SECTION 1
INTRODUCTION

Ivins City has retained Bowen Collins & Associates (BC&A) to prepare an Impact Fee Analysis (IFA) for its storm drain system based on a recently completed impact fee facility plan. An impact fee is a one-time fee, not a tax, imposed upon new development activity as a condition of development approval to mitigate the impact of the new development on public infrastructure. The purpose of an IFA is to calculate the allowable impact fee that may be assessed to new development in accordance with Utah code.

Requirements for the preparation of an IFA are outlined in Title 11, Chapter 36a of the Utah code (the Impact Fees Act). Under these requirements, an IFA shall accomplish the following for each facility:

1. Identify the impact of anticipated development activity on existing capacity
2. Identify the impact of anticipated development activity on system improvements required to maintain the established level of service
3. Demonstrate how the impacts are reasonably related to anticipated development activity
4. Estimate the proportionate share of:
    a. Costs of existing capacity that will be recouped
    b. Costs of impacts on system improvements that are reasonably related to the new development activity
5. Identify how the impact fee was calculated
6. Consider the following additional issues
    a. Manner of financing improvements
    b. Dedication of system improvements
    c. Extraordinary costs of servicing newly developed properties
    d. Time-price differential

The following sections of this report have been organized to address each of these requirements.

SECTION 2
IMPACT ON SYSTEM - 11-36a-304(1)(a)(b)

Growth within the City's service area, and projections of storm water flows resulting from said growth is discussed in detail in the City's Master Plan and Impact Fee Facilities Plan. For the purposes of impact fee calculation, growth in the system has been expressed in terms of developed impervious acres. Growth in developed impervious acres is projected for the service area is summarized in Table 2-1.

Table 2-1
Developed Acreage for Existing and Future Development
(Impervious Acres)

Development Type	Impervious Acreage
Existing Development	530
10-Year Development	271
Greater than 10-Year Development	268
Total Developed Impervious Acreage at Buildout	**1,070**

As indicated in the table, projected growth for the 10-year planning window of this impact fee analysis is 271 developed impervious acres. To maintain the established level of service, projected future growth will be met through a combination of available excess capacity in existing facilities and construction of additional capacity in new facilities.

SECTION 3
RELATION OF IMPACTS TO ANTICIPATED DEVELOPMENT
11-36a-304(1)(c)

To satisfy the requirements of state law, it is necessary to show that all impacts identified in the impact fee analysis are reasonably related to the anticipated development activity. This has been documented in detail in the Impact Fee Facilities Plan. In short, only that capacity directly associated with demand placed upon existing system facilities by future development has been identified as an impact of the development. The steps completed to identify the impacts of anticipated development are as follows.

1. **Existing Development** – The demand existing development places on the system was estimated based on GIS records and available aerial photography.
2. **Existing Capacity** – The capacities of existing facilities were calculated based on the level of service criteria established for each type of facility in the Impact Fee Facilities Plan.
3. **Existing Deficiencies** – Existing deficiencies in the system were looked for by comparing defined levels of service against calculated capacities. Where existing deficiencies existed, projects were identified to eliminate the deficiencies. Costs associated with existing deficiencies were not assigned to impacts of development.
4. **Future Development** - The demand future development will place on the system was estimated based on development projections as discussed in Section 2.
5. **Future Demand Use of Existing Capacity** – Whenever possible, excess capacity in existing facilities has been used to serve future demands. Where this occurs, the amount of capacity used by future growth has been calculated as described in detail in the Impact Fee Facilities Plan.
6. **Future Deficiencies** – Where excess capacity is inadequate to meet projected demands, future deficiencies in the system were identified using the same established level of service criteria used for existing demands.
7. **Recommended Improvements** – Needed system improvements were identified to meet demands associated with future development.

SECTION 4
PROPORTIONATE SHARE ANALYSIS - 11-36a-304(d)

A comprehensive proportionate share analysis associated with anticipated future development and its impact on the system was completed as part of the Impact Fee Facilities Plan. A summary of that analysis is contained here with additional discussion of the costs of facilities impacted by growth.

EXCESS CAPACITY TO ACCOMMODATE FUTURE GROWTH

As part of the Impact Fee Facilities Plan, the calculated percentage of existing capacity in system facilities used by existing users, growth during the 10-year planning window, and growth beyond the 10-year planning window is summarized in Table 4-1.

Table 4-1
Use of Existing Capacity

	Percent Use of Capacity in Existing Facilities
Existing	48.2%
10-year Growth	27.2%
Growth Beyond 10 Years	24.6%
Total	100%

EXISTING SYSTEM INFRASTRUCTURE COSTS

To calculate the value of excess capacity in the existing system, BC&A first looked at the value of all existing facilities. Ivins City has recorded the actual construction costs of existing components of the City's storm drain system since 2003, which totals $8,873,241.11. These are actual costs and were obtained from a storm drain fund report for the City through 2023. This cost excludes interest accrued which was paid as part of the bond associated with these projects and it excludes the costs the City paid that were subsequently reimbursed by grants. This cost will be addressed subsequently.

Note that the impact fee eligible cost identified above represents only a portion of the total system value. System costs not included in the total include facilities with a service life of less than 10 years, project level improvements serving single developments, and improvements not paid for by the City (e.g., projects funded through grants, developer dedications, etc.). In this study, public facility costs already incurred by the City will be included in the impact fee only to the extent that new growth will be served by the previously constructed improvements.

REIMBURSEMENT AGREEMENTS

No reimbursement agreements exist within the system that will affect the impact fee calculation.

FUTURE IMPROVEMENTS

In addition to using available existing capacity, demand associated with projected future development will be met through the construction of additional capacity in new facilities. A primary focus of the Impact Fee Facilities Plan was the identification of projects required to serve new

development. The results of the Impact Fee Facilities Plan are summarized in Table 4-2. Included in the table are the costs of each required project and the portion of costs associated with development.

Table 4-2
Impact Fee Eligible Capital Projects

Project ID	Project Location	Project Expense - 2023 Dollars	Percent Attributable to 10-Year Future Growth	Cost Attributable to 10-Year Future Growth
P-08	400 West, Center St.	$517,000	5.6%	$29,198
P-15	100 West/200 South	$50,000	9.6%	$4,818
P-19	250 East, 200 South	$593,000	15.2%	$90,299
P-20	250 East, 400 South	$473,000	7.4%	$34,938
P-23	Park Avenue Way	$437,000	10.5%	$45,699
P-24	Hwy 91 and Red Mtn. Blvd.	$70,000	56.0%	$39,199
P-25	Hwy 91 and Red Mtn. Blvd.	$707,000	56.0%	$395,913
P-26	Flood Street (400 East)	$609,000	3.5%	$21,569
P-28	RV Park @ Hwy 91	$70,000	100.0%	$70,000
P-29	200 North, 400 West	$319,000	30.0%	$95,700
P-30	265 West, Center Street	$190,000	25.0%	$47,500
DB-4	400 East, 400 South	$445,000	7.4%	$32,870
DB-6	600 West, 200 North	$272,000	32.9%	$89,385
C-4	450 South, Wash	$100,000	100.0%	$100,000
C-5	Dry Wash (West Side)	$200,000	50.0%	$100,000
Inlets	450 North, 400 West	$50,000	0.0%	$0
PW	Public Works Yard*	$603,000	27.5%	$165,878
	Total	**$5,705,000**		**$1,362,966**

* Cost for Public Works Yard is based on the portion of the total project that is attributable to storm drain (5%).

SECTION 5
IMPACT FEE CALCULATION 11-36a-304(1)(e)

Using the information contained in the previous sections, impact fees can be calculated by dividing the proportional cost of facilities required to service 10-year growth by the amount of growth expected over the next 10 years. This is done for each of the major system components identified previously. Calculated impact fees by component are summarized in Table 5-1.

