NIBLEY CITY COUNCIL MEETING AGENDA
THURSDAY, February 19, 2026 – 6:30 PM

In accordance with Utah Code Annotated §52-4-207 and Nibley City Resolution 12-04, this meeting may be conducted electronically. The anchor location for the meeting will be Nibley City Hall, 455 W 3200 S NIBLEY UT 84321-6337. The public may also view the meeting via the YouTube link provided at www.nibleycity.gov. Public comment should be submitted to cherylb@nibleycity.gov by 6:30 PM. Public comments with names and addresses will be read into the public record.

1. Opening Ceremonies (Councilmember Mann)
2. Call to Order and Roll Call (Chair)
3. Approval of the January 29, 2026, Meeting Minutes and the Current Agenda (Chair)
4. Public Comment Period[1] (Chair)
5. Planning and Zoning Commission Report

6. Report and Discussion: Connect Transit; Lieren Hansen, Connect Transit Board Chair
7. **Discussion and Consideration:** Resolution 26-06—Adoption of the Nibley City Storm Water Master Plan (First Reading)
8. **Discussion and Consideration:** Ordinance 26-01—Adoption of the Nibley City General Plan (Second Reading)
9. **Discussion and Consideration**: Ordinance 25-36—Amending NCC 21.10.020 Open Space Subdivision, Including Requirements for Setbacks, Lot Size Standards, and Variation (Second Reading)
10. **Workshop**: 2026 Goals
11. **Council and Staff Reports**

Adjourn

Nibley City's next scheduled Council meeting will be on Thursday, March 12, 2026, at 6:30 PM

[1] *Public input is welcomed at all City Council Meetings. 15 minutes have been allotted to receive verbal public comment. Verbal comments shall be limited to 3 minutes per person. A sign-up sheet is available at the entrance to the Council Chambers starting 15 minutes prior to each council meeting and at the rostrum for the duration of the public comment period. Commenters shall identify themselves by name and address on the comment form and verbally for inclusion in the record. Comment will be taken in the order shown on the sign-up sheet. Written comment will also be accepted and entered into the record for the meeting if received prior to the conclusion of the meeting. Comments determined by the presiding officer to be in violation of Council meeting rules shall be ruled out of order.*

In compliance with the Americans With Disabilities Act, reasonable accommodations for individuals with disabilities will be provided upon request. For assistance, please call (435) 752-0431.

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Nibley City Council
Agenda Report for
February 19, 2026

Agenda Item #6

Description	**Report and Discussion:** Connect Transit
Presenter	Lieren Hansen, Connect Transit Board Chair and Nibley City representative
Staff Recommendation	
Reviewed By	

Background:

Lieren Hansen is the Nibley/Hyrum area representative on the Connect Transit Board, and would like to give an update to the Council on the transit district.

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Agenda Item #7

Description	**Discussion and Consideration:** Resolution 26-06: Adoption of the Nibley City Stormwater Master Plan (First reading
Presenter	Tom Dickinson, City Engineer, Steven Wood, Sunrise Engineering
Staff Recommendation	Approval of Resolution 26-06: Adoption of the Nibley City Stormwater Master Plan
Reviewed By	Justin Maughan, City Manager Tom Dickinson, City Engineer Steve Eliason, Public Works Director Chet Olsen, Streets and Stormwater Manager Tyler McCary, Public Works Inspector

Background:

The City has been working with Sunrise Engineering since 2024 to update the Stormwater Master Plan. The Stormwater Master Plan was last updated in 2015. Since 2015, there have been numerous changes to stormwater runoff patterns due to ongoing growth and development.

The Nibley City Stormwater Master Plan update is based on stormwater standards established at the state and local levels as mandated by the Federal Clean Water Act. The Nibley City Stormwater Master Plan Recommendations and findings of the report are based on zoning growth models and include recommended capital improvement projects. The updated plan will assist the City in planning for and implementing stormwater control facilities and infrastructure. It also provides information on existing stormwater infrastructure, evaluates the adequacy of current facilities, and offers recommendations for improvements.

The Nibley City Stormwater Master Plan includes an Impact Fee Analysis, Impact Fee Facilities Plan, and recommended user rate. These studies and recommendations are for reference only. No proposed adjustments are being proposed at this time.

A project steering committee provided direction on the process and development of the plan and was made up of the following individuals:

Justin Maughan, City Manager
Tom Dickinson, City Engineer
Steve Eliason, Public Works Director
Chet Olsen, Streets and Stormwater Division Manager
Tyler McCary, Public Works and Stormwater Inspector
Sunrise Engineering

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RESOLUTION 26-06

ADOPTING THE NIBLEY CITY STORMWATER MASTER PLAN

WHEREAS, Nibley City has grown very quickly over the last 10 years; and

WHEREAS, new developments increase runoff from previous undeveloped sites and are adding infrastructure to convey stormwater away from the development, and

WHEREAS, Nibley needs a plan to follow as the growth continues, and

WHEREAS, Nibley City has adopted regulations aimed at reducing or eliminating stormwater pollution discharges through proper management and maintenance of a stormwater system; and

WHEREAS, the Nibley City Stormwater Master plan provides direction for the construction of system improvements to continue serving the residents of Nibley City in the future.

NOW, THEREFORE, IT IS HEREBY RESOLVED BY THE NIBLEY CITY COUNCIL THAT:

1. The attached NIBLEY CITY STORMWATER MASTER PLAN shall be accepted and used as a guiding document for the development of stormwater infrastructure and for stormwater management planning.

Adopted by the Nibley City Council this ____ Day of _____, 2026.

_____
Larry Jacobsen, Mayor

ATTEST:

_____
Cheryl Bodily, City Recorder

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NIBLEY CITY STORMWATER MASTER PLAN

Nibley, Utah | January 2026

SUNRISE ENGINEERING

Creating solutions that work and relationships that last.

NIBLEY CITY

STORMWATER MASTER PLAN

JANUARY 2026

MAYOR---------- LARRY JACOBSEN
COUNCIL MEMBER ---------- ERIN MANN
COUNCIL MEMBER ---------- GARRETT MANSELL
COUNCIL MEMBER ----------NICK KENCZKA
COUNCIL MEMBER ----------NATHAN LAURSEN
COUNCIL MEMBER ----------RANDY SPAULDING
PUBLIC WORKS DIRECTOR ---------- STEVE ELIASON
CITY MANAGER----------JUSTIN MAUGHAN
CITY ENGINEER---------- TOM DICKINSON
STREETS/STORMWATER MANAGER----------CHET OLSEN

PREPARED BY:

SUNRISE ENGINEERING

2100 North Main Street
North Logan, Utah 84341
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Haiming Peng, P.E.
Project Engineer

Steven D. Wood, P.E.
Project Manager

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PREFACE

Nibley City (City) has contracted with Sunrise Engineering, LLC (Sunrise) to prepare an update to the City's Stormwater Master Plan. The previous plan was completed by JUB Engineers in 2015. This updated plan was based on the stormwater standards and on the zoning growth models from 2015 and included recommended capital improvement projects, several of which have since been implemented by the City. Since 2015 there have been numerous changes to stormwater runoff patterns due to ongoing growth and development.

This updated plan will assist the City in planning for and implementing stormwater control facilities and infrastructure. It also provides information on existing stormwater infrastructure, evaluates the adequacy of current facilities, and offers recommendations for improvements.

EXECUTIVE SUMMARY

This Stormwater Master Plan has been prepared for Nibley City to:

- Conduct a hydrologic analysis of the surrounding area, identify and evaluate major stormwater conveyance and storage facilities.
- Determine deficiencies in and provide recommended improvements to existing drainage systems.
- Provide recommendations regarding stormwater improvements for future developments.
- Propose financial recommendations for funding future projects and ongoing maintenance efforts.

The study area is comprised of the Nibley City limits, its annexation boundary, and the surrounding watersheds that contribute toward stormwater flows passing through Nibley City.

Sunrise Engineering conducted a survey of 69 detention basins and 24 retention basins throughout the study area and collected field data for approximately 68,200 feet of piping and 58,000 feet of earthen canals belonging to the Nibley City, UDOT and private properties. Sunrise also surveyed approximately 51,900 feet of piping and 189,700 feet of earthen canals belonging to the Nibley Blacksmith Fork, Clear Creek, and College irrigation companies. Furthermore, Sunrise manually delineated 125 sub-watersheds across the entire study area.

Hydrologic analysis was conducted to provide information regarding the flows and volumes of stormwater that each individual basin stores or each conveyance facility transports during a design storm event. The design storms selected for this plan are 25-year 24-hour, 100-year 24-hour, and 100-year 48-hour storms for conveyance facilities, detention basins, and retention basins, respectively. The hydrologic analysis conducted in this study considers major geographic attributes of the study area including soil types, natural and man-made flow patterns, current and future land uses, local precipitation data, and storm routing. It should be noted that final design for all recommended improvements should include additional site specific hydrologic and hydraulic analysis.

HEC-HMS, a software developed by the US Army Corps of Engineers to simulate the hydrologic and hydraulic processes of watershed systems, was used in this report to model drainage in the study area. It also helped determine peak flow and total stormwater volume in each watershed. The model was first created using current conditions and then updated to reflect future growth and development based on land use and site plans. This allowed the team to assess the capacities and shortcomings of the City's drainage system. The results showed that several existing facilities do not have enough capacity to handle the required 25-year or 100-year design storms.

An analysis was conducted to determine the available capacity of primary irrigation canals and pipelines operated by the three irrigation companies, Nibley Blacksmith Fork, College, and Clear Creek, in Nibley. This evaluation combined field data, canal company watering schedules, and results from the hydrologic model. The findings identify the remaining capacity within the canals, which can help determine suitable discharge locations and volumes for stormwater from new

developments. In addition, the results highlight areas of deficiency within the system where improvements could reduce the risk of future flooding.

Sunrise Engineering has identified a deficiency list and selected 13 prioritized capital improvement projects from the list after evaluation with the City. Each project is crucial to resolve the existing system deficiencies or provide larger drainage capacity for future growth and increased surface runoff. The types of prioritized projects include drainpipe upsizing, earthen canal piping, new storage pond installation, old facilities removal, cleanup, and maintenance. In addition to the 13 priority projects, Sunrise proposes utilizing a regional conveyance method for the future development of the southwest annexation area, including five trunk line projects that will be built out in the next ten years. Preliminary cost estimates for each project and period were developed to assist in creating a cash flow, user rate, and impact fee analysis. Excluding two urgent Hideaway projects under construction currently, the total estimated costs for these Capital Improvement Projects (CIP) and Trunk Line Projects (TLP) for the next 10-year period are $1,706,700 and $790,000, respectively.

Cost breakdowns for each of the identified projects can be found in **Appendix E**. The recommended improvements may be paid for in part with the proposed impact fee, as described in **Section 4.1**, that will be collected during the 10-year planning period. The remaining portion of the recommended projects may be funded through the proposed user rate, reserve funds collected for this purpose, and/or grants and loans from various funding agencies.

SECTION 1 | BACKGROUND & DATA COLLECTION

1.1. INTRODUCTION

This Stormwater Master Plan has been prepared for Nibley City, Utah, located at the center of Cache County along the east side of Highway 91. An area map is included in **Exhibit 1** attached to this report.

Nibley City covers an area of approximately 4.2 square miles and has a population of over 8,500 people. The City has experienced significant growth of 415% over the past 30 years and is projected to have a constant growth rate in the coming years. As this growth has occurred, the construction of homes, roads, and other improvements typical of development has altered the natural terrain upon which the community was built. These alterations have resulted in an increase in stormwater runoff generated by storm events and have changed the routes by which storm runoff is directed through the City.

Historically, the City's storm drainage system consisted of a network of ditches that were primarily used for irrigation. The City has since installed storm drain infrastructure and is continuing improvements to separate the irrigation system and storm drain system. However, the storm drain system serving the City has historically utilized the local irrigation delivery systems from the Nibley Blacksmith Fork, Clear Creek, and College irrigation companies.

The City has constructed significant flood control improvements. The City's existing storm drain network routes the majority of storms without flooding. However, improvements are needed to convey large rain event storms. This report provides recommendations on infrastructure to improve the system and prevent flooding in large storm events. Future growth of the City will continue to add more strain on the storm drain network. **Figure 1.1** illustrates the general process of onsite stormwater management.

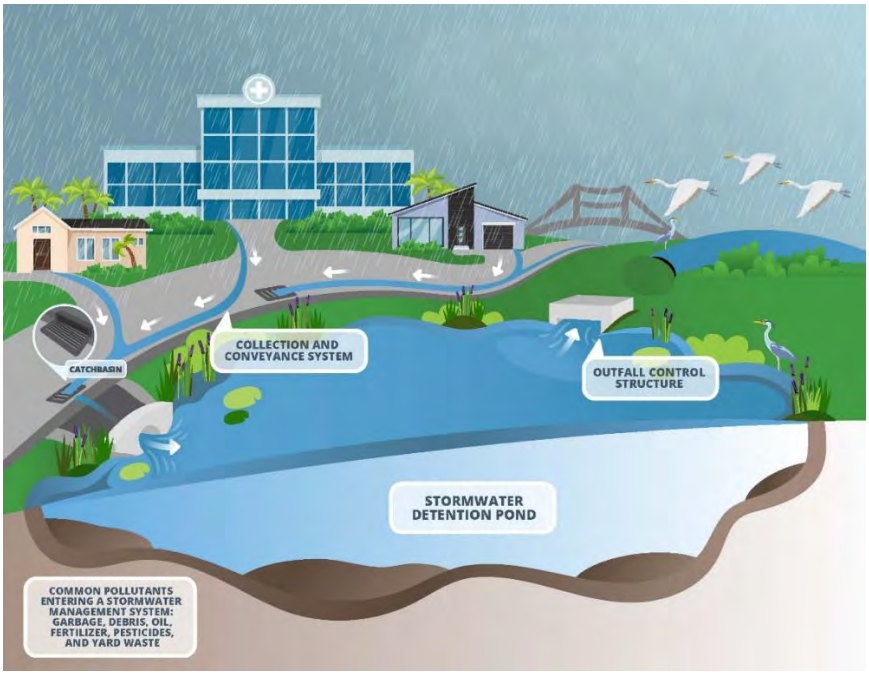


Figure 1.1. *An Illustration of Typical Stormwater Management (Manatee County, Florida)*

The Blacksmith Fork River, located at the east side of the City, functions as a natural barrier to intercept runoff coming from the eastern mountains; the Hyrum Slough also serves as a natural barrier for the City. Both of these natural systems convey water to the northwest and on to Cutler Reservoir. Meanwhile, the current drainage systems within Nibley City are comprised of a series of retention and detention basins that capture and convey stormwater within each sub-watershed, with the goal of infiltrating and/or evaporating the stormwater within individual sub-watersheds. Any overflow volumes not contained in the sub-watershed where the runoff is generated are routed to the next sub-watershed downstream. These systems are owned by the City or private entities. Additionally, the City utilizes existing open-channel irrigation systems to convey stormwater. The stormwater conveyance infrastructure primarily consists of earthen canals, PVC pipe, corrugated metal pipe, reinforced concrete pipe, box culverts, and streets with curb and gutter.

Title 15.10 of the Nibley City Code currently governs the storm drainage requirements for new developments. New developments are required to install storm drain improvements consistent with the Nibley City Stormwater Design Standards and in accordance with the current Master Plan. Therefore, with the goal of a net zero impact to existing land uses, the future developers shall ensure the post-development peak storm runoff does not exceed the predevelopment stormwater flow.

The plan includes general requirements for the sizing, maintenance, and configuration of a stormwater management system in Nibley City and provides recommendations for addressing specific problem areas in the City. In addition, this plan provides operation and maintenance recommendations for existing and future stormwater improvements. It is intended that this 2024 Stormwater Master Plan will help Nibley City manage current and future stormwater routing scenarios.

1.1.1. Length of Planning Period

The planning period for this Stormwater Master Plan is 20 years, beginning in 2025 and running through 2035. Nibley City should review and update this plan every five to ten years, or as otherwise dictated by growth.

1.2. FIELD INVESTIGATION

To assist with preparation of this Stormwater Master Plan, Sunrise Engineering's staff conducted a detailed field investigation of the City. The overall purpose of the field investigation was to collect information regarding existing drainage facilities, drainage patterns, irrigation systems, and problematic areas in the study area. The survey includes collecting the streamline, cross section, turnouts, and key infrastructure for all main and lateral conveyance facilities. These facilities consist of earthen canals, pipe segments, culverts, irrigation systems, field drain lines, and the municipal storm sewer system. Additionally, Sunrise Engineering surveyed 93 existing ponds throughout the study area. The collected information for each pond includes the basin bottom area, basin depth, discharge infrastructure, and basin type.

The findings of the field investigation were compared against prior findings and recommendations made during completion of the 2015 Master Plan. This process helped determine the basis for the system evaluation and modeling. **Table 1.1** provides a summarized inventory showing the ownership of the infrastructure that was identified during the field investigation.

Table 1.1. *Summarized Field Data Collected*

Property Owner		Infrastructure Quantities				
		Detention Basins	**Retention Basins**	**Stormwater Catch Basins / Structures**	**Pipes**	**Earthen Canals**
Nibley City		21	8	1740	54,895'	58,042'
UDOT		3	2	73	13,000’	
Private		42	17	577	324'	
Irrigation Company	NBSF	N/A		11	51,880'	117,056'
	Clear Creek					29,249'
	College			1		43,359'

The field investigation was further supplemented by maps obtained from the City and other entities regarding soil types, land uses, zoning, and elevations. The gathered information was then used in a hydrologic analysis of the study area to determine the amount of runoff generated by specific precipitation events and to evaluate the ability for existing facilities to convey the runoff flows.

1.3. EXISTING DRAINAGE FACILITIES

Nibley City utilizes multiple types of facilities for drainage conveyance and stormwater management. The following subsections generally describe the main existing facilities. Although a significant amount of field data was collected, it is infeasible for the model to exactly match reality. Several assumptions were made for the hydrologic and hydraulic analysis. These parameter assumptions are discussed in **Subsection 3.3**.

1.3.1. Roadway Conveyance

Excess stormwater generated by a given rainfall event typically sheet flows to the curb and gutter system lining the streets in a drainage area. Where necessary, valley gutters are located at street intersections to route stormwater across the intersections. Curb inlet boxes are installed in certain locations within the gutter systems to collect water from the streets and direct it into available storm drainpipes or natural drainage channels. On streets where curb and gutter systems are absent, shoulder swales or open channels along the road sometimes serve as drainage barriers which route stormwater runoff to the nearest drainage facility or local depression.

1.3.2. Storm Drainpipe System

Storm drainpipe systems are located in certain portions of the City and were constructed to drain specific regions. These systems include catch basins, cleanout boxes, pipe segments, and outfall structures which discharge stormwater to artificial facilities such as retention or detention basin, as well as to natural drainage features including several watercourses that ultimately lead to the Blacksmith Fork River, Spring Creek, or Hyrum Slough. The existing stormwater infrastructure is displayed in **Exhibit 2**. Nevertheless, a sizable portion of Nibley does not include complete storm drainpipe systems and consists mainly of roadway conveyance, drainage, and irrigation open channels which route flow to the nearest artificial stormwater facility or natural drainage feature. There are also several locations which have curb and gutter but lack effective routing of stormwater to the nearest drainage channel. New pipe segments have been proposed in certain areas in Nibley City where the current conveyance facilities do not have the capacity to handle the storms.

1.3.3. Irrigation Systems

The existing flood irrigation system within the City has historically diverted water from the Blacksmith Fork River and conveyed it to the fields throughout the City by means of canals and ditches.

There are 3 main irrigation companies serving the Nibley City: the Nibley Blacksmith Fork Irrigation Company, the Clear Creek Irrigation Company, and the College Irrigation Company. The serving area and main infrastructures of each irrigation company are mapped in **Exhibit 3**. Furthermore, the system not only served irrigation purposes but was also effective in collecting and routing stormwater runoff to discharge points along the Blacksmith Fork River, Spring Creek, and Hyrum Slough. Due to ongoing development in the Cache Valley area, the irrigation system might be utilized to convey more stormwater in the future. Several improvement recommendations for the existing flood irrigation system are listed in this report. Furthermore, various irrigation companies are interested in the piping and pressurization of their systems, which will be discussed in the system improvements section.

1.3.4. Detention/Retention Facilities

Detention basins are designed for temporary storage of water, and retention basins are designed to permanently hold water. There are 69 detention basins and 24 retention basins within Nibley City that were analyzed in this master plan. All surveyed basins are mapped in **Exhibit 2**. These storage facilities help manage peak stormwater flow generated on each sub-watershed. Generally, storage facilities are used to alleviate or eliminate peak flows to a smaller volume that can be handled by downstream infrastructure. Several storage facility improvements have been proposed in certain areas in Nibley City where downstream infrastructure does not have the capacity to handle peak flows in the current scenario.