Table 5-1
Impact Fee Calculation per Impervious Acre

Storm Drain Collection System Components	Total Cost of Component	% Serving 10-year Growth	Cost Serving 10-year Growth	10-year Impervious Acres Served	Cost Per Impervious Acre
Collection Facilities					
Existing Facilities	$8,873,241	27.2%	$2,415,888	271	$8,902.05
Existing Facilities Interest Costs	$1,161,989	34.9%	$405,135	271	$1,492.84
10-year Projects	$5,705,000	23.9%	$1,362,966	271	$5,022.25
Subtotal	**$15,740,230**		**$4,183,988**		**$15,417.14**
Other					
Credit For User Fees Paid Toward Existing	($656,696.92)	100%	($656,696.92)	271	($2,419.79)
Impact Fee Studies	$40,000.00	100%	$40,000.00	271	$147.39
Subtotal	**($616,696.92)**		**($616,696.92)**		**($2,272.40)**
Total	**$15,123,533**		**$3,567,291**		**$13,144.74**

The total impact fee per impervious acre can be calculated by adding up the fee for each type of system component. This is separate from any additional charges levied by the City for hookup costs or for other reasonable permit and application fees.

BONDING INTEREST COSTS

In addition to construction costs, Table 5-1 includes rows for the cost of bond interest expense where applicable. This includes any outstanding interest costs on existing facilities where new growth will benefit from excess capacity and future interest costs for bonds required to build projects needed for growth as identified in the Impact Fee Facilities Plan. Similar to project construction costs, only that portion of interest expense associated with capacity for growth should be included in the impact fee calculation.

CREDIT FOR USER FEES

Not all existing deficiencies identified in the plan can be paid for from existing cash reserves. As a result, the plan includes some bonding for projects that have at least a portion of their costs that benefit existing users. In this situation, a credit is needed to ensure that future users are not paying twice for the same project, once for their own capacity through impact fees and a second time for existing users' capacity through user rates. Included in Table 5-1 are credits for user fees projected

to be paid toward projects benefiting existing users in the future. Calculation of the fee is summarized in Table 5-2. Note that the user fee credit decreases over time. For each year that passes, less will be paid by new users through user fees toward existing deficiencies.

Table 5-2
Credit for User Fees Paid Toward Existing

Year	Impervious Acres	Future Debt Service*	Annual Cost per Impervious Acre	PV Annual Cost per Impervious Acre	PV Cumulative Cost per Impervious Acre
FY24	558	$188,382.07	$337.88	$328.04	$2,419.79
FY25	585	$188,382.07	$322.20	$303.70	$2,091.75
FY26	612	$188,382.07	$307.91	$281.78	$1,788.05
FY27	639	$188,382.07	$294.83	$261.95	$1,506.27
FY28	666	$188,382.07	$282.82	$243.96	$1,244.32
FY29	693	$188,382.07	$271.74	$227.58	$1,000.36
FY30	720	$188,382.07	$261.51	$212.63	$772.78
FY31	748	$188,382.07	$252.01	$198.94	$560.15
FY32	775	$188,382.07	$243.18	$186.38	$361.21
FY33	802	$188,382.07	$234.95	$174.83	$174.83

* Includes only that portion of debt service to be paid through user fees that will benefit existing users

IMPACT FEE STUDIES

Utah code allows for the cost of planning and engineering associated with impact fee calculations to be recovered as part of impact fee. This cost includes a portion of the cost of the master plan along with the cost of the IFFP and IFA as part of the reimbursable impact fee costs.

RECOMMENDED IMPACT FEE

The total calculated impact fee is summarized in Table 5-3. As is shown in Table 5-2, credits will decrease with time. Thus, while the base impact fee will stay constant, the net impact fee to be paid by new development will increase slightly each year. For this reason, the estimated impact fees for the next six years have been summarized in Table 5-3. This is the legal maximum amount that may be charged as an impact fee. A lower amount may be adopted if desired, but a higher fee is not allowable under the requirements of Utah Code.

Table 5-3
Recommended Impact Fee

Year	Impact Fee Before User Fee Credit ($/Impervious Acre)	User Fee Credit ($/Impervious Acre)	Calculated Impact Fee ($/Impervious Acre)	Calculated Impact Fee ($/1000 Impervious SF)
FY24	$15,564.54	$2,419.79	$13,144.74	$301.76
FY25	$15,564.54	$2,091.75	$13,472.78	$309.29
FY26	$15,564.54	$1,788.05	$13,776.49	$316.26
FY27	$15,564.54	$1,506.27	$14,058.26	$322.73
FY28	$15,564.54	$1,244.32	$14,320.22	$328.75
FY29	$15,564.54	$1,000.36	$14,564.18	$334.35

The City has historically established impact fees based on zoning type. To keep with City's current impact fee structure and to simplify administration of the impact fee, it is recommended that the City collect impact fees on a per lot basis for all single-family development based on zoning type and expected percent impervious. For similar reasons, it is recommended that the City collect impact fees for other zoning types based on total lot size and expected percent impervious by zoning type. The details of this proposed approach are summarized in Table 5-4. If a developer presents actual percent impervious values at building permit that are substantially different the average values, these fees could be adjusted accordingly.

Table 5-4
Sample Impact Fee Calculation Based on 2024 Values

Zoning Type	Average Lot Size	Percent Impervious	Impact Fee/1000 SF	Recommended Impact Fee
Low Impact Development (LID)*	43,560	7%	$301.76	$920.13/unit
Low Density Residential	22,000	25%	$301.76	$1659.68/unit
Medium Density Residential	13,000	35%	$301.76	$1373.01/unit
High Density Residential	6,500	50%	$301.76	$980.72/unit
Apartments	-	55%	$301.76	$165.97/1000 SF total lot size
Commercial	-	85%	$301.76	$256.5/1000 SF total lot size
Church	-	60%	$301.76	$181.06/1000 SF total lot size
Office	-	70%	$301.76	$211.23/1000 SF total lot size

*To qualify as LID development, a property may have no more than 15 percent impervious and must have sufficient detention/retention to reduce the effective impervious area to no greater than 7 percent.

Based on this approach, recommended impact fees for the City are summarized in Tables 5-5 and 5-6.

Table 5-5
Recommended Impact Fee – Single Family Residential
($/unit)

Zoning Type	FY24	FY25	FY26	FY27	FY28	FY29
Low Impact Development (LID)*	$920.13	$943.09	$964.35	$984.08	$1,002.42	$1,019.49
Low Density Residential	$1,659.69	$1,701.11	$1,739.46	$1,775.03	$1,808.11	$1,838.91
Medium Density Residential	$1,373.02	$1,407.28	$1,439.00	$1,468.44	$1,495.80	$1,521.28
High Density Residential	$980.73	$1,005.20	$1,027.86	$1,048.88	$1,068.43	$1,086.63

*To qualify as LID development, a property may have no more than 15 percent impervious and must have sufficient detention/retention to reduce the effective impervious area to no greater than 7 percent.

Table 5-6
Recommended Impact Fee – Other Zoning Types
($/1000 Impervious SF)

Zoning Type	FY24	FY25	FY26	FY27	FY28	FY29
Non-Residential	$301.76	$309.29	$316.26	$322.73	$328.75	$334.35

IMPACT FEE ACCOUNTING

An important part of the Impact Fee Act is the future accounting of impact fees received and spent. As detailed in the Act, all collected funds must be spent or encumbered within six years after the impact fee is collected. A detailed ledger must be assembled to identify when and where the funds were collected and when and where they will be spent.

As discussed in the Act, a significant portion of the impact fee may be attributable to excess capacity in the existing system. Receipt of funds collected for this purpose should be documented in accordance with the Act but should then be transferred out of the impact fee fund account to reimburse existing users for the value of the excess capacity. This should also be documented in accordance with the Act. As with the overall fee, the value of the reimbursement will vary slightly depending on the remaining user fee credit (i.e. the reimbursement value should be reduced by any user fee credit associated with bonding on the existing infrastructure). The appropriate portion of the impact fee to be reimbursed for existing excess capacity is documented in Table 5-7.

Table 5-7
Excess Capacity Reimbursement Schedule

	Reimbursement Portion of Impact Fee (Per Acre of Impervious Area, by year)					
	FY24	**FY25**	**FY26**	**FY27**	**FY28**	**FY29**
Reimbursement for Excess Existing Capacity	$8,122.49	$8,450.53	$8,754.23	$9,036.01	$9,297.96	$9,541.92
Future Projects	$5,022.25	$5,022.25	$5,022.25	$5,022.25	$5,022.25	$5,022.25
Total Overall Fee	$13,144.74	$13,472.78	$13,776.49	$14,058.26	$14,320.22	$14,564.18

SECTION 6
ADDITIONAL CONSIDERATIONS - 11-36a-304(2)

MANNER OF FINANCING - 11-36a-304(2)(a-e)

As part of this Impact Fee Analysis, it is important to consider how each facility has been or will be paid for. Potential infrastructure funding includes a combination of different revenue sources.

USER CHARGES

Because infrastructure must generally be built ahead of growth, there often arise situations in which projects must be funded ahead of expected impact fee revenues. In some cases, the solution to this issue will be bonding. In others, funds from existing user rate revenue will be loaned to the impact fee fund to complete initial construction of the project and will be reimbursed later as impact fees are received. Consideration of interfund loans should be considered in subsequent accounting of impact fee expenditures.

SPECIAL ASSESSMENTS

Where special assessments exist, the impact fee calculation must consider funds contributed. No special assessments exist for this analysis.

BONDS

The City has funded a portion of the existing infrastructure through bonds. Where City financial plans identify bonding will be required to finance impact fee eligible improvements, the portion of bond cost and interest expense attributable to future growth could be added to the calculation of the impact fee. Currently, no bonding is proposed for the construction of future infrastructure.

GENERAL TAXES

If taxes are used to pay for infrastructure, they should be accounted for in the impact fee calculation. Specifically, any contribution made by property owners through taxes should be credited toward their available capacity in the system. In this case, no taxes are proposed for the construction of infrastructure.

FEDERAL AND STATE GRANTS AND DONATIONS

Impact fees cannot reimburse costs funded or expected to be funded through federal grants and other funds that the City has received for capital improvements without an obligation to repay. Grants have been received from the NRCS to help fund the rehabilitation of the NRCS dams. Any existing or future infrastructure funded through past or future grants has been removed from the system value during the impact fee analysis. Only those costs which the City is responsible for have been included in this analysis.

DEDICATION OF SYSTEM IMPROVEMENTS (11-36A-304.2.F)

Developer exactions may be considered in the inventory of current and future infrastructure. If a developer constructs a facility or dedicates land, the value of the dedication is credited against that particular developer's impact fee liability.

If the recognized value of the credit is less than the development's impact fee liability, the developer will owe the balance of the liability to the City. If the recognized value of the improvements/land

dedicated is more than the development's impact fee liability, the City must reimburse the difference to the developer.

It should be emphasized that the concept of impact fee credits pertains to system level improvements only. For project level improvement (i.e., projects not identified in the impact fee facility plan), developers will be responsible for the construction of the improvements without credit against the impact fee.

EXTRAORDINARY COSTS (11-36A-304.2.G)

The impact fee act indicates the analysis should include consideration of any extraordinary costs of servicing newly developed properties. In cases where one area of potential growth may cost significantly more to service than all other growth, a separate service area may be warranted. No areas with extraordinary costs have been identified as part of this analysis.

TIME-PRICE DIFFERENTIAL (11-36A-304.2.H)

Utah code requires consideration of time-price differential in order to create fairness for amounts paid at different times. Correspondingly, the cost of future projects includes consideration of inflation and the time-value of money. Per the requirements of the code, existing infrastructure value is based on actual historical costs.

NOTICING AND ADOPTION REQUIREMENTS (11-36A-504)

The Impact Fees Act requires that entities must publish a notice of intent to prepare or modify any IFA. Before the resulting impact fee can be adopted, the City must:

- Provide notice in accordance with Section 10-9a-205 of State Code. This includes reasonable notice of a public hearing published in a local newspaper at least 10 days before the actual hearing.
- A copy of the IFA and proposed impact fee enactment must be made available on the City's website or posted in each public library within the service area during the notice period for public review and inspection.
- Following the noticing period, a public hearing will be held, after which the IFA and impact fee enactment may be adopted, amended and adopted, or rejected.

SECTION 7
IMPACT FEE CERTIFICATION (11-36A-306.2)

This IFA has been prepared in accordance with Utah Code Title 11, Chapter 36a (the "Impact Fees Act"), which prescribes the laws pertaining to the imposition of impact fees in Utah. The accuracy of this report relies upon the planning, engineering, and other source data, which was provided by the City and their designees.

In accordance with Utah Code Annotated, 11-36a-306(2), Bowen Collins & Associates, makes the following certification:

I certify that the attached impact fee analysis:

1. Includes only the costs of public facilities that are:
    a. allowed under the Impact Fees Act; and
    b. actually incurred; or
    c. projected to be incurred or encumbered within six years after the day on which each impact fee is paid;
2. Does not include:
    a. costs of operation and maintenance of public facilities;
    b. costs of qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that is supported by existing residents; or
    c. an expense for overhead, unless the expense is calculated pursuant to a methodology that is consistent with generally accepted cost accounting practices and the methodological standards set forth by the federal Office of Management and Budget for federal grant reimbursement; and
3. Complies in each and every relevant respect with the Impact Fees Act.

_____

Cody Moultrie, P.E.

IVINS CITY STORM DRAIN RATE STUDY

FEBRUARY 2024

DRAFT

PREPARED FOR:

IVINS CITY UTAH

PREPARED BY:

BOWEN COLLINS & ASSOCIATES

TABLE OF CONTENTS

Page No.

SECTION 1 – PROJECTED REVENUE NEEDS 1-1
Introduction 1-1
Projected Revenue Needs 1-1
10-Year Budget Plan 1-2

SECTION 2 – STORM DRAIN RATE ANALYSIS 2-1
Key Assumptions 2-1
Projecting Future Connections and Impervious Area 2-1
Historic Drainage Area 2-1
Projected Accounts 2-2
Projected Developed Area 2-2
Calculating Revenue Requirements 2-3
Non-Rate Revenue 2-3
City Expenditures 2-3
Rate Design 2-5

SECTION 3 – CONCLUSIONS AND RECOMMENDATIONS 3-1

LIST OF APPENDICES

APPENDIX A – DETAILED STORM DRAIN RATE MODEL TABLES

TABLE OF CONTENTS
(continued)

LIST OF TABLES

No.	Title	Page No.
1-1	Recommended Annual Rate Revenue Increase for 10-Year Budget Plan	1-3
2-1	Drainage Area Summary	2-2
2-2	Projected Accounts Summary	2-2
2-3	Impervious Area Summary	2-3
2-4	Projected Non-Rate Revenue	2-4
2-5	Projected Revenue Requirements	2-4
2-6	Projected Revenue Based on Existing Storm Rates	2-5
2-7	Recommended Monthly Storm Drain Rates	2-5
2-8	Storm Drain Monthly Rates Comparison	2-6
3-1	Recommended Monthly Storm Drain Rates	3-1

LIST OF FIGURES

No.	Title	On or Following Page No.
1-1	10-Year Revenue and Expenditures – Storm Drain	1-4

SECTION 1
PROJECTED REVENUE NEEDS

INTRODUCTION

Ivins City has retained Bowen, Collins & Associates (BC&A) to update its storm drain rates. The purpose of this study is to update the City's storm drain rate based on changes in system development patterns and revenue requirements that have occurred since the last study. The rate study will calculate detailed rates for the next six years and present a longer-term finance plan to achieve the City's primary objectives of:

- Maintaining high quality, reliable storm drain service at affordable prices for customers;
- Maintaining stable revenue generation adequate to fund system needs; and
- Minimizing the City's long-term costs by avoiding debt where possible.

Implementing the recommendations contained in this report will help Ivins City keep its storm drain utility system adequately funded to maintain its current infrastructure and keep pace with its currently approved capital improvements plan.

PROJECTED REVENUE NEEDS

Before calculating detailed rates for individual customer classes, it is important to consider the overall plan for meeting the future revenue needs of the City. The first step in this process is to project future expenditures. Budgeted and projected expenditures for the City for years 2024 through 2034 are shown in Figure 1-1.