1.3.5. Drainage Channels

There are 3 primary natural and artificial drainage channels that are located within the Nibley City watersheds. These drainage channels are described as follows:

- Blacksmith Fork River: The Blacksmith Fork River is located along the east side of Nibley City, separating the City from Millville City. The river has plenty of capacity to intercept a significant amount of storm runoff coming from the east mountain areas. Several sub-watersheds at the east side of the City including UDOT roadway drainage will discharge excessive stormwater into the river directly or indirectly. The Blacksmith Fork River will convey water under the UDOT road near the east intersection of Highway 91 and W 1700 S Street and ultimately flow into the Logan River.

- Hyrum Slough: Hyrum Slough originates from Hyrum Reservoir located south of Nibley City. It conveys water northwards and plays a significant role in Nibley's irrigation system. The slough ultimately flows into the Bear River. Besides irrigation, a considerable portion of stormwater in the southern part of Nibley City discharges into Hyrum Slough.

- Spring Creek: Spring Creek fills an important role in the City's drainage system. Although Spring Creek does not pass through Nibley City, it is located on the northwest side of the City and receives a significant amount of stormwater.

1.4. WATERSHED INFORMATION

Work performed during the data collection and field investigation phase of this study included a detailed review of how stormwater runoff within Nibley City is routed to the primary drainage channels and pipe systems previously described. Sunrise established the direction of stormwater flow for local developments and reviewed existing stormwater conveyance facilities to understand how they route stormwater to the major drainage channels. After these patterns were determined, watershed drainage watersheds and sub-watersheds were delineated.

A drainage watershed is a portion of a greater watershed area that has specific, well-defined boundaries and produces runoff at a downstream location. A sub-watershed is a sub-area within a drainage watershed that is characterized by drainage features and land use and contributes runoff to the larger drainage watershed. Dividing larger watershed areas into individual drainage watersheds and sub-watersheds allows more detailed and accurate analyses of the individual areas. These individual analyses can then be combined to generate data for the large basins and the watershed as a whole. This process was followed for this plan. An exhibit showing the drainage watersheds as analyzed has been included as **Exhibit 4**.

1.5. SOIL TYPE INFORMATION

The soil type within a watershed area has a significant impact on how much excess stormwater is available for runoff because the soil type determines the precipitation infiltration rate. This infiltration rate is the rate at which water moves from the ground surface into subsurface soil layers. If the infiltration rate is particularly high, stormwater runoff generated by precipitation events is lower because a greater volume of moisture is absorbed by the soil. Conversely, if the infiltration rate is low, higher volumes of runoff are generated because minimal absorption occurs in the subsurface soil layers. The Soil Conservation Service (SCS) has studied soil types throughout the United States and has grouped soils according to their type and infiltration rates. These groups are described in the list that follows:

- Group A: These soils have a high infiltration rate. They are chiefly deep, well drained sands or gravel, deep loess, or aggregated silts. They have low runoff potential.

- Group B: These soils have a moderate infiltration rate when thoroughly wet. They are moderately deep and well drained and are of moderately fine to moderately coarse texture. Examples include shallow loess and sandy loam.

- Group C: These soils have a slow infiltration rate when wet. They are soils with a layer that impedes downward movement of water and typically have moderately fine to fine texture. Examples include clay loams or shallow sandy loams. These soils are typically low in organic content and high in clay content.

- Group D: These soils have a particularly slow infiltration rate. They are chiefly clay soils with high swelling potential. A high-water table is often permanent. Clay pans are often found

at or near the surface. A shallow layer of soil may cover a nearly impervious material. Examples include heavy plastic clays and certain saline soils. They have high runoff potential.

The National Resource Conservation Service (NRCS) has performed several studies of soils throughout the United States including those in Nibley City and the surrounding area. These studies reveal that the soil types located in the study area are primarily of groups B, C, and D. Soil data used for the study area consisted primarily of data from the SSURGO database which was obtained from the NRCS Web Soil Survey website. The data collected was used in the watershed analysis described by this plan. A map of the SCS soil types in the study area is included in **Exhibit 5**.

Some data was not able to be obtained during the soil analysis for the mountain area identified as watershed #109. No open resources or percolation data has been found for this location at the time of this report. Therefore, HSG Group B, the most common soil type throughout the Cache Valley mountain area, was assigned to the watershed for the calculation of its hydrologic characteristics. This sub-watershed is the only one that required this assumption.

1.6. LAND USE PATTERNS

The type of land use in a given watershed area is a factor that significantly affects the magnitude of stormwater flow and runoff volume generated by precipitation events. Land uses that create relatively higher percentages of impervious surfaces such as parking lots, shopping areas, storage yards, and high-density residential housing tracts generate more stormwater runoff than areas with lower percentages of impervious surfaces such as parks and grasslands.

A review of the Nibley City zoning map, current aerial photographs, and information collected during the field investigation were used to determine the current land use categories used in this plan. The following land uses were identified:

- Agricultural: This use includes cultivated land for farming and agriculture.
- Commercial: This use includes retail shops, restaurants, and other types of businesses.
- Low Density Residential: This use includes residential housing with 1-3 dwelling units per acre.
- Medium Density Residential: This use includes residential housing with 4-6 dwelling units per acre.
- High Density Residential: This use includes residential housing with 7-10 dwelling units per acre.
- Industrial: This use includes industrial-related land.
- Open Spaces (Parks/Schools): This use includes public school areas, recreation grounds and facilities, other grassy areas, etc.

Development in the City has been governed by guidelines established by adopted zoning ordinances. It was assumed, for the purposes of this study and for predicting future land use patterns within the City, that development and land use will follow the Nibley City zoning map.

Maps showing the current City zoning and future land use in this study have been included as **Exhibit 6** and **Exhibit 7**.

1.7. HISTORY OF FLOODING & COMPLAINTS

The data collection and field investigation process completed for this study included coordination with the City to identify existing stormwater related problem areas within the City. **Exhibit 2** and **Exhibit 4** can be referenced to locate the basin and watersheds, respectively. A summary of the problem areas identified is shown below:

- Detention Basin #18 & 19 – These two basins are located at the northeast corner of W 2980 S Street and S 1200 W Street, as indicated in **Exhibit 2**. This area is a problem area because of onsite stormwater (Watershed #119, displayed in **Exhibit 4**), and because of two basins that experience excessive runoff southeast of Heritage Elementary School (Watershed #41), which makes the total volume of stormwater over their maximum detention capacity.

- Detention Basin #8 & 59 – These two basins, which are shown in **Exhibit 2**, are linked to handle onsite stormwater (Watershed #17, displayed in **Exhibit 4**) and runoff from upstream watersheds. According to Nibley City staff, Basin #8 is too deep to maintain regularly.

- Residential Sump Pumps – The groundwater table is high throughout multiple portions of Nibley City. Many residents use sump pumps to eliminate flooding issues on their basement floor. The pump effluent is discharged to the gutter in the streets or other stormwater facilities that flow to the surrounding detention/retention basins, which reduces the storage capacity of these basins in a large storm event. Nibley City staff have been documenting the location and time of year of the operation of these residential sump pumps. Their locations have been marked on various exhibits to help illustrate their correlation with various features and are described below:

    - **Exhibit 2**: This map shows the relationship of locations of the residential sump pumps to the stormwater infrastructure throughout the city. It is important to note the clustering of the residential sump pumps. This clustering results in an aggregated impact to the stormwater ponds dedicated to those areas. If these pumps were more spread out, their impact would be less concerning. Due to their clustered nature they often directly impact individual stormwater ponds.

    - **Exhibit 5**: This map provides soil types for the study area. The soil type governs the transmissivity of the soil, and the water percolation rates and behaviors. Clays and silts will reduce percolation rates and will result in surface ponding or higher ground water levels. Sands and gravels allow water to flow through the soil and help keep water moving further northwest and deeper. If clays are located beneath smaller layers of sands, clays, and silts a bathtub effect can occur. This results in stormwater being pulled down through the top permeable layers of sand and gravel, but it is then stopped by lower clay layers creating a highly saturated soil with no reliable drain. This is often the situation that results in a residential sump pump being required and having a continual operation. The water never leaves these areas, and the pump is simply cycling water through the soil.

- **Exhibit 8**: This map should be considered the most crucial for this discussion. Depicted on this map are land drains that have been identified through field investigation and/or information gathered from local property owners. These land drains were originally designed to help in the management of ground water to help dry up fields to allow them to be farmed effectively. Often these pipes are 6 to 10 feet deep and are perforated with a drain location. During development, the new landowner does not understand the role these land drains provide and will often dig through them during the installation of utilities, basements, and foundations. This results in a sectioned-up land drain that delivers collected ground water directly to the foundation wall of a newly built home. It is important to note that the majority of residential sump pumps are concentrated around areas with significant land drains reported.

The history of flooding in Nibley is extensive and high runoff flows are generated from even small rainfall events. Through past improvement projects and ongoing maintenance, the City has corrected numerous prior problem areas identified in past plans and studies. It is expected that the City will be able to eliminate the additional problem areas identified by following the recommendations contained within this plan.

1.8. INTERACTION OF DRAINAGE SYSTEM WITH IRRIGATION SYSTEM

As elaborated in **Subsection 1.3.3**, there are 3 main irrigation companies serving the farmland and secondary water needs of Nibley City. The serving area and infrastructure layout for these 3 companies are displayed in **Exhibit 3**. The current design and functionality of the existing stormwater system serving Nibley City is heavily reliant on the local irrigation systems. Without the irrigation systems, many of the stormwater ponds would be cut off from emergency overflow paths and regulate discharge paths. Presently Nibley City has an agreement with only the Nibley Blacksmith Fork Irrigation Company to allow the City to utilize their irrigation system to convey excessive runoff in storm events. Nibley City does have a non-documented agreement with Clear Creek Irrigation Company and College Irrigation Company to allow stormwater utilization of their irrigation systems. Therefore, in this study, existing irrigation systems will be used for drainage analysis and modeling.

However, it is of paramount importance that the City maintains these relationships and it is recommended that documented agreements be established with the Clear Creek Irrigation Company and the College Irrigation Company and that the current agreement with the Nibley Blacksmith Fork Irrigation Company be reviewed and updated for current situations.

A key objective of this master plan is to determine how much capacity the primary irrigation canals have available for conveying stormwater. This amount that is available will be referred to as remaining capacity. Evaluating the remaining capacity involves three components. The first is identifying the maximum flow the canal or pipe can convey before overtopping or becoming surcharged (**Maximum Available**). The second is determining the peak irrigation flow through the canal based on irrigation demand and schedules (**Irrigation Demand**). The third is accounting for the existing stormwater that already enters the canal (**Stormwater Input**). By performing a mass balance of these factors, the remaining capacity can be determined. The following equation illustrates this calculation process.

$$Remaining\ Capacity = Maximum\ Available - Irrigation\ Demand - Stormwater\ Input$$

The remaining capacity was calculated for 160 sections of canal and pipes. The results of the analysis are shown on the exhibits described in **Table 1.2.**

Table 1.2. *Summarized Exhibits for Irrigation Capacity Analysis*

Variable	Exhibit
Maximum Available Irrigation Canal Capacity	Exhibit 15
Irrigation Demand for Irrigation Canals	Exhibit 16
Stormwater Input to Irrigation Canals	Exhibit 17
Remaining Irrigation Canal Capacity	Exhibit 18

1.9. FIELD DRAINS

Field drains, also known as land drains, are typically made up of perforated pipes buried below the surface. These pipes collect water that seeps through the soil and channel it away from a field, often discharging it into nearby water bodies or drainage ditches. These are often installed to make land farmable and to relieve the ground water in the area.

There are several existing land drain facilities throughout the City, which play a crucial role in stormwater conveyance. The layout of known field drains can be found in **Exhibit 8**, and the Nibley City Field Drain Identification Project report prepared by Utah Association of Conservation Districts is included in **Appendix D**. One crucial item of note concerning the filed drains is that there is no agency or group that is currently taking ownership of the maintenance, protection, mapping, and replacement of the drains. This results in the destruction of field drains during development and home construction with no verification that the removal of the drains will not negatively impact the general area.

Therefore, it is recommended that the City require future developers to be responsible for locating, protecting, repairing, or replacing all land drains within their development areas.

SECTION 2 | HYDROLOGIC PARAMETERS & METHODS

2.1. INTRODUCTION

After completion of the field investigation and data collection process outlined in **Section 1** of this plan, a hydrologic analysis of the drainage watersheds contributing runoff flow to the Nibley City study area was also completed.

Two software programs were used to complete the analysis. The programs used are Watershed Modeling System (WMS) by Aquaveo LLC and Hydrologic Modeling System (HEC-HMS) developed by the US Army Corps of Engineers. The WMS software package was used during the basin delineation process and to determine several of the basin characteristics required for the analysis. This data was then imported into HEC-HMS to perform hydrologic and hydraulic modeling and to determine peak and total volume flows generated in the drainage watersheds.

Certain assumptions and modeling parameters that mathematically describe precipitation and runoff characteristics of the study area were required for development of the computer model. These parameters include:

- Method of Analysis
- Sub-watershed Delineation
- Rainfall Data
- Design Storm
- Soil Type and Land Use Characteristics
- Lag Time

A discussion of these input parameters and the process of creating the hydrologic model is given in **Subsection 2.2**. Results generated by the computer model are discussed in **Section 3**.

2.2. HYDRLOGIC MODEL

2.2.1. Method Of Analysis

Numerous methods have been developed for performing hydrologic analyses for given watersheds. Each of the methods has its strengths and weaknesses, so particular methods are better suited to specific watershed characteristics and configurations. The specific hydrograph method chosen to analyze the Nibley City watershed was the SCS Dimensionless Unit Hydrograph Method. This method, developed by the Soil Conservation Service, is best suited for urban or rural conditions with drainage sub-watershed areas ranging from one to 2,000 acres. Data required for input includes rainfall intensities, predominant soil types, land use patterns, and runoff curve numbers (CN) for individual basins. Output results include runoff hydrographs from which peak flows and volumes can be determined.

In the Unit Hydrograph Method, input data is used to create a direct hydrograph that results from one inch of excess rainfall uniformly distributed over the watershed area for a specific duration storm event. After the unit hydrograph is created, it can be used to generate flood hydrographs for

design storms (i.e. 25-year 24-hour, 100-year 24-hour, etc.) based on the theory that individual hydrographs resulting from successive increments of rainfall excess that occur throughout a storm period will be proportional in discharge throughout their length. The software package has the ability to run the SCS method to generate stormwater discharge hydrographs based on the required input data. Hence, this package was appropriately suited for analysis of Nibley City watershed.

2.2.2. Sub-Watershed Delineation

In order to effectively model precipitation and runoff scenarios for the Nibley City watershed, the study area was divided into drainage watersheds. These watersheds were further broken down into several sub-watersheds which contribute to the total runoff of the larger drainage watersheds. **Exhibit 4** illustrates the watershed and sub-watershed delineations. These watersheds were delineated using a combination of automatically delineated basins using a digital elevation model (DEM) imported into WMS® and by hand drawing or correcting basin boundaries based on findings from the field investigation. The DEM utilized was obtained from the Utah AGRC website. These watersheds and sub-watersheds represent the current storm runoff configuration for the City. **Figure 2.1** indicates a sub-watershed of GIS mapping and HEC-HMS model near Nibley Park Avenue. Using this sub-watershed for an example, Watershed #86 flows into the Basin #6, Watershed #121 flows into Basin #5, and Watershed #47 flows into Basins #71, 72, and 73. All stormwater from these basins are discharged into the adjacent sump area, and the runoff is ultimately cascaded downstream through an existing 18" HDPE pipe. The watersheds and sub-watersheds were first manually delineated and mapped in the GIS software and then they were exported to a hydrologic analysis software for further modeling.

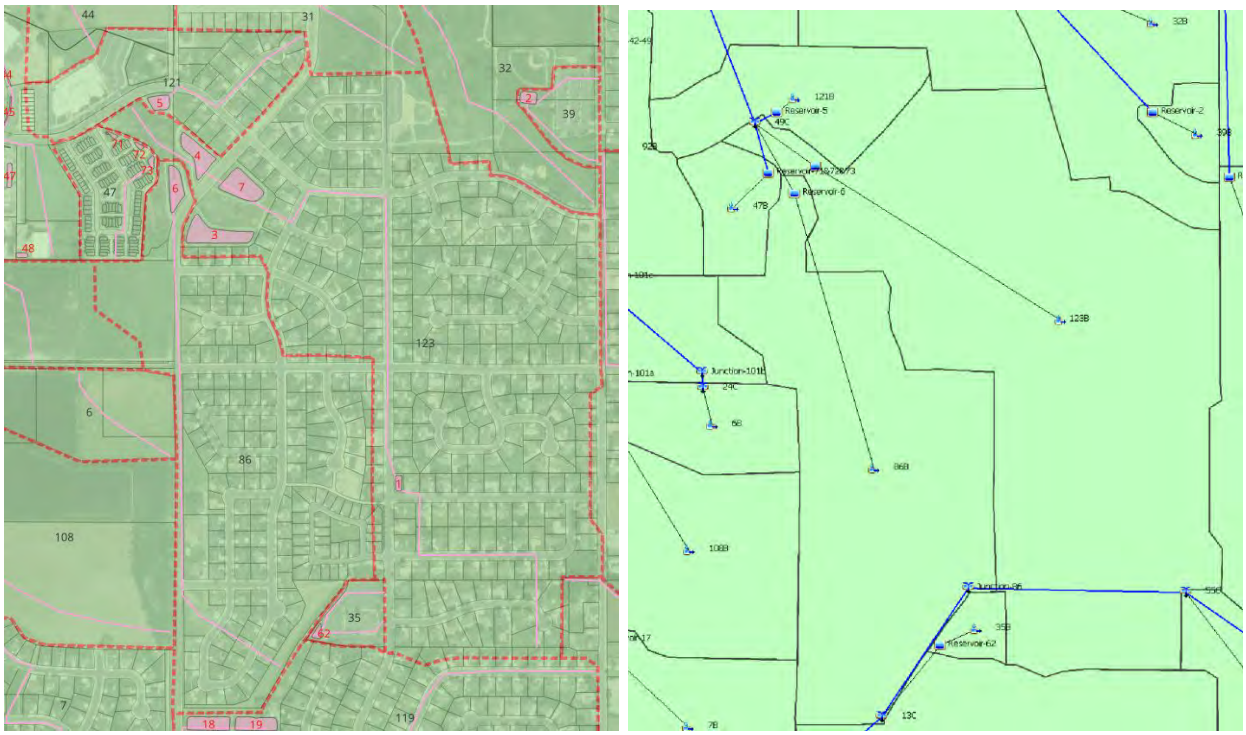


Figure 2.1. *A Typical Example of Nibley Sub-watershed: GIS Mapping (Left), HEC-HMS Model (Right)*

2.2.3. Rainfall Data & Design Storm

The design storm for a hydrologic analysis is normally chosen based upon data observations that reveal the type of precipitation event that produces the highest peak flows and volumes for a given watershed under realistic rainfall event conditions. In the western United States and especially arid areas, storms that generally produce the highest levels of runoff are thunderstorms. The design storm and precipitation data used in this study is in compliance with the Cache Valley Storm Water Standards as amended by Nibley City in April 2019. These data are also consistent with the requirements for surrounding cities within Cache County. The Cache Valley / Nibley City Storm Water Standards selected a representative location for the precipitation data of the whole county. Accordingly, this study will also be premised on this.

Rainfall data necessary for input into the computer model was taken from the National Oceanic Atmospheric Administration (NOAA) website ATLAS 14. **Table 2.1** included in **Appendix A** provides information regarding design storm depth-duration-frequency (DDF) of rainfall events. These precipitation data can be used to create a DDF curve which is a relationship between the depth, duration, and frequency or return period of a given storm event. This can then be used to produce a storm temporal distribution. This distribution is a relationship between the percentage of rain produced given the amount of time that has elapsed.

Figure 2.2 and **Figure 2.3** display the intensity and cumulative amount of precipitation for three storm events. Compared to the 25-year 1-hour storm event (0.967 inches), which was used in the previous 2015 Stormwater Master Plan, this report uses larger storm events for modeling and analysis. The 25-year 24-hour (2.41 inches) was applied for conveyance systems, and the 100-year 24-hour and 100-year 48-hour were selected for detention basins and retention basins, respectively. Due to the considerably higher precipitation intensity chosen, model results and conclusions in this study will be significantly different compared to the previous master plan.