Tables containing the values used to generate these figures are contained in Appendices A-B. Future expenditures can be grouped into four categories:

- **Operation and Maintenance Expenditures –** These are the annual costs of running the system. They include items such as salary and benefit costs for City staff, equipment and supplies, power costs, and all other costs associated with doing business throughout the year. Operation and maintenance (O&M) costs are relatively consistent from year to year and tend to increase at the rate of inflation. O&M costs also increase over time as the storm drain system expands with population growth and development. Some of the largest O&M costs are employee wages and repair of storm drain lines.
- **Debt Service Expenditures –** These are the costs paid toward bonds taken out by the City in previous years. These costs are easily predictable because they are tied to set payment schedules for each bond. Note that the repayment schedule for the City's current bond includes additional principal payments through fiscal year (FY) 2027. It can be seen in Figure 1-1 that annual debt service expenditures drop in FY 2028 when these additional principal payments end.
- **Capital Improvement Expenditures –** These are the costs of constructing new facilities within the City. This can include completely new facilities or replacement of existing facilities. Capital improvement expenditures are usually the most volatile of expenditure categories. Because O&M and debt service costs are basically fixed, budgets are usually balanced by increasing or decreasing capital improvement expenditures as necessary. While some fluctuation in the funding of capital improvements is acceptable from year to year, the overall robustness of the system will depend on adequately funding this portion of the budget over

the long term. The current capital improvement budget shown in the figure is based on the City's recently completed storm drain master plan and associated capital improvement plan.

- **Rehabilitation and Replacement –** These costs are associated with repairing and replacing damaged and aging infrastructure. Each component of the storm drain system has a finite service life. As such, it is necessary to continually budget money for the rehabilitation or replacement of these system components. If adequate funds are not set aside for regular system renewal, the system will fall into disrepair and be incapable of providing the level of service customers in the City expect.

  Planned capital improvements as identified in the previous category (Capital Improvement Expenditures) are important for addressing known deficiencies and to accommodate future growth. However, it is also important to include costs in the budget to cover additional rehabilitation and replacement projects as the system ages and additional needs arise. This category includes funds for this purpose.

10-YEAR BUDGET PLAN

With the expected expenditures outlined above, it is possible to prepare a future budget plan. A budget plan has been developed for the storm drain utility and is shown in Figure 1-1. The process of creating this budget plan was as follows:

1. **Identify projected revenue based on existing storm drain rates –** Using the City's existing storm drain rates, BC&A calculated the revenue the City could expect to receive over the next 10 years if no changes are made to existing rates. These projections include consideration of future system growth and account for recommended impact fee rate increases over time. As can be seen in Figure 1-1, projected revenues based on existing rates are sufficient to meet the City's existing O&M and debt service costs but fall short of funding the City's recommended capital improvement plan and rehabilitation and replacement needs. An increase in existing rates will be required if the City wants to sustainably fund its capital improvement needs.

2. **Identify recommended level of funding based on long-term system needs** – To maintain the utility in good operating condition, the City's annual investment into the system should be about equal to the replacement value of the system divided by its estimated service life. The current estimated replacement value of the City's storm drain system is approximately $56 million. Based on an approximate service life of 70 years, we would recommend the City budget approximately 1.5 percent of replacement costs ($840,000 in 2023) per year for capital investment in its storm drain system. This amount would increase over time to account for overall system growth and inflation. While a substantial portion of this total can be used toward constructing those projects identified in the capital facilities plan, the remaining amount will be available for rehabilitation and replacement of existing facilities.

   Based on this approach, the City's recommended long-term level of funding based on all O&M and system investment needs is shown in Figure 1-1. As can be seen in the figure, the City's available funding from existing rates is substantially below the long-term recommendations. The City will need to increase its rates to keep up with inflation and continue to meet the City's long-term needs for the system.

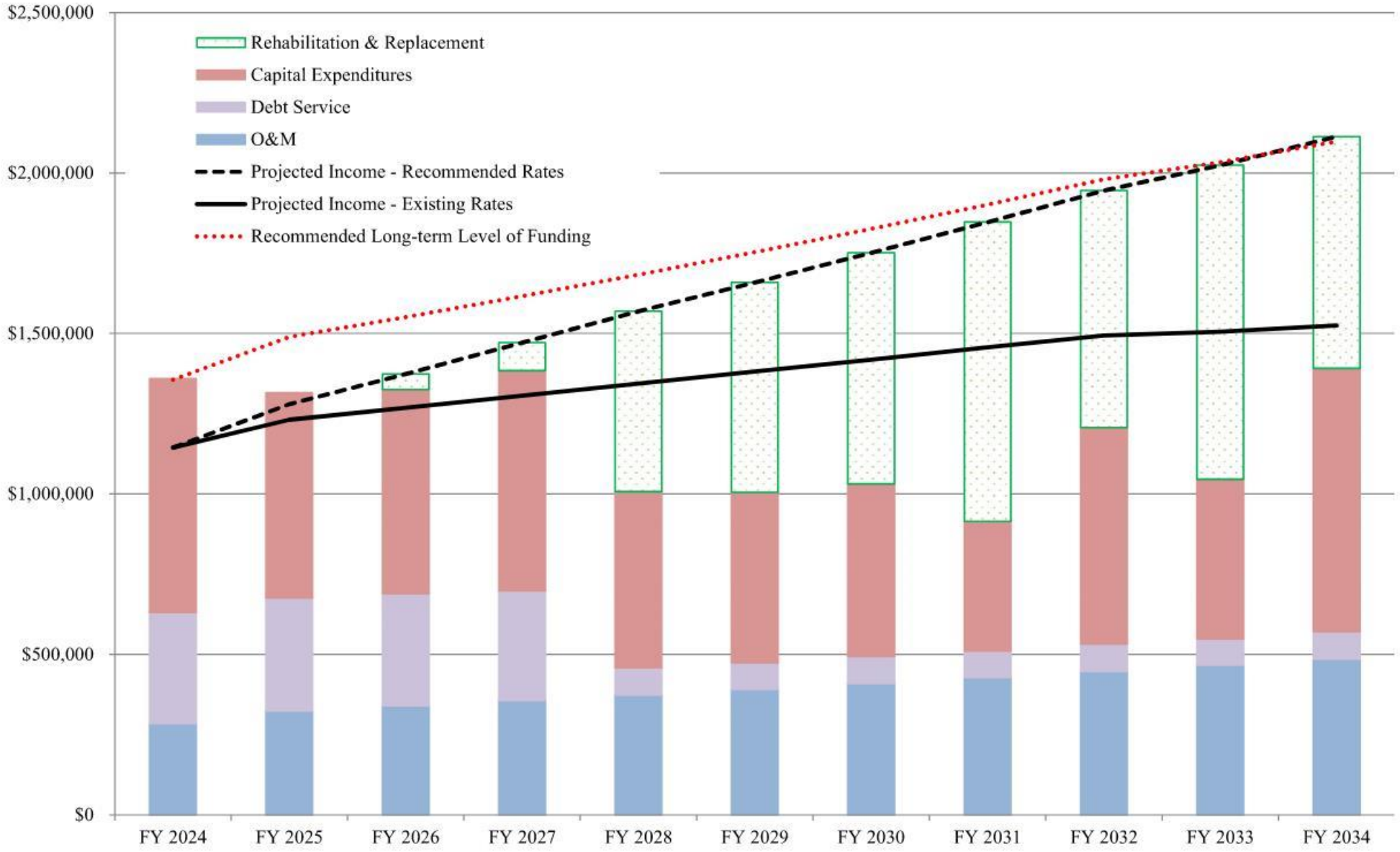
3. **Create a plan to transition from existing revenue to revenue adequate to support long-term system needs** – As discussed above, the City needs to increase its rates in order to implement its capital improvement plan and meet long-term funding goals. As a result, it is recommended that rates be increased gradually over the next 10 years until the long-term

level of funding is reached. At that point, rates can be increased at the rate of inflation. The recommended rate increases for Ivins City over the next 10 years are presented in Table 1-1. Following the rate increases recommended in this table will result in sufficient income to accomplish the City's goals as shown in Figure 1-1, assuming actual growth occurs at the projected growth rate.

Table 1-1
Recommended Annual Rate Increase for 10-Year Budget Plan

Year	Storm Drain Percent Increase
2025	5.0%
2026	5.1%
2027	4.8%
2028	4.3%
2029	3.3%
2030	3.2%
2031	3.1%
2032	3.0%
2033	3.2%
2034	3.0%

Figure 1-1
10-Year Revenue and Expenditures - Storm Drain



SECTION 2
STORM DRAIN RATE ANALYSIS

In Section 1, a 10-year budget plan was developed for the storm drain systems. Based on this overall budget plan, detailed rates can now be calculated. The purpose of this section is to calculate detailed storm drain rates for the next five years based on the overall budget plan.

This analysis focuses on three major tasks:

1. **Projecting Future Connections and Impervious Area:** Future storm drain connections and associated impervious area were estimated by projecting system growth for the next several years.
2. **Calculating Revenue Requirements:** Total revenue requirements for the system were projected for the next several years based on the budget plan outlined in Section 1. Non-rate revenue (including impact fee revenue) was deducted from the total to give the net revenue requirement to be recovered from rate payers.
3. **Rate Design:** Rates were calculated to generate the required rate revenue.

The remainder of this report details the results of each of these major tasks. Detailed rate tables from the model used to develop the rate recommendations are in Appendix A.

KEY ASSUMPTIONS

The results presented in this report are based on the following assumptions:

1. The storm drain fund will continue to be an enterprise-type fund.
2. This rate study is based on projections of future system operation, maintenance, and improvement costs. These projections are based on current economic conditions and regulatory requirements. Because conditions may change over time, it is recommended that Ivins City review the rates annually to determine if adjustments are needed to provide a revenue stream that will adequately fund operation and maintenance costs as well as needed capital improvements. It is also recommended that a comprehensive review and updating of storm drain rates be undertaken in three to five years so that the basic analytical foundations of this study can be re-evaluated.

PROJECTING FUTURE CONNECTIONS AND IMPERVIOUS AREA

HISTORIC DRAINAGE AREA

Ivins City provides storm drain service to over 4,600 accounts as shown in Table 2-1. To estimate the potential for storm drainage from each of these accounts, Table 2-1 also summarizes the total impervious area associated with each customer class. Average impervious area per account was then estimated for each customer class.

Table 2-1
Drainage Area Summary

Customer Class	Impervious Area (acres)	Accounts	Impervious Square Feet per Account
Residential	439	4583	4,174
Commercial	78	32	106,440
Office	2	10	6,963
Church	11	4	120,250
Total	**530**	**4,629**	

Please note that a decision has been made to base this analysis on impervious area. This is one of two common methods of looking at potential for storm drainage. The other common method is to consider total lot size. For this study, impervious area was used because it most closely matches the volume of runoff generated from each property and also matches historic billing practices.

PROJECTED ACCOUNTS

Ivins City has historically seen a wide range of growth rates depending on economic conditions in the area. Current master plan projections available from the City project residential growth at rates between around 3.5 to 3.0 percent per year over the next 6 years. However, for the purpose of projecting future user rates, it is prudent to assume a slightly less aggressive growth rate. This will help the City meet budgetary needs if growth were to slow and revenue from impact fees decrease. In this study, it has been assumed that residential growth will be equal to two-thirds of the master plan growth rate. Projected rates for non-residential growth are expected to be higher than residential rates over the next 6 years. Projected growth rates and number of accounts by customer type referenced in this analysis are summarized in Table 2-2.

Table 2-2
Projected Accounts Summary

	FY24	FY25	FY26	FY27	FY28	FY29
Residential Growth Rate	**2.3%**	**2.3%**	**2.2%**	**2.2%**	**2.1%**	**2.1%**
Residential	4,689	4,794	4,900	5,006	5,112	5,217
Non-Residential Growth	**14.1%**	**12.4%**	**11.0%**	**9.9%**	**9.0%**	**8.3%**
Commercial	37	41	46	50	55	59
Office	11	13	14	16	17	18
Church	5	5	6	6	7	7
Total	**4,741**	**4,853**	**4,966**	**5,078**	**5,190**	**5,302**

PROJECTED DEVELOPED AREA

Future impervious areas were estimated to grow at the same rates as residential and non-residential accounts. Using this methodology, the projected growth in impervious acres is shown in Table 2-3.

Table 2-3
Impervious Area Summary

Customer Class	Developed Impervious Area (Acres)					
	FY24	FY25	FY26	FY27	FY28	FY29
Residential	454	468	482	497	511	525
Commercial	89	100	111	122	133	144
Office	2	2	2	3	3	3
Church	13	14	16	17	19	20
Total	**558**	**585**	**612**	**639**	**666**	**693**

CALCULATING REVENUE REQUIREMENTS

Calculating revenue requirements was completed on a cash basis. The cash basis of revenue requirement calculation is based on the system's actual cash expenditures. Its goal is to make sure revenues match the cash needs of the system. In public utilities, this method generally matches the budgetary expenditures for the period. It has the additional advantage of being more understandable to most ratepayers and more directly meets any debt service coverage requirements that the system might need to comply with.

NON-RATE REVENUE

The projected non-rate revenue for the planning period is summarized in Table 2-4. Non-Rate Revenue consists primarily of impact fees, but may also include items such as service charges, net interest income, lease income, and gain/loss on disposal of assets. It should be noted that revenue shown in the table assumes adoption of the impact fees recommended in the City's recently completed Impact Fee Analysis.

Table 2-4
Projected Non-Rate Revenue

	2023	2024	2025	2026	2027	2028
Impact Fees	$191,975	$198,027	$247,186	$247,642	$248,114	$248,602

CITY EXPENDITURES

The projected City expenditures for the planning period are summarized in Table 2-5. Included in the table are the projected total costs for the three major categories of expenditures: operations and maintenance, debt service, and capital expenditures. Each of these categories is discussed in more detail in subsequent sections.

Table 2-5
Projected Revenue Requirements

Item	FY2024	FY2025	FY2026	FY2027	FY2028	FY2029
O&M	$284,000	$324,276	$340,071	$356,406	$373,302	$390,780
Debt Services	$346,800	$350,800	$349,200	$342,200	$85,000	$82,600
Capital	$729,000	$640,000	$693,000	$686,000	$549,000	$532,000
Rehabilitation & Replacement	$0	$0	$0	$86,789	$561,953	$653,527
Total Expenditures	**$1,359,800**	**$1,315,076**	**$1,382,271**	**$1,471,395**	**$1,569,255**	**$1,658,907**

Operation and Maintenance Costs

The projected operation and maintenance (O&M) costs for the City have been taken from the City's budget year for 2024. A detailed list of all O&M budget categories is included as part of the rate model in Appendix A. Beyond 2024, it has been assumed that most of these O&M cost categories will increase at a rate equal to half the system growth rate in each year and an assumed inflation rate of 3.0 percent (e.g., budget growth in 2025 = 3.89 %/2 + 3% = 4.95%). An additional $25,000 was also added to the 2025 O&M budget for a portion of the cost for an additional employee that is anticipated to be hired at that time.

Debt Service Costs

Ivins City is currently in the eighth year of a 20-year loan worth 3.68 million dollars. The projected cost of all debt service including interest has been included as part of this study.

Capital Improvement Costs

As identified in the City's capital facility plan, there are multiple storm drain capital projects which will be completed during the next 6 years. Over the next 6 years, approximately $630,000 per year is budgeted to be spent on identified capital projects. The list of specific projects proposed to be completed in the next 6 years along with a cost for each project can be seen in the City's Impact Fee Facility Plan.

Rehabilitation and Replacement Funding

Included in the required revenue is a section for the transfer of funds to or from the City's reserve fund for rehabilitation and replacement funding. As noted in Section 1, there should be a budget of approximately $840,000 annually (increased with an assumed inflation rate of 3.0% and half of the projected growth rate) for investment into the system. Any money not spent on projects in the capital facility plan should be spent on other system rehabilitation and replacement projects. However, if specific rehabilitation and replacement projects are not immediately identified, this same total should be deposited in the utility's reserve fund. The reserve fund can then be used to smooth out total, overall capital expenditures in the City. To facilitate the option of paying for improvements without bonding, it is expected that there will also be years in which excess funds are generated and added to the reserve, only to be drawn out in subsequent years for large projects. From a long-term perspective, the City should continue to invest the recommended amount into projects in the system such that the reserve fund's overall size does not appreciably increase due to these transfers.

RATE DESIGN

Ivins City currently charges a storm drain rate fee of $14.05 per month for residential accounts and $2.87 per 1000 square feet of impervious area for non-residential accounts. This pay structure was developed as a result of a cost allocation analysis performed as part of the previous master plan and rate study. That analysis categorized storm drain costs into volume characteristics (which includes total storm water flow), and customer characteristics (which includes billing and administrative costs).

For residential accounts, the current flat rate was developed by combining the average billing and administrative costs with the volume characteristics costs, based on an average impervious area per lot. This rate structure is reasonable because, on average, there is relatively little variation in the impervious area per lot.