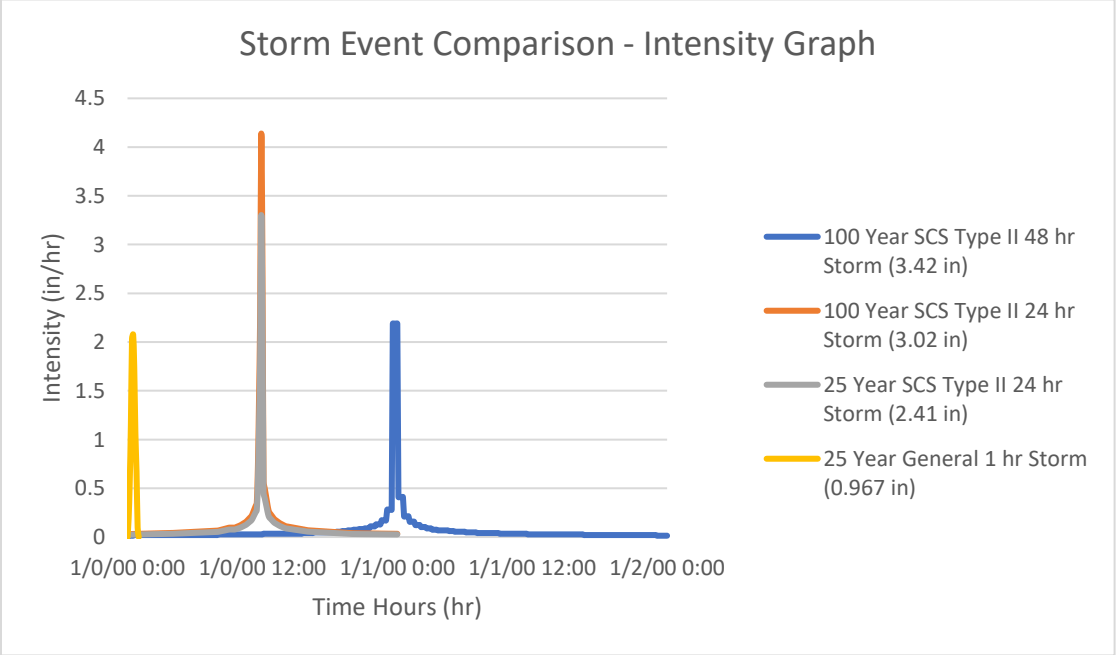


Figure 2.2. *Precipitation Intensity Comparison for Different Storm Events*

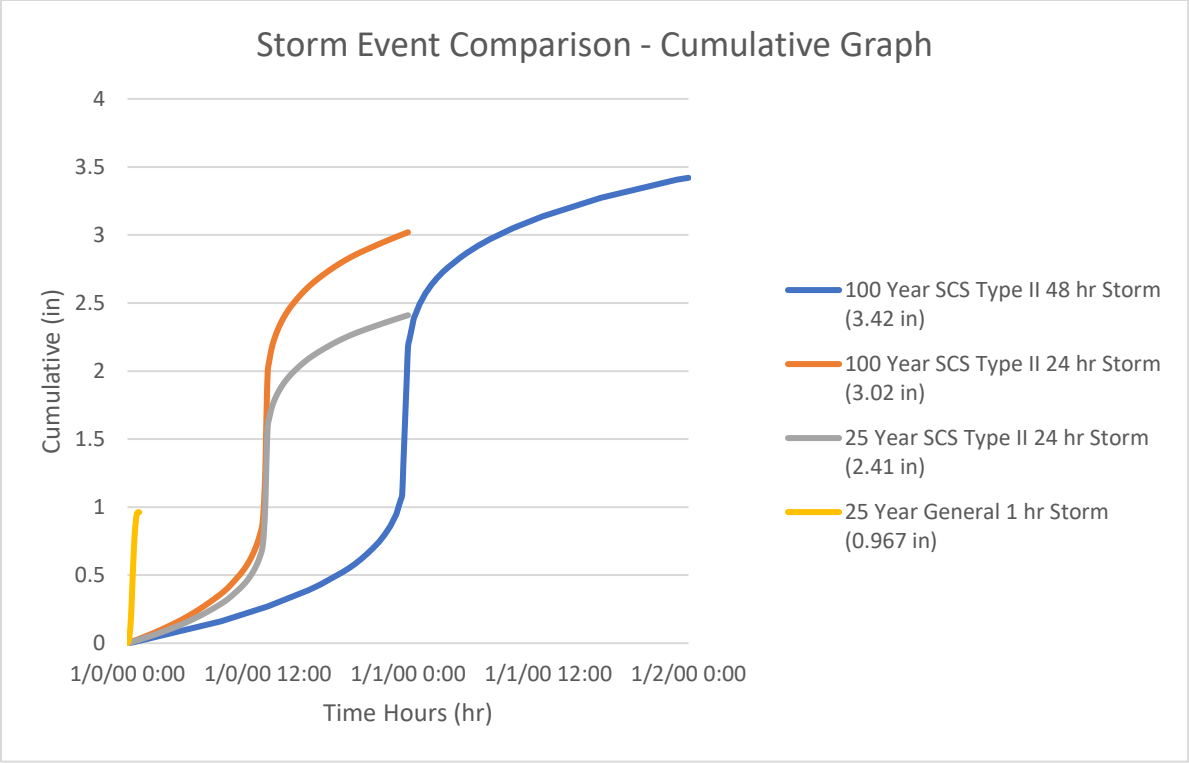


Figure 2.3. *Precipitation Cumulative Amount Comparison for Different Storm Events*

2.2.4. Soil Type & Land Use Characteristics

One factor that significantly affects the amount of runoff generated by a particular watershed is the soil type within the watershed. Different soils have different infiltration rates, or rates at which water can move through the surface to subsurface layers and thus be held from flowing off the watershed via surface drainage. If the infiltration rate is high, the runoff generated from storms is decreased. If the infiltration rate is comparatively low, precipitation will flow off the watershed rather than being absorbed.

Another key factor that affects the amount of runoff generated by a watershed is land use. Developed areas have a higher percentage of impervious surfaces like streets, driveways, parking lots, and roofs while undeveloped areas are typified by pervious surfaces and plant features that are more efficient at absorbing precipitation, preventing stormwater from leaving the watershed as runoff. The result is that higher rates are expected with increased development than are typically observed from a watershed in its natural condition.

The effect of soil types and land uses on watershed runoff flows and volumes is accounted for within the SCS Unit Hydrograph method for hydrologic analysis by the runoff curve number (CN). The Soil Conservation Service has calculated CN values for each soil group based on particular land uses. Representative curve numbers were calculated by the computer model according to soil maps and land use maps imported into the model under existing and build-out conditions. These soil type maps and current land use maps are shown in **Exhibit 5** and **Exhibit 6**. Using WMS, a composite CN value for each sub-watershed was calculated based on a weighted average of the different soil and land use types located within each sub-watershed. The current and future curve

number values assigned to each of the sub-watersheds are shown in tabular form, along with other drainage watershed parameters, in **Tables 2.2** and **Table 2.3** in **Appendix A**, respectively.

2.2.5. Lag Time

The final input parameter required for the hydrologic model is the lag time (T_l) which is generally defined as the time between the center of mass of effective rainfall and the inflection point on the recession (falling limb) of the direct runoff hydrograph. This is often related to the time of concentration which is defined as the time that must elapse before the entire sub-watershed area is contributing to runoff at the outflow point of the sub-watershed. This parameter helps to define the shape and peak of the resulting hydrographs from rainfall events. Factors that determine the lag time are the length of overland flow (L) which is the maximum distance that water must travel from the upper extremity of the sub-watershed to the outflow point, the curve number (CN) which accounts for the soil infiltration capacity, and the slope (S) which is the average surface slope within the sub-watershed.

Of the various methods used to calculate the lag time, the SCS lag method is well suited for the hydrologic conditions characteristic of Nibley City's watershed area, which is also compliant with the Nibley City Stormwater Design Standards. The SCS lag equation was developed from observations of agricultural watersheds where overland flow paths were poorly defined and channel flow was absent, but the method has been adapted to small urban watersheds less than 2,000 acres in area and performs reasonably well for areas that are completely paved. Hence, the method can be applied to each of the sub-watersheds within the Nibley City study area. The SCS lag equation is expressed as follows:

$$T_l = \frac{L^{0.8}\left(\left[\frac{1000}{CN} - 10\right] + 1\right)^{0.7}}{1900 * \sqrt{S}}$$

where T_l is the lag time in hours, L is the sub-watershed hydraulic length in feet, CN is the SCS runoff curve number, and S is the average surface slope of the sub-watershed as a percentage.

Evaluation of the lag time equation reveals that as the length of the sub-watershed decreases and as the SCS runoff curve number and slope increases, the calculated lag time decreases. It is important to note that the time of concentration and the lag time has a significant effect on the size and timing of the peak flow from a watershed sub-watershed. Therefore, care must be taken to accurately calculate this parameter. **Table 2.2** and **Table 2.3** in **Appendix A** include a column that lists the calculated lag times for each sub-watershed in current and future conditions, respectively.

SECTION 3 | SYSTEM ANALYSIS & MODEL RESULTS

3.1. INTRODUCTION

After the hydrologic analysis described in **Section 2** of this plan was completed, a general overall evaluation of existing drainage conditions and facilities in Nibley City was performed to determine the adequacy of existing storm drain conveyance and routing facilities. This evaluation included hydraulic analyses of existing drainage features such as roadways, storm drainpipe systems, culverts, etc. The results of this analysis were used to reveal locations of flooding potential, to indicate where additional storm drain systems, improvements, or repairs are needed, and to provide insight on the prioritization of future projects and improvements.

The discussion presented in this section includes an analysis of existing storm drain facilities, and identified system deficiencies in the existing system, which are elaborated in **Subsection 3.3** and **Subsection 3.4**, respectively.

3.2. HYDROLOGIC MODEL RESULTS

Information regarding sub-watersheds, rainfall data, design storms, land uses, soil types, and lag times were compiled. Following the compilation of the watershed and rainfall information, an analysis using HEC-HMS was run which generated runoff hydrographs for each sub-watershed in the watershed area. The runoff hydrographs provided values on peak flows and total runoff volumes for each sub-watershed. Peak flows and volumes resulting from the 25-year 24-hour, 100-year 24-hour, and 100-year 48-hour storm event under existing and build-out conditions are summarized in **Table 3.1** and **Table 3.2** in **Appendix A**.

Additionally, the total model output reports are over 3000 pages, which is impractical to attach here. Hence, only the model output reports for existing condition in 25-year storm event have been included in **Appendix B**, and the completed version of the reports can be provided as requested. The main purpose of this analysis is to provide reference information for future analyses, basic data for future designs, and to ensure that no current systems within Nibley City are largely undersized or under designed.

3.3. EXISTING FACILITIES

Primary stormwater conveyance facilities existing in Nibley City include the roadway systems, irrigation ditches, storm drainpipe systems, culverts, and natural drainage channels. A brief description of each type of facility is listed in **Subsection 1.3**, while the role and conveyance capabilities of each is discussed in the following subsections. This subsection is meant to be informative and provide details regarding the design methods and parameter assumptions used to determine system improvements. Exhibits showing the recommended stormwater improvements for the City boundaries and annexation areas have been included as **Exhibit 9** and **Exhibit 10**, respectively.

3.3.1. Roadway Conveyance

After precipitation contacts the surface, excess stormwater begins to flow in the direction of highest gradient to concentration points. These concentration points are often a roadway with its defined edges being formed by a curb and gutter system or shoulder swales. The stormwater

conveyance capacity of a given roadway is governed primarily by its cross-sectional shape as determined by the curb and gutter configuration and the cross slope of the roadway. Like any other conveyance channel, the longitudinal slope and surface roughness strongly influences the capacity. If it is assumed that a roadway is lined on both sides with high back curb, the cross slope of the roadway is 2.0% and the average Manning's roughness of the roadway is 0.013 (a conservative value), the conveyance capacity of the roadway can be closely approximated by the equation:

$$Q_{capacity} \approx 25.18\sqrt{S}$$

where Q capacity is the conveyance capacity of the roadway in cubic feet per second (cfs) and S is the longitudinal slope of the roadway in foot per foot (ft/ft). This equation holds true for nearly all roadway right-of-way widths. For those streets that are lined with only one side of curb and gutter this capacity is simply cut in half.

Several of the streets in Nibley City are not characterized by the idealized cross section used to develop the street flow capacity equation given above. For example, some streets have no curbs at all and depend on swales or irrigation ditches to convey all stormwater flows from the immediate surrounding area. For these cross sections mentioned above, it can be expected that the roadway flow capacity is lower.

Table 3.3 below provides an inventory of all existing paved roadways within the city limits, categorized by slope ranges from 0% to 5%, the inventory is also illustrated in **Exhibit 11**. The total length of inventoried roadway is 43.66 miles. The majority of the roadway network has slopes ranging from 0% to 1%, with estimated roadway conveyance capacities approximately between 1.78 cfs and 5.63 cfs for roadways with curbs.

Table 3.3 *Roadway Conveyance Capacity by Various Road Slopes*

Slope (%)	Length	
	feet	miles
0 - 0.5	114,290	21.6
0.5 - 1.0	74,759	14.2
1.0 – 2.0	32,504	6.2
2.0 – 3.0	7,407	1.4
3.0 – 4.0	624	0.12
4.0 +	737	0.14
Totals	230,321	43.66

3.3.2. Storm Drainpipe Systems

Storm drainpipe systems are currently installed in many areas of the City. These systems generally include catch basins, cleanout boxes, pipe segments, etc. Many of these systems function as complete isolated systems and are not connected to larger municipal storm drain mains. Others collect storm runoff for a particular area and route water to larger storm drainpipes where the runoff is combined with flows from other areas before being routed to natural drainage facilities.

Table 3.4 in **Appendix A** presents the conveyance capacity of several types of piped systems based on the installed slope of the pipe. The conveyance capacity of piped storm drain systems is generally calculated using Manning's equation:

$$Q = \frac{1.486}{n} AR^{2/3} S^{1/2}$$

Where Q is the flow capacity of the swale in cfs, n is Manning's roughness coefficient, A is the area of fluid flow in square feet, R is the hydraulic radius in feet, and S is the longitudinal slope of the swale in ft/ft.

Certain components of Nibley's storm drain system were modeled hydraulically to verify adequate conveyance capacity for the 25-year 24-hour design storm. Particularly, those portions of the system which route stormwater runoff from upstream basins, through downstream basins, and which combine runoff from multiple basins before finally discharging into a natural drainage facility. To simplify the hydraulic model, the slope for all drainpipe is assumed as 0.004 ft/ft, while the Manning's roughness is assumed as 0.013, which are both conservative assumptions.

By all appearances, these systems are functioning as designed and are effectively conveying stormwater out of the nearby streets and developed areas.

Excess stormwater routed into these systems generally enters the storm drainpipe system through catch basins and inlet boxes. Covers and grates for these inlet boxes have many sizes and configurations which affect the amount of stormwater that can be captured by these boxes. If the actual grate is smaller or becomes choked with debris or is otherwise clogged, the capture capacity is reduced. Limited capacity at a grate may cause localized flooding and may also cause flooding at downstream grate locations due to the reduced amount of water being captured at upstream locations. Future storm drain system designs and development requirements should consider these facts.

3.3.3. Irrigation System & Open Channels

Irrigation systems are widely and actively utilized in the Cache County area to divert water from nearby rivers and reservoirs to the fields for crop growth. The system not only served its irrigation purpose but was also effective in collecting and routing stormwater runoff back to drainage channels, including the Blacksmith Fork River, Hyrum Slough, and Spring Creek in this study area. Cross sections of the irrigation channels varied widely and included trapezoidal channel sections, rectangular channel sections, and round pipe sections. Channel construction materials also varied. Most of the channels are earthen ditches while the rest are concrete or metal pipe segments.

Considering these various types of open channels, there are multiple assumptions made based on all field data collection and cross section survey. The Manning's roughness for earthen channel and pipe segment are assumed to be 0.013 and 0.045, respectively. Meanwhile, the longitudinal slopes for Hyrum Slough and Blacksmith Fork River are 0.01 ft/ft while the slope for other open channels and pipe segments are 0.004 ft/ft. Additionally, all open channels are assumed to be trapezoidal shaped as displayed in **Figure 3.1** and **Figure 3.2**. The cross section for Hyrum Slough is assumed to be a 6' bottom width and a 3' depth with 2:1 (H:V) side slope. For the Blacksmith Fork River, the cross section is assumed to be a trapezoid with a 25' bottom width, 10' depth, and

2:1 (H:V) side slope. The rest of the open channels are assumed to have a 3’ bottom width and a depth of 3’ with 1.5:1 (H:V) side slope. With these assumptions, the flow capacity of each of these channels can be calculated using Manning’s equation which was presented previously.

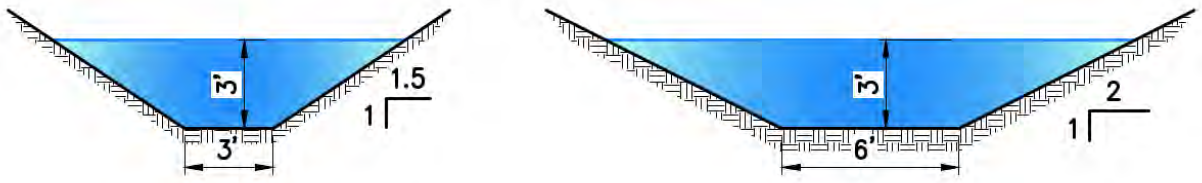


Figure 3.1. *Typical Cross Section for Open Channels (Left) and Hyrum Slough (Right)*

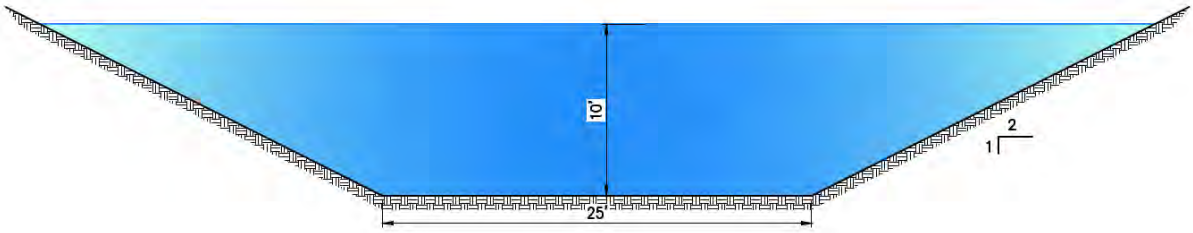


Figure 3.2. *Typical Cross Section for Blacksmith Fork River*

3.3.4. Culverts

Conveyance facilities within Nibley City include several natural drainage channels and canals. With this being the case, a few culverts are located throughout the City to convey stormwater under roadways or other such embankments.

The shapes of these culverts may vary but most are understood to be circular. Culvert construction materials also vary. Many are made from steel, concrete, and plastics. Culvert inlet and outlet configurations also vary. All these factors, including the size of the culvert, contribute to the conveyance capacity.

Generally, the culverts are adequately sized to convey runoff for the 25-year design storm based on current and future land uses. Several are shown to be slightly undersized for runoff from the required 25-year design storm. However, due to the inexact science of hydrology, the City not observing any overtopping during the past few decades, and the maximum conveyance capacity of the culverts and storm drains having been conservatively calculated to occur when the peak flow reaches 85% of the pipe diameter or culvert height, the improvements have not been recommended for replacement. Meanwhile, there are still a few culverts that are severely undersized which are verified by the City. These culvert segments are added to the improvement recommendations.

3.3.5. Detention Facilities

Basins including detention and retention ponds are the most critical facilities in Nibley City to control the peak flow in a large storm event. Field surveys were conducted to determine each

basin's type, depth, area, discharge point, and pipe size. To simplify the model, all basins are assumed to be trapezoidal shape with the side slope of 3:1 per the City's pond design standards. **Figure 3.3** indicates the typical profile of simplified detention basins.

Peak discharge flow rate, storage elevation, and volume for detention basins and retention basins are modeled for 100-year 24-hour and 100-year 48-hour storm events, respectively. Additionally, there are 3 low-impact development (LID) communities in Nibley City with no basin facilities that utilize the designed infiltration swale along the driveway for self-detaining. Per the Nibley City Storm Water Standards, the infiltration swale also needs to handle a 100-year 48-hour storm event. Hence, the LID area is modeled in the same way as a retention basin.