For non-residential accounts, the rate is charged on a per 1000 square foot of impervious area basis. This rate structure was adopted because, unlike residential parcels, non-residential parcels can have wide ranges in impervious area per lot. This is due in part to the wide range of total area per parcel for non-residential areas.

Ivins City intends to continue with this overall rate structure. Total annual projected rate revenues based on existing storm drain rates are shown in Table 2-6. As summarized in the table, the projected revenue from existing storm drain rates will become increasingly insufficient to meet revenue requirements in the coming years.

Table 2-6
Projected Revenue Based on Existing Storm Rates

	FY24	FY25	FY26	FY27	FY28	FY29
Projected Rate Revenue - Existing Rates	$1,144,353	$1,230,626	$1,268,196	$1,305,782	$1,343,383	$1,381,002
Projected Rate Revenue Requirements	$1,359,800	$1,315,076	$1,382,271	$1,471,395	$1,569,255	$1,658,907
Projected Difference	**($215,447)**	**($84,450)**	**($114,075)**	**($165,613)**	**($225,872)**	**($277,905)**

As described in Section 1, BC&A would recommend a series of small annual increases to reach the recommended long-term level of funding needed. If the proposed increases are applied to the existing rate structure, the resulting recommended rates are summarized in Table 2-7.

Table 2-7
Recommended Monthly Storm Drain Rates

	FY24	FY25	FY26	FY27	FY28	FY29
Residential ($/Account)	$14.05	$14.75	$15.50	$16.25	$16.95	$17.50
Non-Residential ($/1000 Impervious SF)	$2.87	$3.01	$3.17	$3.32	$3.46	$3.57

For comparison purposes, Table 2-8 show the existing and proposed future rates for Ivins City and other communities throughout Utah. The table shows the average monthly bill that each municipality charges a residential connection for storm drain. For Ivins City, the future rate shown assumes the

City adopts the rates recommended in this report. For all other cities, future rates are simply based on a constant annual inflation of 3 percent. This likely underestimates future rates for most cities but provides a starting point for comparison.

Table 2-8
Storm Drain Monthly Rate Comparison

City	Cost per Average Residential Connection for FYE 2023	Cost per Average Residential Connection for FYE 2029[1]
Cedar Hills	$15.29	$17.73
Pleasant Grove	$14.41	$16.71
Ivins	$14.05	$17.50
Santa Clara	$13.85	$16.06
Provo	$10.75	$12.46
American Fork	$8.50	$9.85
Centerville	$8.48	$9.83
Farmington	$8.20	$9.51
Clearfield	$8.07	$9.36
Kaysville	$8.00	$9.27
Orem	$8.00	$9.27
Payson	$7.15	$8.29
Toquerville	$7.00	$8.11
Cedar City	$7.00	$8.11
St. George	$7.00	$8.11
Springville	$6.96	$8.07
Washington City	$6.80	$7.88
Alpine	$5.00	$5.80
Hurricane	$4.00	$4.64

[1]Assumes other City rates are inflated at 3.0% annually

As can be seen in the table, Ivins City currently has a higher than average rate for storm drain when compared to other cities throughout Utah. With the proposed increases identified in this report, it is expected that Ivins City will stay at the upper end of rates compared to the other communities surveyed.

In making this comparison, however, it should be noted that many cities choose not to collect the full cost of their storm drain system through rates. Storm drain rates will be used to fund only a small portion of total costs with the remaining funding for storm water improvements coming from the cities' general funds. Thus, a comparison of rates does not represent a comparison of actual costs for the storm drain system. Previous studies by BC&A indicate that the sustainable level of funding for nearly all storm drain systems falls between about $15 and $20 per month for a residential customer. Recommended rates for Ivins fall squarely in that range.

SECTION 3
CONCLUSIONS AND RECOMMENDATIONS

Based on the analysis contained in the previous sections of this report, BC&A would recommend the following actions:

Adopt the Recommended Rate Increases: Ivins City should adopt the proposed rate increases recommended in this report. This equates to increasing rates by 3% to 5% per year over the next five years. The recommended rates are summarized in Table 3-1.

Table 3-1
Recommended Monthly Storm Drain Rates

	2024	2025	2026	2027	2028	2029
Residential ($/Account)	$14.05	$14.75	$15.50	$16.25	$16.95	$17.50
Non-Residential ($/1000 Impervious SF)	$2.87	$3.01	$3.17	$3.32	$3.46	$3.57

Consider Multiple Year Rate Schedules: Ivins City should pursue adopting a multiple year rate schedule (up to the full rate schedule above). By adopting a multiple year rate schedule, the City can program small annual increases to the storm drain rates consistent with the results of this report. This will help avoid large rate increases in future years and minimizes the potential for "rate shock" to customers. Small, affordable changes in rate levels and rate structures are more acceptable to the public and benefit the utility in terms of financial stability. If minor changes are needed to this multiyear schedule in the future, the City can always revise these rates at that time.

Update This Rate Study Periodically: After the implementation of any change to the rate structure, we would suggest that the City monitor customer responses and development patterns for a period of one or two years. Following this initial observation period, the change should be re-examined to determine if there should be any subsequent adjustments. A comprehensive review of this rate study should also be performed in three to five years. The projections, assumptions, and data contained in this report may need to be revised over time. For these reasons, it is prudent to update storm drain rates to ensure they are sufficient to meet system requirements, as well as maintain cost-of-service equity in charges to customers.