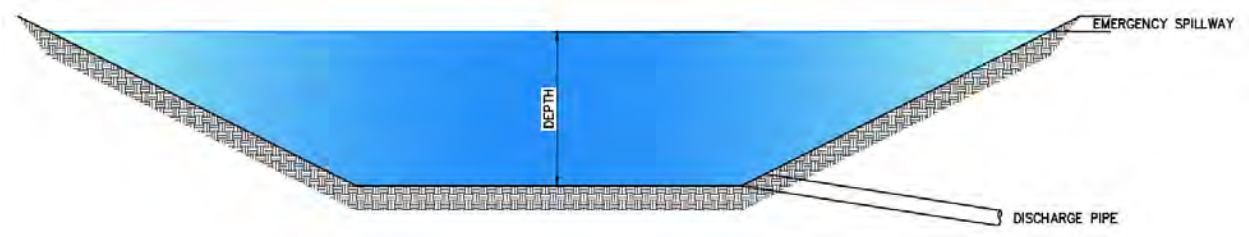


Figure 3.3. *Typical Profile for Detention Basins*

3.4. SYSTEM DEFICIENCIES

3.4.1. City Limits

Through the analysis of existing conditions and results from hydrologic and hydraulic modeling, a series of system problems and operational deficiencies were identified. A total of 93 detention and retention basins were evaluated in this study, providing a combined storage capacity of 38.16 acre-feet. However, 72 of these basins were found to be undersized under the 100-year storm event. In addition, 49 out of 161 reaches within the city were identified as being below capacity for the 25-year storm event.

Because several basins were analyzed collectively in the hydraulic modeling, the study ultimately identified 45 basin-related projects. Several of these projects involve multiple basins. Conversely, each individual deficient reach is treated as a separate project, resulting in 49 reach-related projects. Therefore, a total of 94 projects were identified. Full listings of these projects can be found in **Table 3.5** and **Table 3.6** in **Appendix A**, all these identified projects are displayed in **Exhibit 12**.

Each basin and reach project is further categorized by two evaluation criteria: Urgency and Magnitude.

- Urgency reflects the severity of the adverse impacts caused by the current facility's limitations. This score ranges from 1 to 5. For example, if a 12-inch pipe is significantly undersized and must be upgraded to 36 inches to convey the 25-year, 24-hour peak flow, it would receive a higher urgency score. In contrast, if the same 12-inch pipe only needs to be upsized to 15 inches, it would receive a lower score.

- Magnitude is based on the area affected by a facility's failure. Like Urgency, it is scored from 1 to 5. Facilities impacting larger areas receive higher scores.

The sum of the Urgency and Magnitude scores determines each project's overall priority ranking, on a scale from 1 to 10. All 94 projects are then ranked accordingly.

Over the past few decades, Nibley City has experienced continuous development, and its stormwater design standards have evolved to become more stringent. Many existing basins and conveyance facilities were not originally designed to meet these current standards. As a result, most facilities, both public and private, are now considered undersized when modeled against today's criteria.

However, the City has not historically observed significant overtopping or received frequent flooding reports in these areas. Therefore, while many facilities are technically noncompliant with current design standards, they are still considered functional under the City's Operation and Maintenance (O&M) criteria. These facilities have not been included in the final list of recommended improvement projects, as further discussed in **Section 4**.

3.4.2. Annexation Areas

Nibley City has historically favored a regional approach to stormwater detention and retention, as demonstrated by existing facilities in the Hideaway project and the Sunrise Disc Golf Course area. However, this approach is not considered feasible in the annexation areas due to high groundwater levels and substantial upstream runoff from eastern watersheds. Providing sufficient storage through regional detention basins in these areas would require an impractically large volume, making it both financially and technically unviable for the City.

As an alternative, the City is pursuing a regional conveyance-based strategy. This approach leverages existing natural drainage features, such as open channels, the Hyrum Slough, and highway outfalls, to manage stormwater runoff more efficiently without constructing massive detention facilities. Accordingly, 16 Trunk Line Projects (TLP) are proposed to support the annexation area. The concept is based on an idealized grid layout of 660' x 660' blocks, with an east-west trunk line running beneath every other roadway. These trunk lines will collect runoff from adjacent blocks via two same-sized parallel pipes located under the curb lines to facilitate both north and south block drainage and simplify long-term maintenance.

For design purposes, each block is assumed to be approximately 10 acres, generating up to 1 cfs of runoff based on a maximum rate of 0.2 cfs per acre. Using estimated slopes (provided in **Table 3.4**) and Manning's equation, appropriate pipe sizes were selected to accommodate these flows. As runoff accumulates along the east-west corridors, trunk lines will increase in size, starting from 15-inch pipes and expanding to 18 inches or larger as necessary, until discharging into the natural drainage system. This layout is illustrated in **Exhibit 10**, where deep blue dots denote locations of significant cumulative flow.

The proposed conveyance system consists of five east-west trunk lines east of the Hyrum Slough, all of which discharge into the Slough, and eight east-west trunk lines west of the Slough, supported by three north-south trunk lines that collect runoff from the western system and cross Highway 91 via existing culvert crossings.

To support this system, curb inlets and catch basins will be installed along each street, typically located at mid-block and at block intersections. For example, a crossing intersection would include four curb inlets, one at each corner, to effectively capture gutter flow.

All proposed trunk lines have been sized and laid out across the study area. **Table 3.7** in **Appendix A** summarizes each TLP's layout, including pipe lengths by size and estimated slopes. Considering projected buildout over the next 10 years, selected high-priority trunk lines will be discussed in greater detail in **Section 4**. Per the City's direction, this planning effort is limited to the conveyance-based regionalization approach and covers the annexation area extending west to W 4000 S and east to Highway 91.

SECTION 4 | SYSTEM IMPROVEMENTS

Based on the findings of the field investigation, the known problem areas, and the results of the hydrologic and hydraulic analyses, the following list of recommended improvements has been provided. It is worth noting that the 24-hour and 48-hour storm event rarely occurs in the Cache Valley area, so the hydrologic and hydraulic models are relatively conservative for the City's drainage system. Therefore, considering the reality and model assumptions, these facilities which are slightly undersized in the model results will not be listed in the recommended improvements.

4.1. RECOMMENDED IMPROVEMENTS

It would be neither practical nor realistic to implement all 94 improvement projects identified through the hydraulic modeling effort. After meeting with the City to evaluate the feasibility and cascading impacts of prioritizing certain improvements over others, Sunrise Engineering worked collaboratively with City staff to identify the 13 most critical Capital Improvement Projects (CIP) to be undertaken within the next 20-year planning period inside city limits.

The majority of these 13 CIP were selected from the original model-generated list of 94 projects. However, several were added by the City based on their local knowledge, operational experience, and maintenance insights that were not captured in the modeling process. With this expanded understanding, the 13 projects were re-ranked based on urgency, scale, and priority.

These CIP were then grouped into four planning periods based on their priority scores and implementation relevance: Immediate Period, Years 1–5 (Period 1), Years 6–10 (Period 2), Years 11–20 (Period 3). Preliminary cost estimates for each planning period, along with detailed cost breakdowns for individual projects, are presented in **Appendix E**.

Regarding Trunk Line Projects, 5 projects are located east of the Hyrum Slough, while the remaining 11 projects are located to the west. Based on discussions with the City and projected development trends, it is anticipated that 50% of new development will occur within current city boundaries, while the remaining 50% will occur within the annexation area, specifically concentrated around the east side of the Hyrum Slough. As a result, only TLP #1 through #5 are expected to be necessary within the next 10 years.

Per the City's direction, future developers will be responsible for the full cost of 15-inch pipelines. When larger diameter pipelines are required within a trunk line project, the City will cover the cost difference between the selected pipe size and the equivalent cost of a 15-inch pipe. An overview of all trunk line projects, along with detailed cost breakdowns for each TLP, is provided in **Appendix E**.

The 13 CIP and 5 TLP are briefly discussed in this section. For geographic context and spatial reference, see **Exhibit 9** (CIP) and **Exhibit 10** (TLP).

- **Capital Improvement Projects (CIP)**
  - CIP #1: Hideaway Storm Drain Phase 2

    This is Phase 2 of the City's Hideaway Plan, which involves installing a catch basin and an 18-inch HDPE pipe to address existing flooding issues reported near the intersection of W 3200 S and S 1400 W.

- CIP #2: Hideaway Storm Drain Phase 1

  This project is Phase 1 of the City's Hideaway Project, which involves piping the existing canal with a 42-inch HDPE pipe and diverting all runoff into the Hyrum Slough. The outlet is located near the intersection of S 1850 W and W 3000 S.

- CIP #3: Culvert Maintenance

  The 8.5' x 8.5' box culvert (Reach 10b in the model) near the intersection of Highway 91 and Nibley Parkway needs to be cleaned up and maintained. The west side of the culvert was blocked by several black barrels, as displayed in **Figure 4.1.** This box culvert was utilized to convey a significant amount of runoff during the 25-year 24-hour storm event. The existing barrels will significantly impact the conveyance capacity of this channel. It is highly recommended that these black barrels and other potential barriers be removed.



Figure 4.1. *Several Black Barrels Exists in the West Side of Reach 10 Box Culvert*

- CIP #4: 1200 W & 3350 S Crossing (48")

  There is a 30-inch culvert (Reach 25b) crossing S 1200 W Street, located near the intersection of S 1200 W and W 3350 S. This culvert is currently undersized. According to the City's projections, future development within the upstream Watershed #25 is expected to generate a peak runoff of 111 cfs. To model this peak flow, the curve number and lag time for the watershed were set to 80 and 20 minutes, respectively. Based on this analysis, in order to adequately convey the projected 111 cfs peak flow during a 100-year storm event, the existing culvert must be upsized to 48 inches to prevent overtopping.

- CIP #5: Madison Basin - 1200 W Regional Pond

This detention facility project is proposed immediately west of the existing culvert (Reach 25b) to capture and detain runoff from the upstream Watershed #25. Based on the same modeling results, the facility should provide a detention volume of approximately 8.5 acre-feet.

- CIP #6: 2200 S Crossing (30")

  This existing 18" pipe (Reach 44b) is located at the northeast intersection of Highway 91 and the W 2200 S Street. It conveys runoff from two retention basins, crosses the 2200 S Street. However, it is undersized and needs to be upsized to 30" to avoid overtopping.

- CIP #7: 1500 W Crossing

  This project is located near the intersection of S 1500 W and W 3390 S. The existing 30-inch pipe (Reach 21b) is undersized and needs to be upsized to 48 inches to adequately convey runoff from the upstream watershed.

- CIP #8: 1500 West Canal Piping (48")

  An earthen canal (Reach 21c) follows the existing 30-inch pipe (Reach 21b) and is proposed to be replaced with a 48-inch HDPE pipe to improve conveyance and accommodate future surrounding development.

- CIP #9: 3200 S Crossing (72")

  This project is to upsize the existing 60" corrugated metal pipe (CMP) to 72" reinforced concrete pipe (RCP). This pipe (Reach 102b) is a Hyrum Slough culvert crossing W 3200 S Street. Hyrum Slough is a critical irrigation canal and receives a significant amount of runoff from many sub-watersheds. Hence, the reliability of this pipe conveyance must be ensured at all times.

- CIP #10: 1200 W & 3500 S Crossing

  Similar to CIP #4, future development is planned for the farmland located near the southeast corner of 3410 S Street and S 1200 W Street. A hydrologic model was developed for this future condition using a curve number of 85 and a lag time of 20 minutes. The model indicates that an 18-acre-foot regional detention pond would be required at the downstream end of this farmland to provide adequate stormwater detention. The proposed detention basin is intended to receive runoff from multiple large sub-watersheds and plays a critical role in supporting the downstream drainage system.

  However, due to high groundwater levels and property constraints, constructing an 18-acre-foot detention pond is not feasible. As a result, the focus shifted to improving conveyance as an alternative solution.

  Specifically, the existing 15-inch pipe (Reach 26b) crossing S 1200 W Street is significantly undersized, as it conveys runoff from a large contributing watershed. To support future development and effectively manage a 25-year storm event, this culvert will need to be upsized to 48 inches.

- CIP #11: City 2600 S Basin

  Future development is planned near the southwest intersection of W 2600 S Street and S 1200 W Street. The Watershed #108 was modeled under future conditions using a curve number of 90 and a lag time of 20 minutes. The results indicate that a 5.5-acre-foot regional detention pond will be required onsite to manage the increased surface runoff, including contributions from several upstream watersheds.

- CIP #12: 2600 S & 1300 W Crossing (48")

  There is an existing pipe (Reach 6b) crossing the W 2600 S Street and needs to be upsized to 48" for better conveyance.

- CIP #13: 1200 W & 3650 S Crossing (42")

  This is a 15" culvert (Reach 28b) crossing the S 1200 W Street. It is severely undersized and needs to be upsized to 42" to convey runoff from upstream watersheds.

- **Trunk Line Projects (TLP)**
  - TLP #1: 3600 South Road (East of Slough)

    This trunk line will be constructed along 3600 South Street, starting at S 450 W and flowing west toward the Hyrum Slough. The drainage system will include two parallel 15-inch HDPE pipes serving approximately 6,150 feet of roadway, and two 18-inch HDPE pipes serving an additional 1,198 feet. Curb inlets will be strategically placed near the midpoint of each block and at intersections to collect surface runoff.

  - TLP #2: 3700 South Road (East of Slough)

    Located along 3700 South Street, this trunk line begins near S 570 W and conveys stormwater west to the Hyrum Slough. It will serve around 4,025 feet of roadway using dual 15-inch HDPE pipes, with an additional 2,749 feet managed by dual 18-inch HDPE pipes. The design includes the installation of curb inlets along the alignment for effective surface water collection.

  - TLP #3: 3800 South Road (East of Slough)

    This segment runs along 3800 South Street, beginning at S 570 W and extending west to Hyrum Slough. It includes 3,950 feet of roadway drainage via two 15-inch HDPE pipes, 2,398 feet served by two 18-inch pipes, and 710 feet handled by two 24-inch HDPE pipes. In addition to the trunk line installation, curb inlets will be added to improve surface runoff capture.

  - TLP #4: 3900 South Road (East of Slough)

    Extending along 3900 South Street from S 570 W to the Hyrum Slough, this trunk line will consist of approximately 2,965 feet of dual 15-inch HDPE pipes, 2,150 feet of dual 18-inch pipes, and 1,770 feet of dual 24-inch pipes. Curb inlets will be incorporated into the design to manage roadway runoff effectively.

- TLP #5: 4000 South Road (East of Slough)

  Situated along 4000 South Street, this trunk line begins at S 400 W and flows west into the Hyrum Slough. The alignment includes 3,870 feet of dual 15-inch HDPE pipes and 2,398 feet of dual 18-inch HDPE pipes. Curb inlets will be installed throughout the corridor to capture stormwater runoff from adjacent roadways.

4.2. EXTRA DRAINAGE ANALYSIS

Besides improvements recommended above, there are also a few concerns from the City that were addressed in the model and need to be highlighted in this study.

- Basins by Nibley Park Avenue – Several stormwater basins are located near Nibley Park Avenue to manage runoff from multiple surrounding sub-watersheds. The City is planning for future development in these areas, which may increase surface runoff. As part of that planning effort, the City is interested in understanding the remaining storage capacity within these basins.

  For Basin #6, hydraulic modeling indicates that no storage capacity remains during a 100-year storm event, and overflow is expected due to excessive inflow from southern sub-watersheds. Although the City has not observed any significant overland flooding in this area to date, it is recommended that future development within Watershed #86 include on-site detention facilities to reduce the burden on Basin #6. In contrast, the combined system of Basins #3, #4, and #7 still offers approximately 0.94 acre-feet of available storage capacity to support future development.

  An additional evaluation was also performed for the Sunrise Disc Golf Course area, which may be affected by increased runoff from future development. Under larger storm events with higher peak flows, all basins (Basins #3, #4, #6, and #7) are projected to overtop, with excess flow discharging into the adjacent wetlands, which then act as temporary detention areas.

  These wetlands are divided by S 1200 W, the east and west wetland provides approximately 1.31 and 1.73 acre-feet of storage, respectively. Combined, these wetlands offer 3.04 acre-feet of supplemental storage, without impacting the surrounding walking trail network. This additional capacity is expected to mitigate potential flood risks and support safe stormwater management for future development in the area.

- Southwest Corner of the W 3200 S & S 1200 W – Previously, the City experienced flooding issues in Watershed #38 and #124. Several improvements were completed to address these issues. Runoff from upstream sub-watersheds was collected and diverted into Hyrum Slough through field drain lines, which helped fix the flooding problem.

- Northwest Corner of the W 3200 S & S 800 W – Previously, there were 3 basins, #76, #77, and #78, at Heritage Elementary School (Watershed #41) to handle onsite stormwater with adequate volume to meet the City requirements. Meanwhile, there is a middle school in construction on the east half of this watershed. New ponds in the proposed development are capable of handling increased onsite runoff. Therefore, no

concern was observed from our analysis and modeling for the current and future condition of Watershed #41.

- Residential Sump Pump – As discussed in **Subsection 1.7**, there is a significant concern as the number of residential sump pumps that are discharging into the streets and/or stormwater system. Presently 119 locations have been identified that have residential sump pumps, as displayed in **Exhibit 2**. They operate at various times of the year as shown in **Table 4.1**:

Table 4.1 *Residential Sump Pumps Summary*

# of Sessions of Operation	Session of Operation	# of Sump Pumps
1	Spring	99
2	Spring & Winter	11
2	Spring & Fall	4
3	Spring, Fall, & Winter	1
3	Spring, Summer, & Fall	3
4	Spring, Summer, Winter, Fall	1
Total		119

Although each pump is unique in make, model, operational behavior, etc.; they can be aggregated into the single assumption that each is a 1" discharge with an average velocity of 5 ft/sec resulting in a discharge flow of 12 gpm. Several of these pumps operate 24/7 during the session while others operate only sporadically. For conservative estimations it is assumed that each pump operates for 50% of the time during the session in which they operate. Based on these assumptions, the estimated volumes of water discharged by residential sump pumps are shown in **Table 4.2**. As the table indicates, the majority of the flow, approximately 93,819,600 gallons, occurs during the spring season. The total annual volume discharged is estimated to be approximately 113,529,600 gallons.

Table 4.2 *Residential Sump Pumps Operational Period*

Session of Operation	# of Operating Pumps	Total Gallons Moved
Spring	119	93,819,600
Summer	4	3,153,600
Fall	8	6,307,200
Winter	13	10,249,200
Total		113,529,600

Considering that most residential sump pumps operate primarily in the spring, and only 4 pumps remain active during the summer, their impact on the stormwater conveyance system is minimal. Since large storm events typically occur in the summer, the limited number of operating pumps during that period does not pose a significant concern.

- Irrigation Capacity Analysis – As discussed in **Subsection 1.8**, Nibley City relies on the irrigation canals to convey stormwater out of their city. This analysis answers the question of how much capacity the irrigation canals and pipe have. The Maximum Capacity of the canal and pipe sections was calculated using the Mannings equation as shown below:

$$Q = \frac{1.49}{n} * A * R_h^{\frac{2}{3}} * S^{\frac{1}{2}}$$

Where n approximates the roughness of the canal or pipes,
A is the Area in square feet,
Rh is the Hydraulic Radius in feet,
S is the Slope in ft/ft

Manning's n-values are a critical component whenever doing a Manning calculation. Images of the canals were taken as part of the field data to support the selection of appropriate roughness values. For canals a range of 0.033 – 0.15 manning's n-values were used. Below are images shown of a 0.033 canal (left) and a 0.15 canal (right).





For the pipes, an *n*-value of 0.02 was assumed, consistent with corrugated metal pipes, which make up the majority of the irrigation system.

A HEC-RAS model was developed using field data points that were converted into cross sections. These cross sections were then used to calculate the canal's flow area and hydraulic radius. For the pipes, diameters were used, and their maximum capacity was assumed to occur under full-flow conditions. Where field data was unavailable, LiDAR information was used to determine the area and hydraulic radius of canals. All pertinent pipe information, such as diameter and flow direction was collected in the field. The slope of each section was determined using the LiDAR information and seeing the fall upstream to downstream with each cross section. Typical slopes for the canals and pipes were between 0.008 – 0.003 ft/ft.

For each cross section and pipe, a Manning's n-value, area, hydraulic radius, and slope were determined. They were inputted into the Manning's equation to calculate the Maximum Capacity of the canal or pipe. If multiple cross sections were taken on the same canal section, the minimum maximum capacity was used, as it governs the maximum flow that can be conveyed through that reach.

There are sections of canals/pipes where there is more stormwater routed and irrigation water than the canal has capacity for. There are several sections that appear to be over appropriated and are at risk of flooding. **Exhibit 18** shows the location where overtopping or surcharging is anticipated. The following table describes the locations that are of the most concern if there is flooding.

Table 4.3 *Irrigation Canal Capacity Concern Locations – 25 Year Storm*

Location Description	Maximum Capacity (cfs)	Irrigation Demand (cfs)	Stormwater Input 25-year Storm (cfs)	Remaining Capacity (cfs)	CIP Project to Address Deficiency
Canal in between 1200 W and 1300 W approx. 3450 S to the Hyrum Slough	44 - 65	15	68 - 83	-39	Project 10
Pipe along 3200 S from 600 W to 1200 W	24	18	20	-14	Project 1
Hyrum Slough Culvert - Behind Apex Engineering & Machine	242	12	342	-112	Project 9
Hyrum Slough Culvert - Across 3200 S	225	12	342	-159	Project 9
Canal in between 1200 W and 1500 W approx. 3310 S	15	3	32	-20	Project 4 & 5

Other locations shown on **Exhibit 18** have negative remaining capacity, indicating that there may be flooding during the 25-year storm event. The features listed in **Table 4.3** pose a significant flooding risk to developed areas adjacent to the canal or pipe or cause a choking effect for the upstream areas due to an undersized feature. These locations should be prioritized for improvements over other features that also show negative remaining capacity.

It should be noted that a significant portion of the contributing area causing the conveyance deficiencies originates from undeveloped land. This is attributable to the low infiltration rates typical of the southern, undeveloped portions of the City. Table 4.4 presents the 80th-percentile storm (i.e., the storm for which only 20 percent of events produce greater rainfall) and the corresponding stormwater input to the canals. The 80th-percentile storm for Cache Valley is 0.44 inches.

Table 4.4 *Irrigation Canal Capacity Concern Locations – 80th Percentile Storm*

Location Description	Maximum Capacity (cfs)	Irrigation Demand (cfs)	Stormwater Input 80th Percentile Storm (cfs)	Remaining Capacity (cfs)
Canal in between 1200 W and 1300 W approx. 3450 S to the Hyrum Slough	44 - 65	15	2	27
Pipe along 3200 S from 600 W to 1200 W	24	18	1	5
Hyrum Slough Culvert - Behind Apex Engineering	242	12	8	222
Hyrum Slough Culvert - Across 3200 S	225	12	8	205
Canal in between 1200 W and 1500 W approx. 3310 S	15	3	1	11

Since the 25-year storm is such a severe storm, there are many conveyance deficiencies shown. However, looking at the 5 highest concern areas during the 80th percentile storm, all of the conveyance features do not have a negative capacity, as shown in **Table 4.4**.

4.3. MAINTENANCE & MISCELLANEOUS IMPROVEMENTS

There are several improvements and practices that will enhance the ability for Nibley City to manage stormwater runoff. These improvements include both structural and non-structural items as listed as follows:

- Pave or Chip Seal Unimproved Roads: Sedimentation that occurs in storm drain systems is often caused by erosion from construction areas as well as unpaved roads within the City and can result in significant costs and maintenance to the system. The total amount of sedimentation in the storm drain system can be greatly reduced or eliminated by paving or chip sealing unimproved roads.
- Reshape Existing Roads: Many of the roads in Nibley City lack the ideal 2% cross slope. Without a proper crown in the roadway, the ability of the roadway to convey stormwater and drain properly is diminished. It is recommended that as roadways are resurfaced, care be taken to ensure that the proper cross slope is established.
- Install Curb & Gutter or Shoulder Swale: Many of the streets in Nibley City do not have complete curb and gutter systems which control runoff from the street. The City should install curb & gutter or shoulder swale along these roads whenever possible and require curb and gutter on all future street improvements.
- Complete Regular Street Sweeping: A comprehensive street sweeping and cleanup program should be developed to remove sediment and trash from the streets and gutters so debris is not washed to downstream storm drain control facilities and ultimately into drainage channels. It is anticipated that this simple maintenance procedure will greatly reduce future costs for maintenance of the storm drain system.
- Complete Regular Facility Cleaning: A comprehensive facility maintenance program should be established to clean inlet boxes, manholes, pipe systems, and any future pollution control structures. Regular maintenance will ensure the proper functionality of these structures, prolong life expectancy, and reduce future maintenance costs.
- Ensure Proper Grate Orientation: Ensure that the catch basins in the Nibley City storm drain system that are fitted with directional grates have the directional grates installed in the correct orientation to function at maximum efficiency. Maintenance of the storm drain system should include a procedure to ensure that the grates on every catch basin are oriented properly.
- Establish Standard Maintenance Program: It is recommended that the City develop a regular storm drain system maintenance program with proper tracking and record keeping. This process is most easily accomplished using current computer technology including mapping and record keeping software. Implementing such a system will allow the City to maintain the storm drain system at the highest level of efficiency.
- Maintain a Current System Map: It is strongly recommended that Nibley City maintain a thorough storm drain system map. Modern computer technology makes this task relatively simple and having the map will significantly reduce storm drain system

maintenance costs. If possible, this map should include sizes, materials, and slopes of existing improvements.

- Irrigation Canal Maintenance: To prevent flooding, it is recommended that Nibley City work with all three irrigation companies to ensure canals and pipes are regularly maintained and discharge locations remain unobstructed. Routine maintenance should include vegetation removal, berm and bank repair, and cleaning of inlets and outlets. As the city continues to grow, properly maintaining conveyance capacity will become increasingly critical.

- Irrigation Company Agreements: It is recommended that Nibley City establish formal written agreements with both College Irrigation Company and Clear Creek Irrigation Company. These agreements would provide clarity and legal enforceability for both entities. Such a document should comprehensively outline the financial and physical maintenance responsibilities for both entities, specify the terms for Nibley to discharge more water into the system as the city grows, and establish a clear process for dispute resolution. Nibley City has an agreement with Nibley Blacksmith Fork Irrigation Company that needs to be updated. It is recommended that an updated agreement be finalized.

- Irrigation Canal Improvements: It is recommended that Nibley City work with the irrigation companies to improve the locations where deficiencies have been discovered. Funding agencies such as USACE, BOR, and UDAF should be explored to alleviate construction costs. Table 4.3 shows the deficiencies that should be prioritized for improvements.
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4.4. WATER QUALITY IMPROVEMENT MEASURES

One of the primary goals of a stormwater management plan is to enhance the quality of water discharged to downstream stormwater conveyance facilities. Runoff generated from urban and suburban areas often contains pollutants such as sediments, road salts, oils, greases, solvents, pesticides, fertilizers, detergents, trash, and many other forms of pollutants which may be discharged to downstream rivers and lakes. The Environmental Protection Agency (EPA) requires that these pollutants be controlled, mitigated, and otherwise eliminated before they are discharged.

The first line of defense against pollution discharges is detention/retention basin facilities installed near low segments of storm drain systems. Detention/retention basins control peak flows that would otherwise be routed directly to receiving discharge facilities. As stormwater runoff is held in the detention/retention basin, flow velocity of the water is minimized and many of the suspended pollutants are able to settle out. Some pollutants are broken down organically while the physical debris, such as trash and sediment, can be manually cleaned from the detention/retention basin and disposed of properly. Also, the orifice and discharge pipelines from these basins should be periodically inspected and maintained to avoid clogging. This study recommends installation of

local detention/retention basin facilities in future developments in the City. Individual developers would implement these improvements.

The second line of defense against pollution discharges are Best Management Practice (BMP) improvements such as oil and grease separation structures, vegetated outlet channels, and storm drain inlet filters. These improvements are designed to remove oils, grease, excess sediments, debris, and other similar materials from stormwater before it is discharged to downstream receiving facilities. It is recommended that improvements of this type be installed on all future major storm drain lines to ensure that these pollutant types are removed from stormwater before it is discharged from the storm drain system into drainage channels or rivers. It should be noted that these facilities require regular maintenance. If not cleaned and maintained properly, these devices cease to function, and no pollutants are removed from the discharge flows.

SECTION 5 | USER RATE & IMPACT FEE ANALYSIS

5.1. IMPACT FEE ANALYSIS CERTIFICATION

In accordance with Utah Code Annotated, § 11-36a-306, Steven Wood, PE, on behalf of Sunrise Engineering, LLC., makes the following certification:

I certify that the attached impact fee analysis:

- Includes only the costs of public facilities that are allowed under the Impact Fees Act; and actually incurred; or projected to be incurred or encumbered within six years after the day on which each impact fee is paid.
- Does not include the costs of operation and maintenance of public facilities; or costs for qualifying public facilities that will raise the level of service for the facilities, through impact fees, above the level of service that existing residents support.
- Offsets costs with grants or other alternate sources of payment
- Complies in each and every relevant respect with the Impact Fees Act

Steven Wood, PE, makes this certification with the following caveats:

1. All of the recommendations for implementations of the Impact Fee Facilities Plans (IFFPs) made in the Impact Fee Analysis documents are followed in their entirety by Nibley, Utah, staff and elected officials.
2. If all or a portion of the Impact Fee Analyses are modified or amended, this certification is no longer valid.
3. All information provided to Sunrise Engineering, LLC., its contractors, or suppliers is assumed to be correct, complete, and accurate. This includes information provided by Nibley City, Utah, and outside sources.
4. The undersigned is trained and licensed as a professional engineer and has not been trained or licensed as a lawyer. Nothing in the foregoing certification shall be deemed an opinion of law or an opinion of compliance with law which under applicable professional licensing laws or regulations or other laws or regulations must be rendered by a lawyer licensed in the State of Utah.
5. The foregoing Certification is an expression of professional opinion based on the undersigned's best knowledge, information, and belief and shall not be construed as a warranty or guaranty of any fact or circumstance.
6. The foregoing certification is made only to Nibley City, Utah, and may not be used or relied upon by any other person or entity without the expressed written authorization of the undersigned.

Sunrise Engineering, LLC.

Date: 1/16/2026

By: 

5.2. IMPACT FEE ANALYSIS

This section discusses the process of determining impact fees and user rates for the stormwater system. Impact fees are to be used to pay for improvements to the system that are necessary for new development. It is recommended that an impact fee be charged on new connections at the time of plat approval to help with the necessary capital improvements that Nibley City will be taking on. The proposed impact fees are based on growth and development over the next 10 years. This time period was calculated based on the estimated build out time of the watersheds that directly impact the identified capital improvement projects. This timeline is an approximation and actual growth and development may necessitate adjustment to rates and fees.

5.2.1. Impact Fee Facilities Plan

The prior sections of this report constitute the Impact Fee Facilities Plan for the Nibley City Stormwater System. The recommended improvements were outlined in **Subsection 4.1**. An Engineer's Opinion of Probable Cost (EOPC) was prepared for each of CIP and TLP for the purpose of financial planning and calculation of the stormwater impact fees. Copies of the EOPCs for CIP and TLP have been included in **Appendix E**.

It should be noted that these improvements constitute the system improvements relating to the stormwater system and that individual developments will be responsible for their individual project improvements per the City's current stormwater design standards.

5.2.2. Build-Out & ERU Projections

The Nibley City stormwater impact fee is assessed based on two key factors: the portion of each project that benefits future development, and the number of Equivalent Residential Units (ERUs) associated with new connections. For the purpose of this analysis, one ERU is defined as 3,000 square feet of impervious area, which reflects the average for residential properties in Nibley City.

To establish ERU conversion factors for non-residential land uses, historical user rate revenue data was analyzed. The average billing amounts for various land use categories were compared against the standard flat residential rate of $8 per month, allowing for the derivation of land use-specific billing multipliers, which are shown in **Table 5.1**.

Table 5.1. *Average User Rate Billing and Factor for Various Land Use*

Land Use	Average Monthly Billings	Factor
Residential	$8.00	1
Commercial	$69.99	8.75
Institutional	$148.18	18.52
Industrial	$194.73	24.34

The total number of new ERUs is a foundational component of the impact fee calculation. New ERUs are determined by subtracting the current number of ERUs from the total projected ERUs over a defined planning period. ERU growth projections are based on new connection trends, with

an assumed annual growth rate of 3.87% through 2044, as adopted from the 2020 Nibley City Culinary Water Master Plan prepared by Jones & DeMille Engineering, Inc., to maintain consistency and alignment with other utility planning efforts. For further detail on these assumptions and methodologies, refer to **Sections 4** and **5** of the referenced Water Master Plan.

Table 5.2 presents the projected number of users for each land use category over the next 20 years, using 2024 connection data as the baseline. This approach enables the estimation of annual user counts and the total impervious area citywide. By dividing the projected impervious area by 3,000 square feet, the total ERUs for each future year can be calculated, as indicated in **Table 5.3**.

Table 5.2. *20-Year Projected Land Use Connections*

Land Use	# of Users (Connections)				
	2024	**2025**	**2030**	**2035**	**2045**
Residential	2424	2518	3044	3681	5381
Commercial	17	18	21	26	38
Institutional	8	8	10	12	18
Industrial	7	7	9	11	16
Total	2456	2551	3084	3730	5453

Table 5.3. *20-Year Projected Land Use ERUs*

Land Use	Average Imp. Area (sf)	# of ERUs				
		2024	**2025**	**2030**	**2035**	**2045**
Residential	3000	2424	2518	3044	3681	5381
Commercial	26247	149	154	187	226	332
Institutional	55569	148	154	186	225	333
Industrial	73023	170	177	214	259	389
Total		2891	3003	3631	4390	6436

Because all impact fee-eligible improvements are planned to be constructed within the first 10 years (by 2035), the impact fee calculation is based on the 1,499 new ERUs projected to be added during that timeframe.

5.2.3. Stormwater Impact Fees

As outlined in this report, Nibley City requires additional stormwater conveyance and storage infrastructure to address both existing system deficiencies and the demands of future development. While the City is responsible for resolving current inadequacies in the system, future development within the study area will contribute additional runoff and should therefore bear a proportionate share of the costs for system improvements.

Currently, Nibley's stormwater infrastructure, including pipes, culverts, and detention basins, is undersized. Recommended CIP to address these needs are detailed in **Subsection 4.1**. Of these, CIP #1, #2, #4, #5, and #11 are either partially or fully impact fee eligible, and all five Trunk Line Projects (TLP #1–#5) are fully eligible. However, because CIP #1 and #2 (Hideaway Projects) are

already under construction, and per the City's direction, they are excluded from the impact fee analysis, as well as from the user rate and cash flow models.

As a result, three CIP and five TLP are included in the impact fee calculation. The three eligible CIPS are associated with two regional detention ponds, each serving a specific watershed. Future development within these watersheds will be charged impact fees proportional to their contribution to runoff volume. The five TLPs, located entirely within the annexation area, are also fully impact-fee eligible.

To promote fairness and affordability, a citywide cost-sharing approach is used to calculate the impact fee. This method distributes the cost burden across all projected new development over the next 10 years. **Table 5.4** summarizes the impact fee-eligible projects, their respective eligibility percentages, eligible costs, and total costs. The total impact fee-eligible amount is estimated at $1,057,586 for the eligible CIPs within city limits and $790,000 for the five TLPs in the annexation area, resulting in a combined total of $1,847,586.

Table 5.4. *Impact Fee Eligible Projects*

Project Type	Project Number	Project Name	Total Cost ($)	Eligible Rate	Eligible Amount ($)
CIP	CIP #4	1200 W & 3350 S Crossing (48")	64,000	77%	49,586
	CIP #5	Madison Basin - 1200 W Regional Pond	597,000	100%	597,000
	CIP #11	City 2600 S Basin	411,000	100%	411,000
		Subtotal	1,072,000	99%	1,057,586
TLP	TLP #1	3600 South Road (East of Slough)	50,000	100%	50,000
	TLP #2	3700 South Road (East of Slough)	140,000	100%	140,000
	TLP #3	3800 South Road (East of Slough)	200,000	100%	200,000
	TLP #4	3900 South Road (East of Slough)	310,000	100%	310,000
	TLP #5	4000 South Road (East of Slough)	90,000	100%	90,000
		Subtotal	790,000	100%	790,000
		TOTAL	1,862,000	99%	1,847,586

Three impact fee options are calculated:

- City-Only Impact Fee: New development within the City boundary contributes only to capital improvement (CIP) costs located within that boundary.
- Annexation-Only Impact Fee: New development in the annexation area contributes only to the cost of trunk line projects (TLP) within that area.
- Full-System Impact Fee: All new development, within both the City and annexation boundaries over the next 10 years — shares the cost of all eligible projects.

Following discussions with the City, the Full-System Impact Fee option was selected. Based on the projected 1,507 new ERUs over the next 10 years (see **Subsection 5.1.2**), the average impact fee was calculated to be $1,225.84 per ERU. For comparison and transparency, the City-Only Impact Fee and Annexation-Only Impact Fee alternatives are provided at **Table 5.5** in **Appendix A**.

It is important to note that if the City chooses not to proceed with the capital improvements outlined in this plan, the impact fee structure may need to be reevaluated. According to Utah Code 11-36a-602, impact fees can only be used for system improvements identified in the Impact Fee Facilities Plan (IFFP). Furthermore, impact fees must be spent on the type of facility for which they were collected (e.g., stormwater fees cannot be used for water or transportation projects). Under Utah law, impact fees must be expended or encumbered within six years of their collection unless an exception under Section 11-36a-602(2)(b) applies. The City is also required to maintain proper accounting and documentation for impact fee revenues and expenditures, as detailed in Utah Code 11-36a-601, provided in **Appendix C**.

5.3. USER RATE ANALYSIS

5.3.1. User Fee Facilities Plan

A user rate analysis was performed to determine the rates necessary to meet the City's growing operational and capital improvement needs. Historical operating revenues and O&M expenses from Fiscal Years 2020 to 2025 were collected and analyzed to establish a baseline. The user rate projections were developed based on current budgeted revenues, with adjustments to account for the additional funding required to implement the capital improvements identified in this plan. It is important to note that these recommended rates may need to be revisited over time, depending on the timing of project implementation and market cost fluctuations. The City's stormwater revenue is comprised of four primary sources:

- Stormwater Inspection Fees – Collected from new development during construction.
- Interest Earnings – Based on an assumed 2.0% return on City-held stormwater funds.
- Stormwater Service Fees – Ongoing user fees paid by existing customers.
- Stormwater Impact Fees – One-time fees collected from new development to fund system improvements.

For O&M expense forecasting, a 3.0% annual inflation rate was applied to reflect general cost increases. Additionally, for Professional/Technical Services, an $80,000 reserve was included to fund a Stormwater Master Plan update every five years. Beyond inflation, an additional annual growth rate of 3.87% was applied to certain operational costs to reflect the increasing complexity and expansion of the City's stormwater system as development continues.

5.3.2. Stormwater User Rate Fee

Currently, Nibley City charges residential users a flat stormwater fee of $8 per month. All other properties are billed based on their impervious surface area, calculated by dividing the total impervious square footage by 3,000 square feet (1 ERU) and multiplying by the residential rate. For example, a small business with a 3,000 square-foot roof and a 6,000 square-foot parking lot (totaling 9,000 square feet) would be billed for three ERUs, or $24 per month.

This ERU-based billing method is recognized as a fair and equitable approach to applying stormwater rates across property types, and it is recommended that the City continue using this method. However, it is important to note that the current stormwater budget does not allocate funds for capital improvements or major system upgrades.

Following discussions with City staff, it is recommended that the residential flat rate be increased by $2 in 2025, followed by annual $1 increases until reaching $14 per month by 2029. Non-residential rates would be adjusted proportionally based on the multipliers provided in **Table 5.1**. This rate structure is designed to fund both the recurring costs of updating the Stormwater Master Plan every five years and the non–impact fee eligible portion of the capital improvement projects identified for the next 20 years.

To evaluate the City's financial sustainability, the Debt Service Coverage Ratio (DSCR) – the ratio of total revenues to total expenses – was analyzed. Under the proposed rate structure, the DSCR is projected to remain above 1.14 and increase to above 1.75 by 2036, indicating a healthy and sustainable cash flow position.

Table 5.6 presents the current and proposed rates for each property type by year, based on the current number of users and their average impervious areas. Non-residential fees are shown as averages, but the actual charges would be calculated individually for each development based on site-specific impervious surface areas. These fees would continue to be calculated by dividing the impervious area by 3,000 square feet per ERU and multiplying by the residential base rate.

Table 5.6. *User Rate Summary*

Land Use	Average Monthly Billings					
	2024	2025	2026	2027	2028	2029
Residential	$ 8.00	$ 10.00	$ 11.00	$ 12.00	$ 13.00	$ 14.00
Commercial	$ 69.99	$ 87.50	$ 96.25	$ 105.00	$ 113.75	$ 122.50
Institutional	$ 148.18	$ 185.20	$ 203.72	$ 222.24	$ 240.76	$ 259.28
Industrial	$ 194.73	$ 243.40	$ 267.74	$ 292.08	$ 316.42	$ 340.76

SECTION 6 | CONCLUSIONS AND RECOMMENDATION

6.1. CONCLUSIONS

After several months of analysis and research, Sunrise Engineering has the following main conclusions with regards to Nibley City's drainage system:

- The majority of the conveyance system has sufficient capacity for both current and future conditions, and they possess decent remained capacity for larger storm events. Meanwhile, there are still a few segments of pipes, culverts, and earthen canals that need to be upsized or piped for better conveyance.

- Most public and private detention basins in Nibley are considered undersized when evaluated against the City's current stormwater standards, and during a 100-year storm event, overflow is expected to occur through emergency spillways or basin rims. This is primarily because many of these basins were designed under earlier, less stringent regulations, whereas today's standards have become more conservative as the City has continued to grow and evolve. Although these facilities may not meet current design criteria, the City has not observed significant overtopping issues or received reports of flooding related to these basins. As such, they are still considered compliant with the City's operation and maintenance (O&M) expectations and are not included in the list of recommended capital improvement projects.