APPENDIX A – DETAILED STORM DRAIN RATE MODEL TABLES

10-Year Budget Plan - Storm Drain

Impact Fee Cost per ERU = $ 1,173.44

Estimated Impact Fee Cost per ERU in FY2024 = $ 933.06

	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034			
	Historic	Budgeted	Projected												
			Year												
	FY 2023	FY 2024	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	FY 2030	FY 2031	FY 2032	FY 2033	FY 2034			
Total Number of ERUs (Linear Growth Rate)	5,011	5,214	5,416	5,619	5,822	6,024	6,227	6,430	6,632	6,835	7,016	7,185			
Total Number of Residential ERUs (Linear Growth Rate)	4,623	4,730	4,836	4,943	5,050	5,156	5,263	5,370	5,476	5,583	5,668	5,804	107	85	136
Storm Drain Residential Accounts	4,583	4,689	4,794	4,900	5,006	5,112	5,217	5,323	5,429	5,535	5,619	5,754			
Total Non-Residential Impervious Area	91	104	117	130	142	155	168	181	194	207	221	229			
% Growth from Previous Year		4.04%	3.89%	3.74%	3.61%	3.48%	3.36%	3.25%	3.15%	3.06%	2.65%	2.40%			
		1.141264828	1.123779183	1.110145467	1.099217148	1.090261645	1.082788976	1.076459012	1.071028262	1.066317822	1.069510157	1.034484169			
Expenditures															
O&M	*$275,000*	*$284,000*	*$324,276*	*$340,071*	*$356,406*	*$373,302*	*$390,780*	*$408,863*	*$427,572*	*$446,932*	*$466,269*	*$485,852*	$4,020,322		
Debt Service	$347,400	$346,800	$350,800	$349,200	$342,200	$85,000	$82,600	$85,200	$82,600	$85,000	$82,200	$84,400	$1,629,200		
Capital Expenditures	$949,289	$729,000	$640,000	$693,000	$686,000	$549,000	$532,000	$538,000	$405,000	$675,000	$499,000	$821,000	$6,038,000		
Rehabilitation & Replacement	$0	$0	$0	$0	$86,789	$561,953	$653,527	$719,458	$931,833	$738,325	$977,047	$722,080	$5,391,012	*3%*	*$14,965,201*
Total Expenditures	*$1,571,689*	*$1,359,800*	*$1,315,076*	*$1,382,271*	*$1,471,395*	*$1,569,255*	*$1,658,907*	*$1,751,520*	*$1,847,005*	*$1,945,257*	*$2,024,516*	*$2,113,332*			
	$949,289	*$729,000*	*$640,000*	*$693,000*	*$772,789*	*$1,110,953*	*$1,185,527*	*$1,257,458*							
Income															
Taxes	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$0	$1			
Operations Non-Rate Revenue	$8,500	$8,927	$9,368	$9,825	$10,296	$10,785	$11,289	$11,812	$12,352	$12,912	$13,470	$14,036			
Expansion Non-Rate Revenue	$183,475	$189,100	$237,818	$237,818	$237,818	$237,818	$237,818	$237,818	$237,818	$237,818	$212,784	$197,598	$2,312,926		
Sales (Residential) - Existing Rates ($14.05/month)	$772,694	$790,522	$808,351	$826,179	$844,007	$861,836	$879,664	$897,493	$915,321	$933,149	$947,412	$970,150			
Sales (Non-Residential) - Existing Rates ($2.87/1000 sf/month)	$136,519	$155,804	$175,089	$194,375	$213,660	$232,945	$252,231	$271,516	$290,801	$310,087	$331,641	$343,077			
Projected Income - Existing Rates	*$1,101,188*	*$1,144,353*	*$1,230,626*	*$1,268,196*	*$1,305,782*	*$1,343,383*	*$1,381,002*	*$1,418,638*	*$1,456,292*	*$1,493,965*	*$1,505,307*	*$1,524,863*			
	15.0%	16.5%	17.8%	19.0%	20.2%	21.3%	22.3%	23.2%	24.1%	24.9%	25.9%	26.1%			
System Investment Goal	$840,000	$882,696	$927,198	$973,576	$1,021,902	$1,072,251	$1,124,701	$1,179,334	$1,236,232	$1,295,483	$1,354,773	$1,414,953	$11,600,403		
Recommended Long-term Level of Funding	$1,298,475	$1,355,796	$1,489,292	$1,551,465	$1,616,126	$1,683,371	$1,753,299	$1,826,014	$1,901,622	$1,980,233	$2,033,826	$2,098,403	$20,587,922		
									0.00	0.00	0.00	0.00			
Recommended Rate Increases (Residential)			5.0%	5.1%	4.8%	4.3%	3.3%	3.2%	3.1%	3.0%	3.2%	3.0%			
Sales Revenue With Increase (Residential)	$772,694	$790,522	$848,768	$911,443	$976,165	$1,039,647	$1,095,641	$1,153,059	$1,211,831	$1,271,880	$1,331,997	$1,404,884			
Recommended Rate Increases (Non-Residential)			5.0%	5.1%	4.8%	4.3%	3.3%	3.2%	3.1%	3.0%	3.2%	3.0%			
Sales Revenue With Increase (Non-Residential)	$136,519	$155,804	$183,844	$214,435	$247,116	$281,006	$314,159	$348,832	$385,004	$422,647	$466,264	$496,813			
Projected Income - Recommended Rates	*$1,101,188*	*$1,144,353*	*$1,279,798*	*$1,373,520*	*$1,471,395*	*$1,569,255*	*$1,658,907*	*$1,751,520*	*$1,847,005*	*$1,945,257*	*$2,024,516*	*$2,113,332*	$19,280,046		
		3.92%	*11.84%*	*7.32%*	*7.13%*	*6.65%*	*5.71%*	*5.58%*	*5.45%*	*5.32%*	*4.07%*	*4.39%*			
Surplus/(Deficit)	($470,501)	($215,447)	($35,278)	($8,751)	$0	$0	$0	$0	$0	$0	$0	$0	($44,028)		
Fund Balance (Unrestricted)	$1,073,200	$857,754	$822,476	$813,725	$813,725	$813,725	$813,725	$813,725	$813,725	$813,725	$813,725	$813,725			

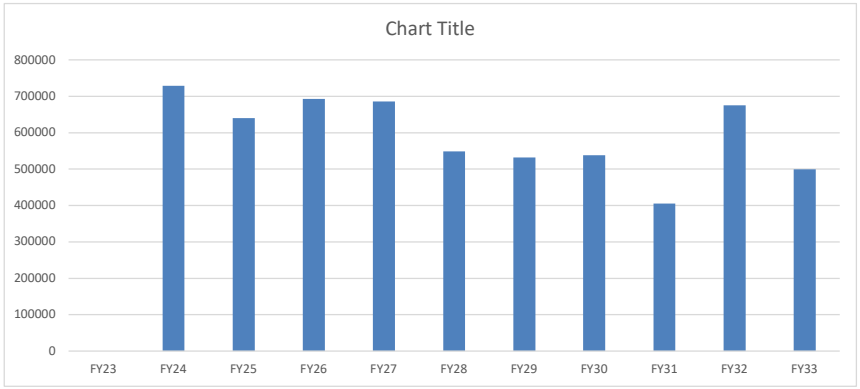
$14.05	$14.05	$14.75	$15.50	$16.25	$16.95	$17.50	$18.05	$18.60	$19.15	$19.75	$20.35	$5.59	$0.62
$2.87	$2.87	$3.01	$3.17	$3.32	$3.46	$3.57	$3.69	$3.80	$3.91	$4.04	$4.16		

Planned Storm Drain Projects
Updated: November 1, 2023

inflation rate = 3%

2023 Master Plan IFFP Projects

Project ID	Project Name	Construction Year																
			0.03	317.18%		7	5	3	3	3	3	3	3	3	3	3	3	
						2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	
			Inflated Cost	2023	Project	FY23	FY24	FY25	FY26	FY27	FY28	FY29	FY30	FY31	FY32	FY33	FY34	
DB-6	600 W & 200 N	2026	$298,000	$272,000	DB-6	0	0	0	298000	0	0	0	0	0	0	0	0	
P-08	400 W & Center Str.	2032	$675,000	$517,000	P-08	0	0	0	0	0	0	0	0	0	675000	0	0	
P-19	250 E & 200 S	2034	$821,000	$593,000	P-19	0	0	0	0	0	0	0	0	0	0	0	821000	
P-20	250 E & 400 S	2028	$549,000	$473,000	P-20	0	0	0	0	0	549000	0	0	0	0	0	0	
DB-4	400 E & 400 S DB	2029	$532,000	$445,000	DB-4	0	0	0	0	0	0	532000	0	0	0	0	0	
P-23	Park Avenue Way	2030	$538,000	$437,000	P-23	0	0	0	0	0	0	0	538000	0	0	0	0	
P-24	Hwy 91 & Red Mtn. Blvd.	2026	$77,000	$70,000	P-24	0	0	0	77000	0	0	0	0	0	0	0	0	
P-25	Hwy 91 & Red Mtn. Blvd.	2024	$729,000	$707,000	P-25	0	729000	0	0	0	0	0	0	0	0	0	0	
P-26	Flood Street Pipeline	2027	$686,000	$609,000	P-26	0	0	0	0	686000	0	0	0	0	0	0	0	
C-4	Remove SITLA Culverlts	2033	$135,000	$100,000	C-4	0	0	0	0	0	0	0	0	0	0	135000	0	
C-5	Kayenta Box Culverts	2033	$269,000	$200,000	C-5	0	0	0	0	0	0	0	0	0	0	269000	0	
P-28	RV Park	2033	$95,000	$70,000	P-28	0	0	0	0	0	0	0	0	0	0	95000	0	
P-29	200 North	2031	$405,000	$319,000	P-29	0	0	0	0	0	0	0	0	405000	0	0	0	
P-30	265 West Dirt Road (18-in PPE)	2026	$208,000	$190,000	P-30	0	0	0	208000	0	0	0	0	0	0	0	0	
P-15b	100 West/200 South	2026	$55,000	$50,000	P-15b	0	0	0	55000	0	0	0	0	0	0	0	0	
Inlets	450 North Inlets	2026	$55,000	$50,000	Inlets	0	0	0	55000	0	0	0	0	0	0	0	0	
PW Yard	Public Works Yard	2025	$640,000	$603,000	PW Yard	0	0	640000	0	0	0	0	0	0	0	0	0	
			$0	$265,585		0	0	0	0	0	0	0	0	0	0	0	0	
			$0	$61,704		0	0	0	0	0	0	0	0	0	0	0	0	
			$0	$146,548		0	0	0	0	0	0	0	0	0	0	0	0	
			$0	$321,376		0	0	0	0	0	0	0	0	0	0	0	0	
			$0	$0		0	0	0	0	0	0	0	0	0	0	0	0	
			$0	$0		0	0	0	0	0	0	0	0	0	0	0	0	
					Total	0	729000	640000	693000	686000	549000	532000	538000	405000	675000	499000	821000	