- Two regional detention ponds are required within the existing City boundaries to manage stormwater runoff. With several new developments already proposed or approved, the existing drainage facilities lack sufficient capacity to handle the additional runoff generated by the increase in impervious surfaces. These two ponds are necessary to detain stormwater from both onsite development areas and contributing upstream watersheds.

- In the annexation area, a system of trunk lines is proposed to be installed beneath future street curbs. These pipelines will collect and convey stormwater runoff from upstream areas and discharge it into the existing natural drainage system, including features such as the Hyrum Slough.

- The future developer shall not rely on the existing or proposed regional ponds for increased runoff caused by impervious area. It is the developer's responsibility to handle the onsite stormwater and runoff from offsite sub-watersheds, the future developer shall ensure that the post-developed peak flow leaving their site not exceeds the pre-developed peak runoff.

6.2. RECOMMENDATIONS

Based on the findings from this study and the results of the cash flow analysis, Sunrise Engineering recommends that Nibley City adopt the following recommendations:

- Implement the Capital Improvement Project and Trunk Line Project schedule for conveyance facilities as outlined in **Section 4**.

- Install two regional ponds to increase storage capacity in the City's drainage system and reduce the load on downstream conveyance facilities.

- Maintain a thorough storm drain system map. For instance, prepare and update GIS mapping of their drainage assets periodically.
- Establish a regular storm drain system maintenance program with proper tracking and record keeping. GIS is one of the most common tools for record keeping. Periodic asset inspections are highly recommended to avoid any facilities clogging or failure.
- Establish formal written agreements with Clear Creek Irrigation Company and College Irrigation Company to provide clarity to both parties.
- Update formal written agreement with Nibley Blacksmith Fork Irrigation Company.
- Coordinate with irrigation companies to improve deficiencies along the canals. Explore funding agencies and grant to alleviate construction and design costs.
- Adjust the existing rate structure by gradually increasing the base residential rate to $14 per month to cover the projected increases in O&M expenses and the non–impact fee eligible portions of the identified capital improvement projects.
- Implement an impact fee to cover all impact fee eligible projects outlined in this report in accordance with the Utah state code.

6.2.1. CIP & TLP

All 13 selected Capital Improvement Projects (CIPs) and 16 Trunk Line Projects (TLPs) are expected to be completed over the next 20 years, with a total estimated cost of $27,933,700. This total includes $3,123,700 for CIPs and $24,810,000 for TLPs.

Following discussions with the City, two urgent CIPs currently under construction have been removed from the financial analysis. It has been determined that eight CIPs will be constructed over the next 10 years, with a total estimated cost of $1,706,700. In addition, five trunk line projects are expected to be implemented during this period, with the majority of those costs assigned to future developers. The City's share of the trunk line costs over the next 10 years is estimated at $790,000. It is recommended that the City reassess development trends and financial capacity after this 10-year period to determine whether additional investments or adjustments are needed to support future growth and infrastructure needs.

Sunrise Engineering has prepared a Preliminary Engineer's Opinion of Probable Cost for each improvement project. Detailed cost summaries and breakdowns are provided in **Appendix E**. The unit pricing used in these estimates is based on Sunrise Engineering's extensive database of historical project bid tabulations. All cost estimates are presented in 2024 dollars. To account for inflation over time, the City should adjust these estimates using appropriate Cost of Living and Heavy Construction Cost Index factors.

6.2.2. Impact Fee and User Rate

An impact fee and user rate analysis was conducted to support the implementation of the recommended stormwater improvements. Based on this analysis, Sunrise Engineering recommends that Nibley City adopt a stormwater impact fee and increase user rates to ensure adequate long-term funding.

It is recommended that impact fees be applied to both properties within the current City boundaries and the annexation areas, with a fee of $1,225.84 per ERU assessed on new development.

Over the past five years, Nibley City has not allocated funding for capital improvement projects or other major system upgrades. To address this funding gap and support the implementation of the identified projects, it is recommended that the base residential user rate be gradually increased from $8 to $14 per month. This rate adjustment is intended to generate sufficient revenue over the next 20 years to fund the non–impact fee eligible portions of the capital improvement projects.

SECTION 7 | REFERENCES

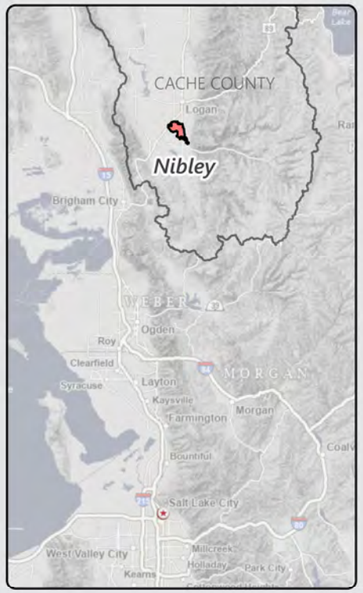
The following documents and resources were thoroughly researched and utilized as key references in the preparation of this report to ensure accuracy, relevance, and comprehensiveness in addressing the subject matter.

- Nibley City, (2016). Nibley City General Plan.
- Jones & DeMille Engineering, Inc. (2020). Nibley City Culinary Water Master Plan, Chapter 4: Demographics, Chapter 5: Connections.
- JUB Engineers, Inc., (2015). Nibley City Stormwater Master Plan.
- Nibley City, (2022). Municipal Codes, Chapter 15.10: Stormwater Regulations.
- Nibley City, (2019). Nibley City Engineering Design Standards, Section 6: Storm Water Systems, adopted & amended from *Cache Valley Storm Water Design Standards*.
- United States Geological Survey (USGS), (2021). The National Map – Data Delivery, Digital Elevation Models (DEM). https://apps.nationalmap.gov/downloader/.
- United States Department Agriculture (USDA), Natural Resources Conservation Service (NRCS). Web Soil Survey Data. https://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.
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EXHIBITS

Legend

- Nibley City Boundary
- Annexation Boundary
- Study Area



0 0.25 0.5 1 Miles

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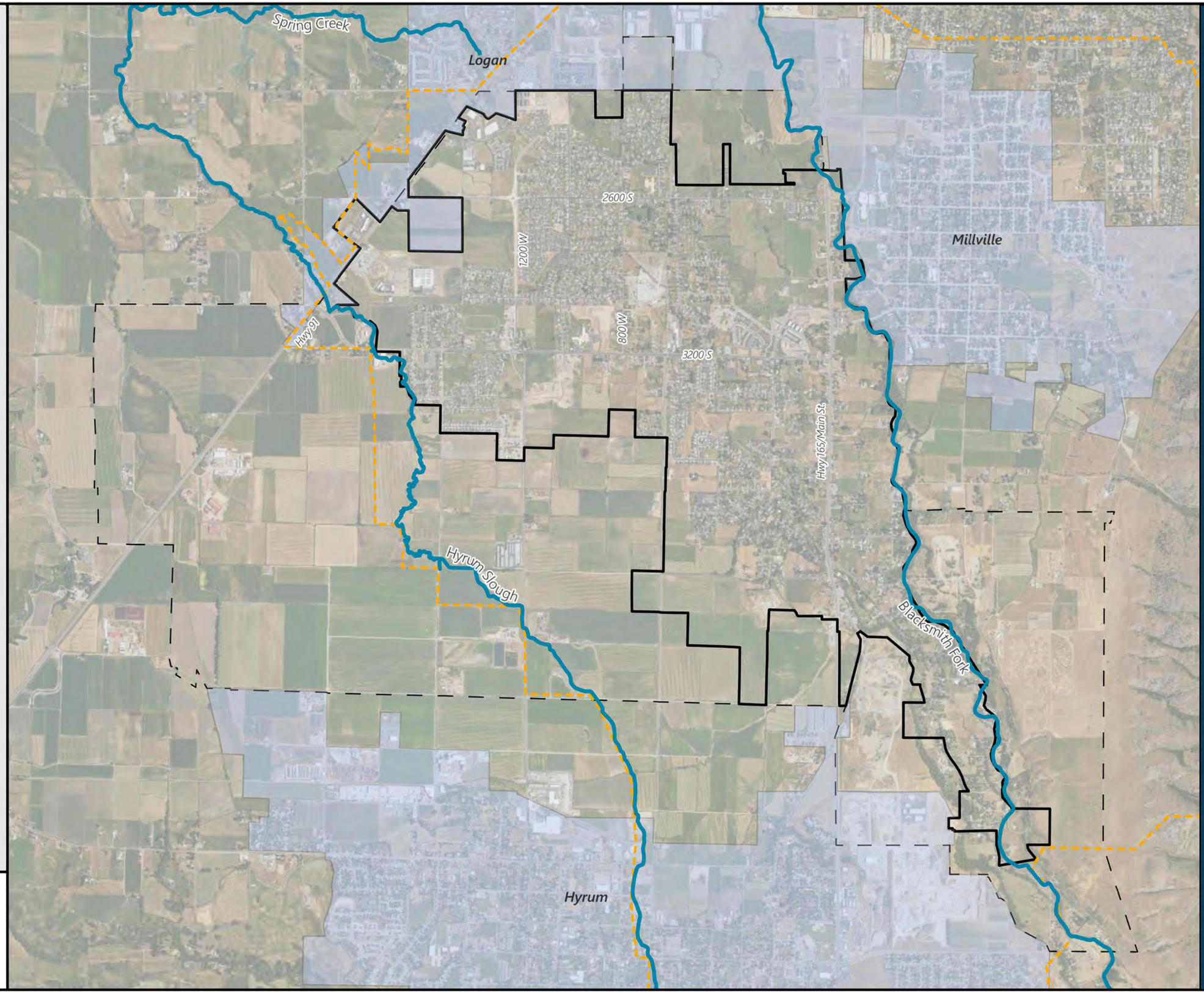


Exhibit 1 - Area Map

Printed: 4/23/2025

Exhibit 2- Basins & Stormwater Infrastructure

Legend

- Nibley City Boundary
- Annexation Boundary
- LID Developement
- Stormwater Gravity Mains (68,218')
- Residential Ground Water (119)
- Stormwater Discharge to Irrigation (99)

Stormwater Basin By Owner

- Private (59)
- Nibley (29)
- UDOT (5)

0 0.25 0.5 1 Miles

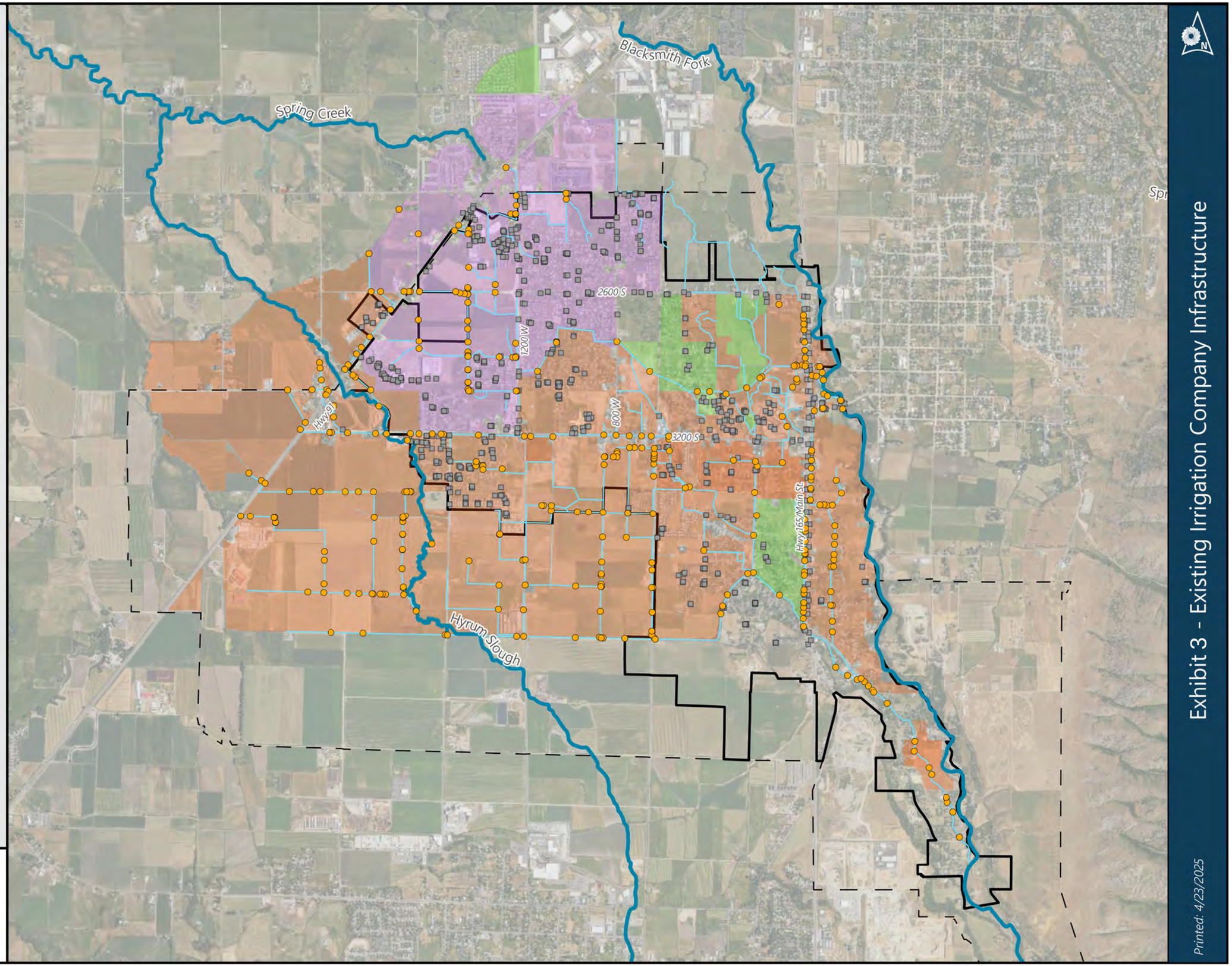
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Legend

- Nibley City Boundary
- Annexation Boundary
- Nibley Blacksmith Fork Service Area
- Clear Creek Service Area
- College Service Area
- Irrigation Lines
- Irrigation Structures



0 0.25 0.5 1 Miles

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Exhibit 3 - Existing Irrigation Company Infrastructure

Printed: 4/23/2025

Exhibit 4 - Drainage Watersheds & Sub-Watersheds

Legend

- Nibley City Boundary
- Annexation Boundary
- Stormwater Basins (93)
- Watershed Boundary (125)
- Flow Path

Spring Creek

Spring Creek

Spring Creek

Hyrum Slough

Blacksmith Fork

2600 S

1200 W

800 W

3200 S

Hwy 165

Hwy 165/Main St

0 0.38 0.75 1.5 Miles

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Legend

- Nibley City Boundary
- Annexation Boundary
- Watershed Boundary
- Residential Ground Water (119)

Soil Types

- ABG2
- Ck
- Gp
- PlA
- PlB
- Pu
- Pv
- RCG2
- RhA
- RhB
- RhC
- Rk
- Rs
- Rt
- Sd
- Se
- SvA
- SvB
- SvC
- SwC
- SwD
- SwF2
- Sy
- TmA
- TmB
- TmC
- TmD2
- TnA
- W
- WhE
- Wn
- PaA
- NcB
- NcA
- NbC
- MNE
- Lr
- KfA
- HgE2
- GvA
- GuA
- GsB
- GsA

0 0.4 0.8 1.6 Miles

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Spring Creek

Spring Creek

Spring Creek

Hyrum Slough

Blacksmith Fork

Hwy 165 Main St

2600 S

2200 S

2600 W

800 W

Exhibit 5 - SCS Soil Types

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Legend

- Nibley City Boundary
- Annexation Boundary

Current Zoning

- Agriculture - A (197 ac)
- Residential Estate - R-E (225 ac)
- Residential - R-1 (1,745 ac)
- Residential - R-1A (183 ac)
- Residential - R-2 (948 ac)
- Residential - R-2A (348)
- Commercial - C (122 ac)
- Neighborhood Commercial - C-N (10 ac)
- Industrial - I (117 ac)
- Park/School - P/S (191 ac)
- Floodplain Overlay District - FP (211 ac)
- Residential - PUD (56 ac)
- Residential Development - R-PUD (168 ac)

0 0.25 0.5 1 Miles

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Spring Creek
2600 S
1200 W
800 W
3200 S
Hwy 91
Hwy 165/Main St
Hyrum Slough
Blacksmith Fork

Exhibit 6 - Current City Zoning

Printed: 4/23/2025

Legend

- Nibley City Boundary
- Annexation Boundary
- Irrigation Lines
- Field Drain Lines

Future Land Use

- Agriculture (262 ac)
- Low Density Residential (1,362 ac)
- Medium Density Residential (1,970 ac)
- High Density Residential (9 ac)
- Commercial & Med/High Residential (572 ac)
- Commerical (359 ac)
- Industrial (908 ac)
- Municipal/Schools/ Churches (67 ac)
- Open Space, Ag., & Low Density Residential (372 ac)
- Parks, Open Space, & Trails (294 ac)
- Town Center (199 ac)

0 0.25 0.5 1 Miles

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Spring Creek
2600 S
1200 W
800 W
3200 S
Hwy 91
Hwy 165/Main St.
Hyrum Slough
Blacksmith Fork

Exhibit 7 - Future Land Use

Printed: 4/23/2025

Exhibit 8 - Field Drains & Ground Water

Legend

- Nibley City Boundary
- Annexation Boundary
- Field Drain Lines
- Field Drain Inspection Location
- Residential Ground Water

Water Table Depth

- 0 - 24"
- >24" - 48"
- >48" - 78"
- >78"

0 0.3 0.6 1.2 Miles

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Spring Creek

Blacksmith Fork

Hyrum Slough

2600 S

3200 S

1200 W

800 W

Hwy 91

Hwy 165/Main St

Printed: 4/23/2025

Exhibit 9 - Capital Improvement Project Map

Legend

- Box Culvert
- 18" Culvert
- 24" Culvert
- 30" Culvert
- 36" Culvert
- 42" Culvert
- 48" Culvert
- 54" Culvert
- 72" Culvert
- Basins for Finalization
- Nibley City Boundary
- Annexation Boundary

Annexation Stormwater Mgmt. System

- Flow Interval (cfs)
- Trunk Lines
- Phase 1

0 0.2 0.4 0.8 Miles

CIP Number	Name	Urgency	Magnitude	Priority
1	Hideaway Storm Drain Phase 2	5	5	10
2	Hideaway Storm Drain Phase 1	5	5	10
3	Culvert Maintenance	5	4	9
4	1200 W & 3350 S Crossing (48")	5	4	9
5	Madison Basin - 1200 W Regional Pond	5	4	9
6	2200 S Crossing (30")	4	4	8
7	Road Crossing	4	3	7
8	1500 W Canal Piping (48")	4	3	7
9	3200 S Crossing (72")	4	3	7
10	Pipe Upsizing & Road Crossing	3	4	7
11	5.5 ac-ft Detention Basin	4	3	7
12	2600 S & 1300 W Crossing	3	3	6
13	1200 W & 3650 S Crossing	3	3	6

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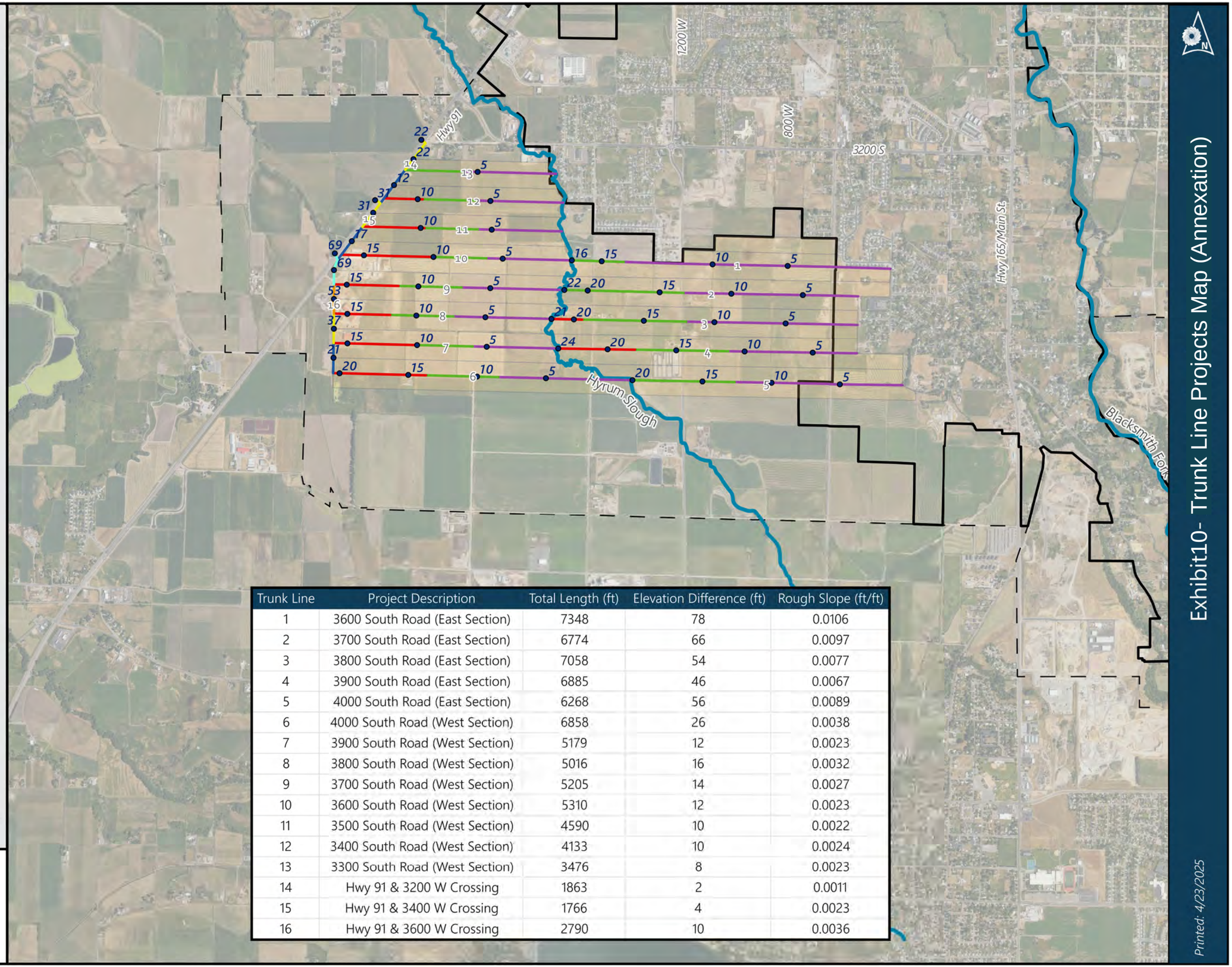
Exhibit10- Trunk Line Projects Map (Annexation)

Annexation Stormwater Mgmt. System

- Flow Interval (cfs)
- Phase 1
- Nibley City Boundary
- Annexation Boundary

Trunk Lines By Diameter

- 15" Parallel Pipes (38,560 ft)
- 18" Parallel Pipes (21,853 ft)
- 24" Parallel Pipes (13,687 ft)
- 30" Single Pipe (2,600 ft)
- 36" Single Pipe (2,409 ft)
- 42" Single Pipe (670 ft)
- 48" Single Pipe (740 ft)



Trunk Line	Project Description	Total Length (ft)	Elevation Difference (ft)	Rough Slope (ft/ft)
1	3600 South Road (East Section)	7348	78	0.0106
2	3700 South Road (East Section)	6774	66	0.0097
3	3800 South Road (East Section)	7058	54	0.0077
4	3900 South Road (East Section)	6885	46	0.0067
5	4000 South Road (East Section)	6268	56	0.0089
6	4000 South Road (West Section)	6858	26	0.0038
7	3900 South Road (West Section)	5179	12	0.0023
8	3800 South Road (West Section)	5016	16	0.0032
9	3700 South Road (West Section)	5205	14	0.0027
10	3600 South Road (West Section)	5310	12	0.0023
11	3500 South Road (West Section)	4590	10	0.0022
12	3400 South Road (West Section)	4133	10	0.0024
13	3300 South Road (West Section)	3476	8	0.0023
14	Hwy 91 & 3200 W Crossing	1863	2	0.0011
15	Hwy 91 & 3400 W Crossing	1766	4	0.0023
16	Hwy 91 & 3600 W Crossing	2790	10	0.0036

0 0.23 0.45 0.9 Miles

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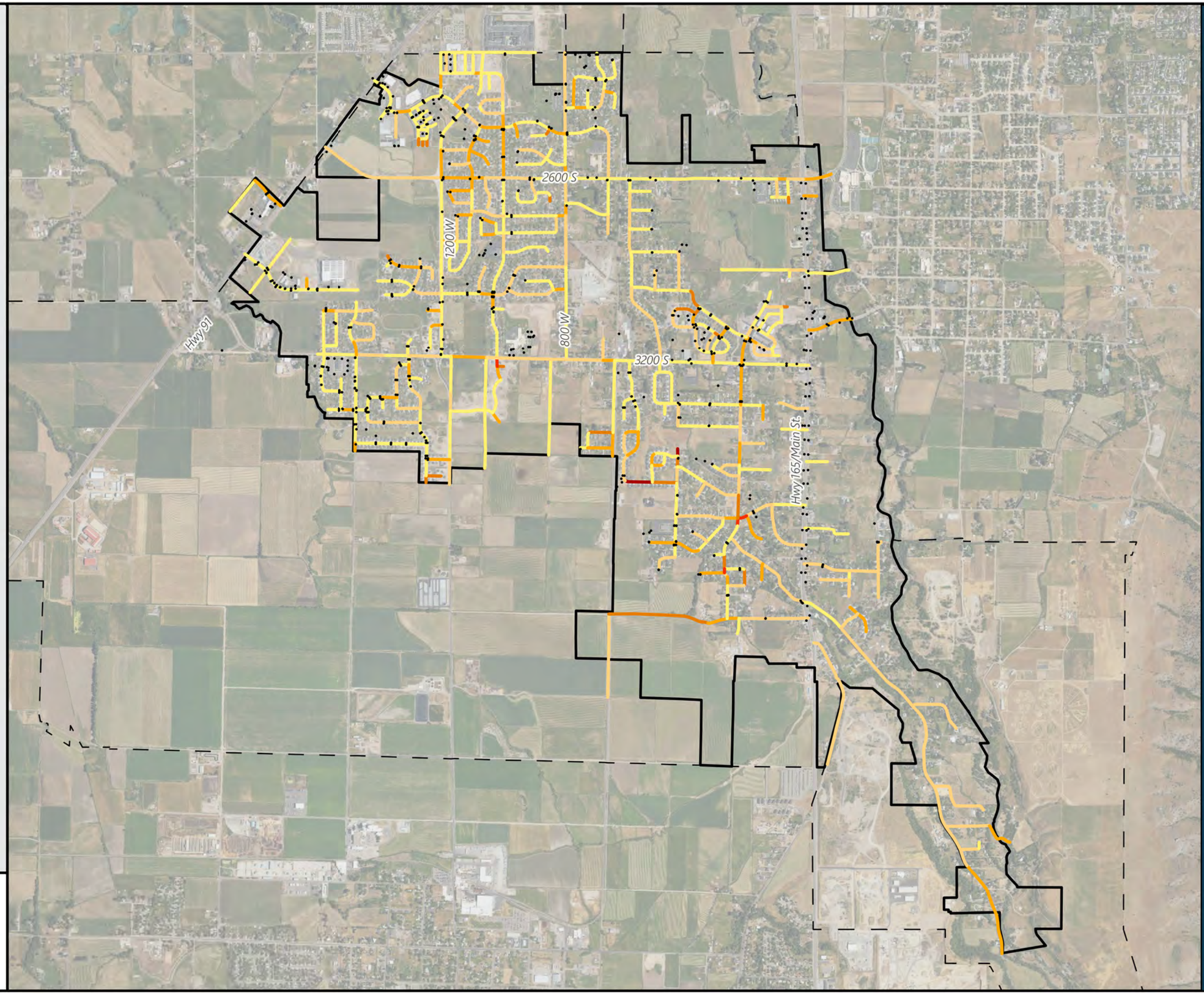
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Exhibit 11- Road Stormwater Conveyance

Legend

Slope of Roads

- 0 - 0.5% (114,290 ft, 21.6 mi)
- 0.5 - 1% (74,759 ft, 14.2 mi)
- 1 - 2% (32,504 ft, 6.2 mi)
- 2 - 3% (7,407 ft, 1.4 mi)
- 3 - 4% (624 ft, 0.12 mi)
- >4% (737 ft, 0.14 mi)
- Nibley City Boundary
- Annexation Boundary
- Storm Inlets



0 0.2 0.4 0.8 Miles

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Exhibit12- Improvement Projects Identified by Hydraulic Model

Legend

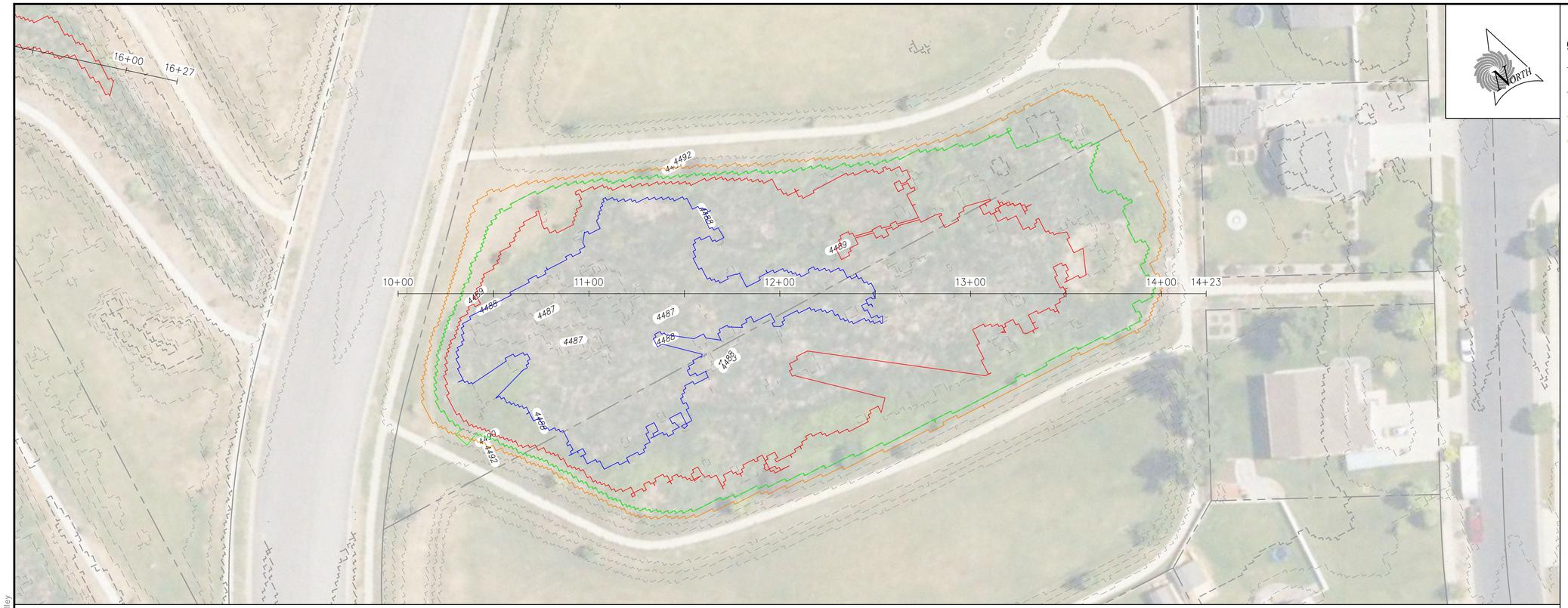
- Reach Projects (49)
- Basin Projects (45)
- Nibley City Boundary
- Annexation Boundary

0 0.25 0.5 1 Miles

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LEGEND

COLOR	DEPTH	AREA	VOLUME
	1'	13,480 SQ. FT.	75 CU. YD.
	2'	35,730 SQ. FT.	560 CU. YD.
	3'	50,840 SQ. FT.	2080 CU. YD.
	4'	57,060 SQ. FT.	4035 CU. YD.

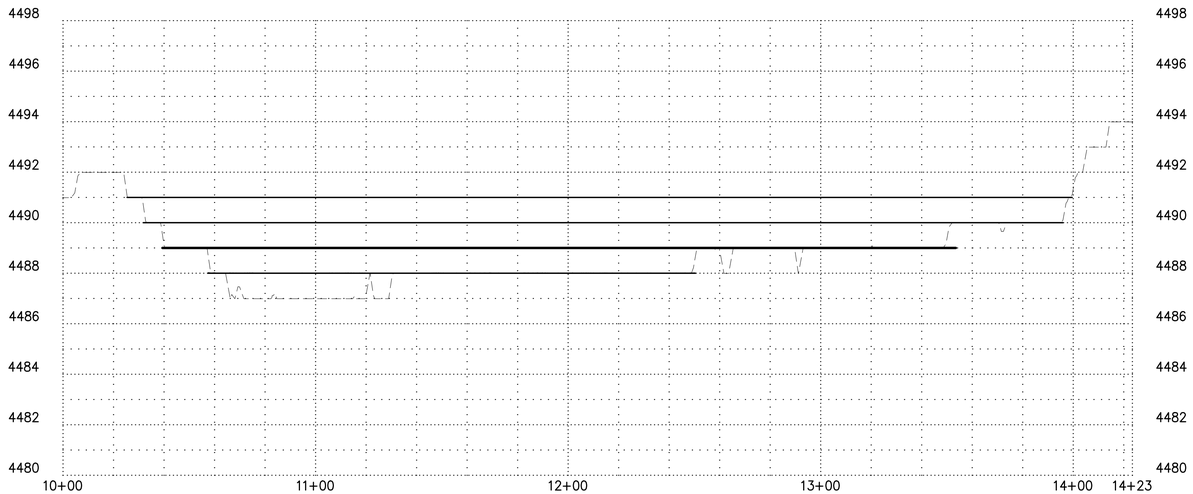


Exhibit 13

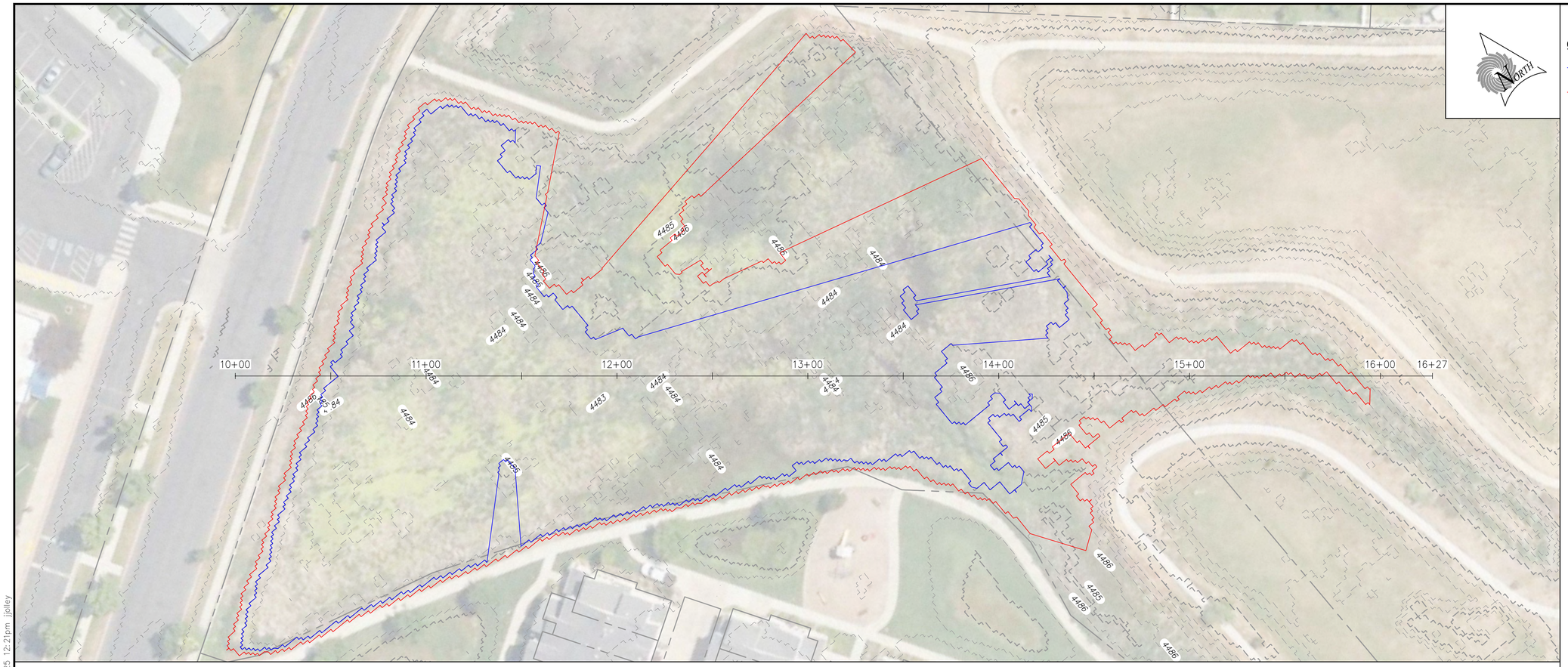
Disc Golf Course
East Wetlands

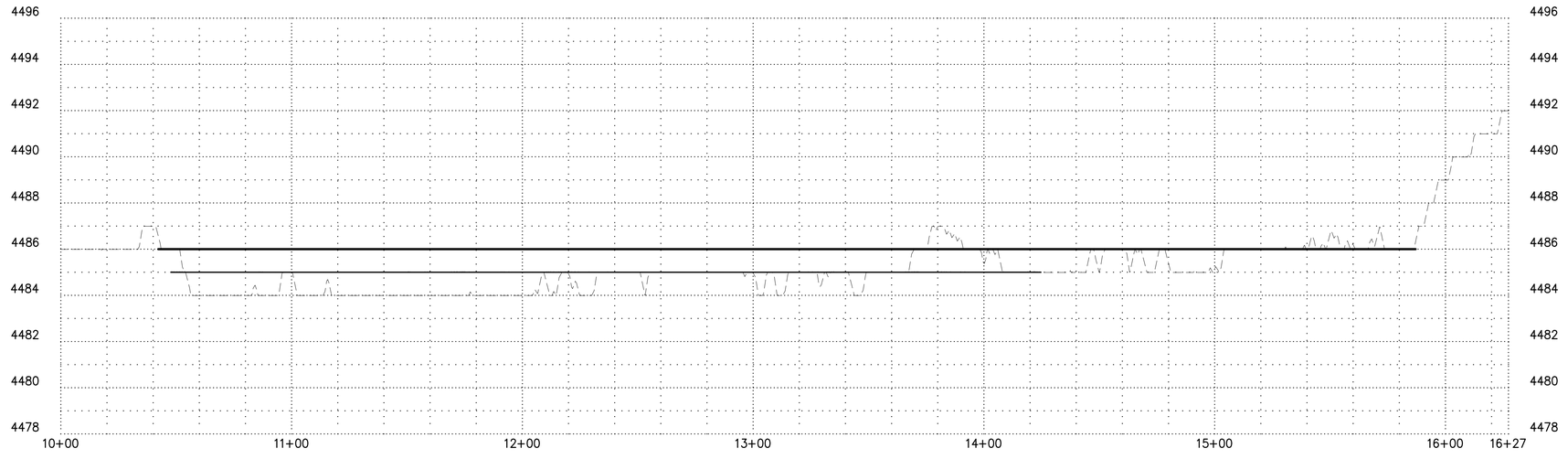
SCALE
0 30' 60'
HORIZ: 1" = 30' : 22 x 34
HORIZ: 1" = 60' : 11 x 17
VERT: 1" = 3' : 22 x 34
VERT: 1" = 6' : 11 x 17

EAST WETLANDS

SUNRISE ENGINEERING
2100 NORTH MAIN STREET
NORTH LOGAN, UTAH 84341
TEL 435.563.3734
www.sunrise-eng.com

P:\Nibley City\S10111.000 Stromwater Master Plan\DWG\Wetlands Volume.dwg Apr 22, 2025 12:19pm jjolley





LEGEND

COLOR	DEPTH	AREA	VOLUME
	1'	50,630 SQ. FT.	790 CU. YD.
	2'	75,210 SQ. FT.	2,520 CU. YD.