Existing Storm Drain Rates
Updated: March 22, 2023

-- Information provided by Ivins City Personnel

Impact Fee Revenue			3 Yr		
Year	Amount	% Change	Running Avg.	% Change	
2018	127,809.67				
2019	153,343.40	20.0%			
2020	156,115.59	1.8%	145756		
2021	308,238.28	97.4%	205899	41.3%	
2022	204,438.87	-33.7%	222931	8.3%	
Average =	189989.16	0.213882633			

Grants and Subdividers Contribution							
	Year						
	2018	2019	2020	2021	2022		
Grants	30,448.75	1,724,050.40	1,354,517.41	0.00	0.00		
Subdividers Contribution	77,240.00	106,925.00	38,000.00	462,400.00	223,600.00		
	Year						
Other Income	2018	2019	2020	2021	2022	2023	
Impact Fee	127,809.67	153,343.40	156,115.59	308,238.28	204,438.87	183000	0.664311
Inspection Fees	0.00	0.00	1,800.00	4,125.00	2,065.50		
Interest Income	26,425.09	15,521.15	14,601.41	4,498.51	6,232.18		
Miscellaneous	2,240.00	3,626.50	0.00	0.00	0.00		
Non-Impact fee Revnue	28,665.09	19,147.65	16,401.41	8,623.51	8,297.68		

Ivins City - SD Rate Summary

Rate Summary - 07/01/2019 to 06/30/2020

Rate	Rate Id	Accounts	Locations	Services	Units	Quantity (1000 sf)	Base Amount	Excess Amount	Override Amount	Manual Amount
		28	24	0	0.00	0.00	$0.00	$0.00	$0.00	-$3.93
Storm Drain - Residential	701	4037	3705	4037	46200.00	10713.99	$588,831.89	$0.00	$8.60	-$53.10
Storm Drain - Non-Residential/Multi-F	702	20	20	20	230.00	36720.00	$0.00	$96,940.80	$0.00	$0.00
Storm Drain - Office Bldg	703	5	5	5	60.00	756.00	$0.00	$1,784.16	$0.00	$0.00
Storm Drain - Church	704	4	4	4	48.00	5772.00	$0.00	$13,621.92	$0.00	$0.00
Non Residential Subotal		29	29	29	338	43248	$0.00	$112,346.88	$0.00	$0.00
		4094	3758	4066	46538	53962	$588,831.89	$112,346.88	$8.60	-$57.03
						82.7				

Rate Summary - 07/01/2020 to 06/30/2021

Rate	Rate Id	Accounts	Locations	Services	Units	Quantity (1000 sf)	Base Amount	Excess Amount	Override Amount	Manual Amount
		46	39	0	0.00	0.00	$0.00	$0.00	$0.00	-$67.78
Storm Drain - Residential	701	4292	3881	4293	48444.00	10693.90	$616,837.46	$0.00	$0.00	-$0.42
Storm Drain - Non-Residential/Multi-F	702	20	20	20	240.00	37392.00	$0.00	$98,714.88	$0.00	$0.00
Storm Drain - Office Bldg	703	5	5	5	60.00	756.00	$0.00	$1,784.16	$0.00	$0.00
Storm Drain - Church	704	4	4	4	48.00	5772.00	$0.00	$13,621.92	$0.00	$0.00
Non Residential Subotal		29	29	29	348	43920	$0.00	$114,120.96	$0.00	$0.00
		4367	3949	4322	48792	54614	$616,837.46	$114,120.96	$0.00	-$68.20
						84.0				

Rate Summary - 07/01/2021 to 06/30/2022

Rate	Rate Id	Accounts	Locations	Services	Units	Quantity (1000 sf)	Base Amount	Excess Amount	Override Amount	Manual Amount
		56	42	0	0.00	0.00	$0.00	$0.00	$0.00	-$180.80
Storm Drain - Residential	701	4590	4095	4591	50914.00	10702.84	$707,482.07	$0.00	$0.00	-$61.52
Storm Drain - Non-Residential/Multi-F	702	20	20	20	240.00	37392.00	$0.00	$107,315.04	$0.00	$0.00
Storm Drain - Office Bldg	703	7	7	7	74.00	756.00	$0.00	$2,169.72	$0.00	$0.00
Storm Drain - Church	704	4	4	4	48.00	5772.00	$0.00	$16,565.64	$0.00	$0.00
Non Residential Subotal		31	31	31	362	43920	$0.00	$126,050.40	$0.00	$0.00
		4677	4168	4622	51276	54623	$707,482.07	$126,050.40	$0.00	-$242.32
						84.0				

Rate Summary - 07/01/2022 to 06/30/2023

Rate	Rate Id	Accounts	Locations	Services	Units	Quantity (1000 sf)	Base Amount	Excess Amount	Override Amount	Manual Amount
		140	120	0	0.00	0.00	$0.00	$0.00	$0.00	-$5,235.26
Storm Drain - Residential	701	4583	4245	4583	52799.00	10677.54	$736,087.78	$0.00	$0.00	-$60.87
Storm Drain - Non-Residential/Multi-F	702	32	32	32	384.00	40873.00	$0.00	$117,305.51	$0.00	$0.00
Storm Drain - Office Bldg	703	10	10	10	101.00	835.56	$0.00	$2,398.07	$0.00	$0.00
Storm Drain - Church	704	4	4	4	48.00	5772.00	$0.00	$16,565.64	$0.00	$0.00
Non Residential Subotal		46	46	46	533	47481	$0.00	$136,269.22	$0.00	$0.00
		4769	4411	4629	53332	58158	$736,087.78	$136,269.22	$0.00	-$5,296.13
						90.8				

Total Amount			Summary					
				FY2020	FY2021	FY2022	FY2023	
-$3.93	0		Total Amount	$701,130.34	$730,890.22	$833,290.15	$867,060.87	
$588,787.39	0		Total Residential Amount	$588,787.39	$616,837.04	$707,420.55	$736,026.91	84.9%
$96,940.80	0		Total Non-Residential Amount	$112,346.88	$114,120.96	$126,050.40	$136,269.22	15.7%
$1,784.16	0		% Residential	84.0%	84.4%	84.9%	84.9%	
$13,621.92	0		% Non-Residential	19.1%	18.5%	17.8%	18.5%	
$112,346.88			Non-Res Impervious Area Quantity (1000 sf)	43248	43920	43920	47481	
$701,130.34			# of Non-Residential Accounts	29	29	31	46	
			Impervious Area Per Account (1000 sf)	1491.3	1514.5	1416.8	1032.2	
			# of Residential Accounts	4037	4292	4590	4583	
Total Amount			Residential Units	46200.00	48444.00	50914.00	52799.00	
-$67.78	0		Residential Rate (per account per month)	$12.74	$12.73	$13.89	$13.94	
$616,837.04	0		Non-Residential Rate (per 1000 sf imp. Area)	$2.60	$2.60	$2.87	$2.87	
$98,714.88	0		Equivalent ERUs if Non-Residential charged Residential Rates	734.6	746.9	756.0	814.6	
$1,784.16	0							
$13,621.92	0		Residential Impervious Area				439	82.9%
$114,120.96			Non-Residential Impervious Area				90.8	17.1%
$730,890.22								

Total Amount		
-$180.80	0	
$707,420.55	0	
$107,315.04	0	
$2,169.72	0	
$16,565.64	0	
$126,050.40		
$833,290.15		

Total Amount		
-$5,235.26	0	0.0
$736,026.91	0	245.1
$117,305.51	0	78.2
$2,398.07	0	1.6
$16,565.64	0	11.0
$136,269.22		90.8
$867,060.87		

DRAPER, UTAH OFFICE
154 E 14075 S
DRAPER, UTAH 84020
PHONE: 801.495.2224

BOISE, IDAHO OFFICE
776 E RIVERSIDE DRIVE
SUITE 250
EAGLE, IDAHO 83616
PHONE: 208.939.9561

ST. GEORGE, UTAH OFFICE
20 NORTH MAIN
SUITE 107
ST.GEORGE, UTAH 84770
PHONE: 435.656.3299

OGDEN, UTAH OFFICE
2036 LINCOLN AVENUE
SUITE 104
OGDEN, UTAH 84401
PHONE: 801.495.2224

BOWEN COLLINS & ASSOCIATES