Exhibit 14

Disc Golf Course West Wetlands

SCALE
0 30' 60'

HORIZ: 1" = 30' : 22 x 34
HORIZ: 1" = 60' : 11 x 17
VERT: 1" = 3' : 22 x 34
VERT: 1" = 6' : 11 x 17

WEST WETLANDS

SUNRISE ENGINEERING
2100 NORTH MAIN STREET
NORTH LOGAN, UTAH 84341
TEL 435.563.3734
www.sunrise-eng.com

P:\Nibley City\S10111.000 Stromwater Master Plan\DWG\Wetlands Volume.dwg Apr 22, 2025 12:21pm jpilley

Exhibit 15- Maximum Irrigation Canal Capacity

Legend

Canal Type and Maximum Available Flows (cfs)

- Open Channel 3 - 20
- Open Channel 20 - 50
- Open Channel 50 - 100
- Open Channel 100 - 450
- Pipe 3 - 10
- Pipe 10 - 20
- Pipe 20 - 50
- Pipe 50 - 250
- Stormwater Discharge Locations (cfs)
- Natural Drainage
- Nibley Blacksmith Fork Service Area
- College Irrigation Service Area
- Clear Creek Service Area
- Nibley City Boundaries
- Annexation Declaration Boundary
- Areas Outside Nibley City

0 0.2 0.4 0.8 Miles

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Exhibit 16- Irrigation Demand

Legend

Current Irrigation Demand

- 3
- 3.5
- 6
- 7
- 9
- 12
- 15
- 18
- 21
- 27
- 30
- 37.5
- 40

- Stormwater Discharge Locations
- Natural Drainage
- Nibley Blacksmith Fork Service Area
- College Irrigation Service Area
- Clear Creek Service Area
- Nibley City Boundaries
- Annexation Declaration Boundary
- Areas Outside Nibley City

0 0.2 0.4 0.8 Miles

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2600 S

1200 W

900 W

3200 S

Hwy 165

Main St.

4000 S

Hwy 165

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Legend

Existing Stormwater Conveyance (cfs)

- 0
- 1 - 3
- 4 - 7
- 8 - 15
- 16 - 25
- 26 - 50
- 51 - 150
- 151 - 362

- Stormwater Discharge Locations (cfs)
- Natural Drainage
- Nibley Blacksmith Fork Service Area
- College Irrigation Service Area
- Clear Creek Service Area
- Nibley City Boundaries
- Annexation Declaration Boundary
- Areas Outside Nibley City

Note: Flow values are rounded to the nearest whole number for both conveyance and stormwater discharge values

0 0.2 0.4 0.8 Miles

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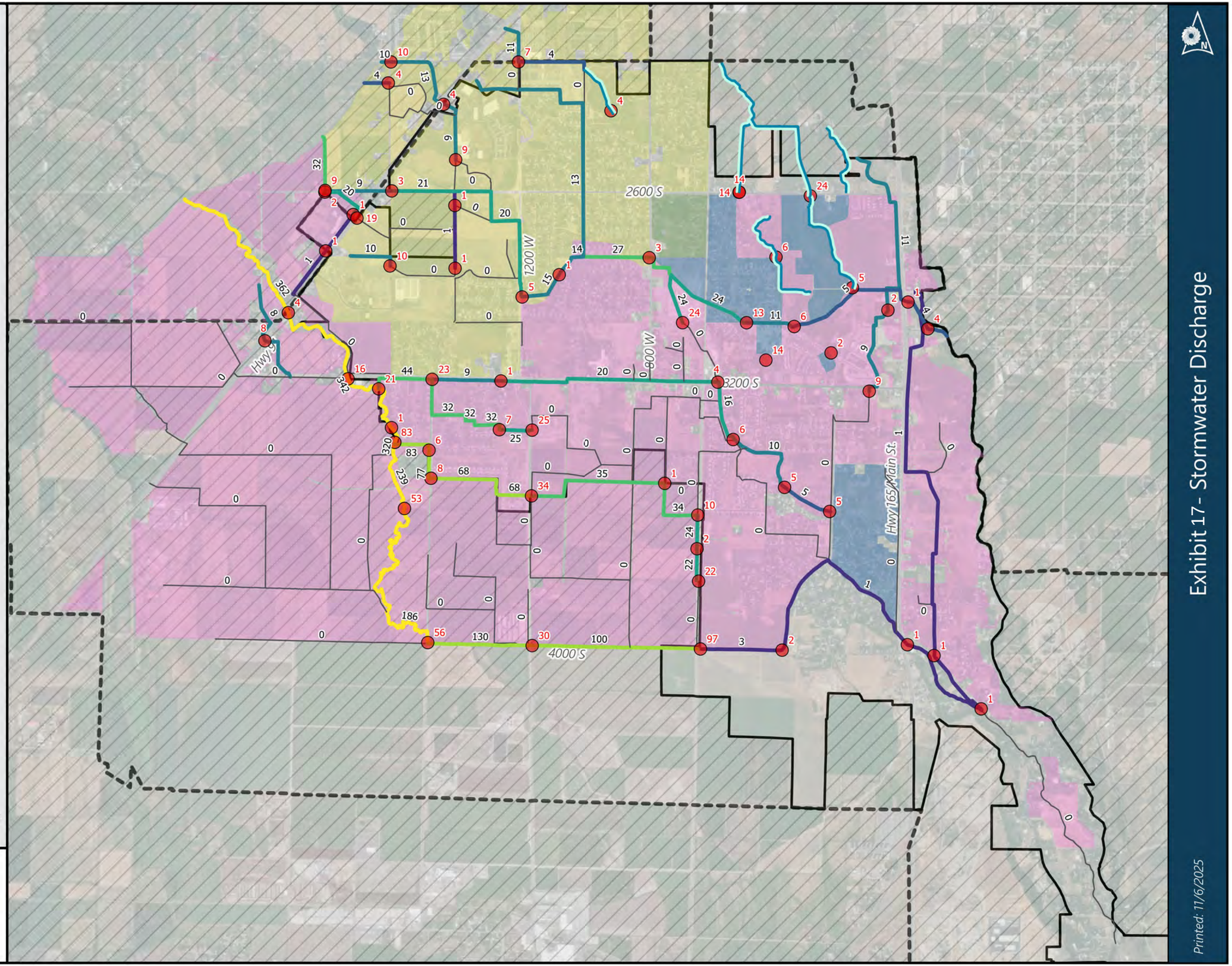


Exhibit 17 - Stormwater Discharge

Printed: 11/6/2025

Exhibit 18- Remaining Irrigation Canal Capacity

Legend

Remaining Capacity (cfs)

- -147 - 0
- 1 - 5
- 6 - 15
- 16 - 30
- 31 - 170
- Stormwater Discharge Locations
- Natural Drainage
- Nibley Blacksmith Fork Service Area
- College Irrigation Service Area
- Clear Creek Service Area
- Nibley City Boundaries
- Annexation Declaration Boundary
- Areas Outside Nibley City

0 0.2 0.4 0.8 Miles

SUNRISE ENGINEERING

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2600 S
1200 W
3200 S
Hwy 165
Main St.
4000 S

Printed: 11/6/2025

APPENDIX A

MASTER PLAN EXPANDED TABLES

Table 2.1

NOAA Atlas 14, Volume 1, Version 5 LOGAN
RADIO KVNU
Station ID: 42-5182
Location name: Logan, Utah, USA*
Latitude: 41.7353°, Longitude: -111.8561°
Elevation:
Elevation (station metadata): 4470 ft**
* source: ESRI Maps
** source: USGS

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	0.107 (0.095-0.121)	0.136 (0.121-0.155)	0.188 (0.166-0.213)	0.234 (0.205-0.266)	0.308 (0.265-0.351)	0.373 (0.314-0.428)	0.451 (0.370-0.523)	0.540 (0.429-0.634)	0.684 (0.519-0.817)	0.809 (0.590-0.986)
10-min	0.163 (0.144-0.183)	0.207 (0.184-0.235)	0.286 (0.253-0.325)	0.356 (0.312-0.404)	0.468 (0.404-0.535)	0.568 (0.478-0.651)	0.687 (0.564-0.796)	0.822 (0.653-0.965)	1.04 (0.790-1.24)	1.23 (0.898-1.50)
15-min	0.202 (0.179-0.227)	0.256 (0.229-0.291)	0.354 (0.313-0.403)	0.441 (0.387-0.501)	0.580 (0.500-0.663)	0.704 (0.593-0.808)	0.851 (0.699-0.987)	1.02 (0.809-1.20)	1.29 (0.980-1.54)	1.53 (1.11-1.86)
30-min	0.272 (0.241-0.306)	0.345 (0.308-0.392)	0.477 (0.422-0.542)	0.594 (0.521-0.675)	0.781 (0.674-0.893)	0.948 (0.798-1.09)	1.15 (0.941-1.33)	1.37 (1.09-1.61)	1.74 (1.32-2.08)	2.06 (1.50-2.51)
60-min	0.337 (0.298-0.379)	0.427 (0.381-0.486)	0.590 (0.522-0.671)	0.735 (0.645-0.835)	0.967 (0.834-1.11)	1.17 (0.988-1.35)	1.42 (1.16-1.64)	1.70 (1.35-2.00)	2.15 (1.63-2.57)	2.55 (1.86-3.10)
2-hr	0.438 (0.395-0.485)	0.549 (0.496-0.606)	0.724 (0.648-0.798)	0.883 (0.782-0.977)	1.13 (0.980-1.26)	1.36 (1.15-1.52)	1.62 (1.34-1.82)	1.92 (1.54-2.19)	2.39 (1.83-2.80)	2.81 (2.08-3.36)
3-hr	0.516 (0.474-0.571)	0.644 (0.589-0.717)	0.820 (0.751-0.907)	0.983 (0.893-1.09)	1.23 (1.10-1.37)	1.46 (1.28-1.63)	1.71 (1.46-1.94)	2.00 (1.66-2.30)	2.46 (1.96-2.90)	2.86 (2.20-3.43)
6-hr	0.701 (0.644-0.770)	0.869 (0.794-0.957)	1.09 (0.992-1.20)	1.28 (1.15-1.42)	1.56 (1.39-1.73)	1.79 (1.58-2.00)	2.05 (1.78-2.31)	2.34 (1.98-2.66)	2.81 (2.31-3.26)	3.21 (2.57-3.79)
12-hr	0.930 (0.851-1.02)	1.15 (1.05-1.27)	1.42 (1.29-1.56)	1.64 (1.49-1.82)	1.98 (1.77-2.20)	2.24 (1.98-2.50)	2.52 (2.20-2.84)	2.83 (2.42-3.21)	3.28 (2.73-3.78)	3.64 (2.96-4.26)
24-hr	1.18 (1.08-1.30)	1.46 (1.33-1.60)	1.78 (1.62-1.95)	2.04 (1.86-2.24)	2.41 (2.19-2.65)	2.71 (2.45-2.97)	3.02 (2.71-3.32)	3.34 (2.98-3.67)	3.78 (3.34-4.16)	4.12 (3.62-4.56)
2-day	1.37 (1.26-1.52)	1.69 (1.54-1.86)	2.04 (1.87-2.25)	2.34 (2.13-2.57)	2.75 (2.49-3.02)	3.08 (2.77-3.38)	3.43 (3.07-3.77)	3.79 (3.37-4.17)	4.27 (3.77-4.72)	4.66 (4.07-5.17)
3-day	1.50 (1.37-1.64)	1.84 (1.69-2.02)	2.22 (2.04-2.44)	2.55 (2.33-2.79)	3.00 (2.73-3.28)	3.36 (3.04-3.67)	3.74 (3.36-4.08)	4.13 (3.69-4.51)	4.66 (4.12-5.10)	5.08 (4.46-5.58)
4-day	1.62 (1.49-1.77)	1.99 (1.84-2.18)	2.41 (2.22-2.63)	2.76 (2.54-3.01)	3.25 (2.98-3.54)	3.64 (3.32-3.96)	4.04 (3.66-4.40)	4.47 (4.01-4.86)	5.04 (4.48-5.49)	5.49 (4.84-6.00)
7-day	1.93 (1.78-2.12)	2.38 (2.20-2.62)	2.89 (2.65-3.17)	3.31 (3.04-3.63)	3.90 (3.55-4.27)	4.35 (3.95-4.77)	4.82 (4.35-5.29)	5.31 (4.76-5.83)	5.97 (5.31-6.58)	6.48 (5.71-7.18)
10-day	2.18 (2.01-2.38)	2.68 (2.47-2.94)	3.26 (3.00-3.56)	3.73 (3.43-4.07)	4.37 (3.99-4.76)	4.86 (4.42-5.29)	5.36 (4.86-5.85)	5.87 (5.28-6.41)	6.55 (5.85-7.18)	7.07 (6.27-7.78)
20-day	2.82 (2.63-3.02)	3.48 (3.24-3.73)	4.18 (3.89-4.48)	4.72 (4.39-5.06)	5.44 (5.04-5.82)	5.96 (5.53-6.39)	6.49 (5.99-6.96)	7.00 (6.43-7.53)	7.65 (6.99-8.27)	8.14 (7.39-8.81)
30-day	3.40 (3.17-3.66)	4.18 (3.90-4.50)	5.00 (4.66-5.38)	5.65 (5.26-6.08)	6.51 (6.05-6.99)	7.15 (6.63-7.68)	7.79 (7.20-8.38)	8.42 (7.76-9.06)	9.23 (8.46-9.98)	9.84 (8.97-10.7)
45-day	4.21 (3.93-4.50)	5.17 (4.82-5.54)	6.13 (5.72-6.54)	6.85 (6.38-7.31)	7.78 (7.24-8.28)	8.45 (7.85-9.01)	9.09 (8.43-9.70)	9.70 (8.97-10.4)	10.5 (9.64-11.2)	11.0 (10.1-11.8)
60-day	5.00 (4.67-5.34)	6.13 (5.73-6.56)	7.19 (6.72-7.69)	7.99 (7.46-8.54)	8.99 (8.40-9.60)	9.70 (9.04-10.4)	10.4 (9.65-11.1)	11.0 (10.2-11.8)	11.7 (10.9-12.6)	12.3 (11.3-13.2)

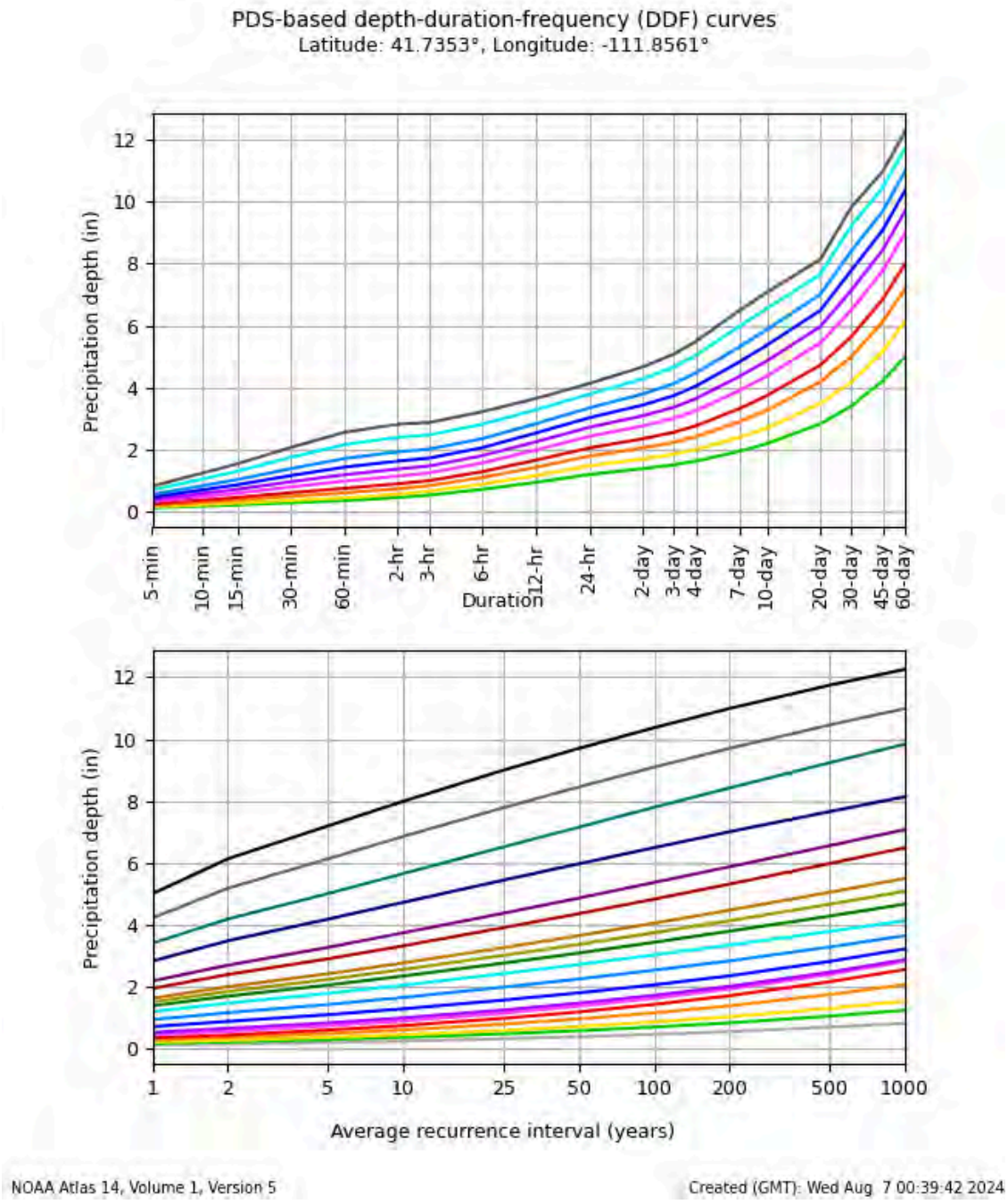
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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.

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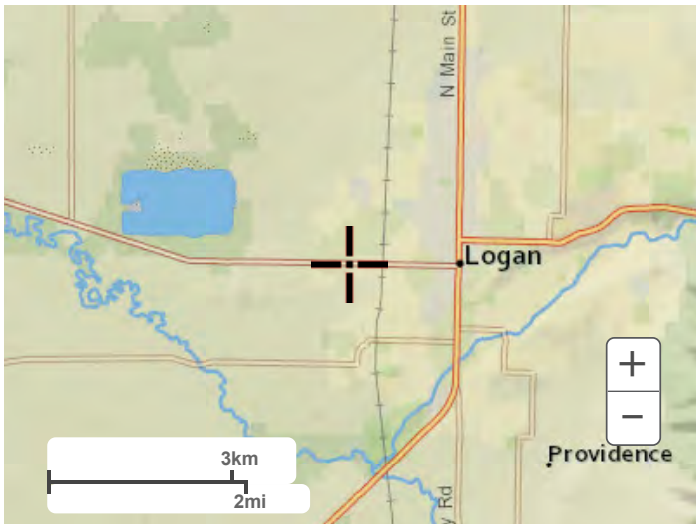
PF graphical



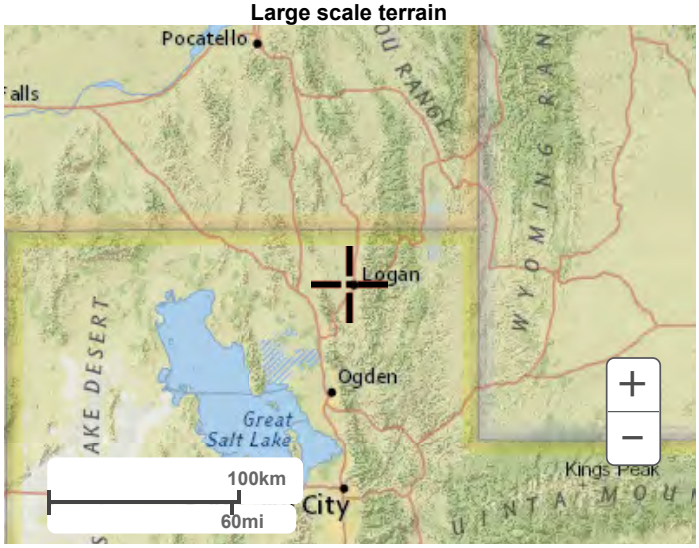
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Maps & aerials

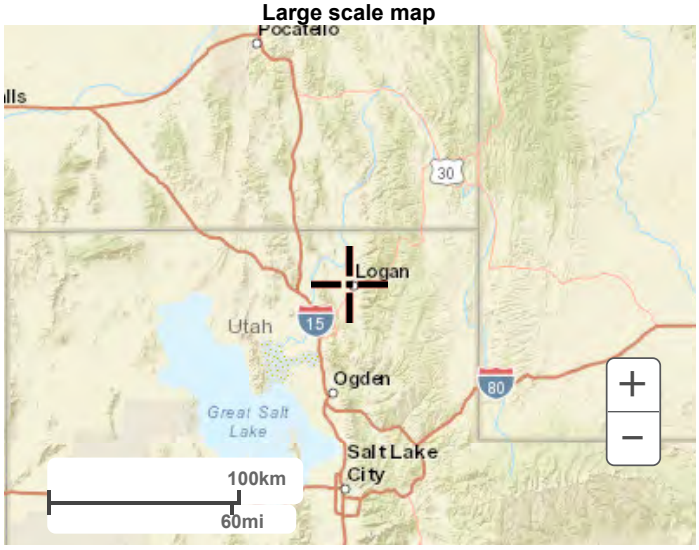
Small scale terrain



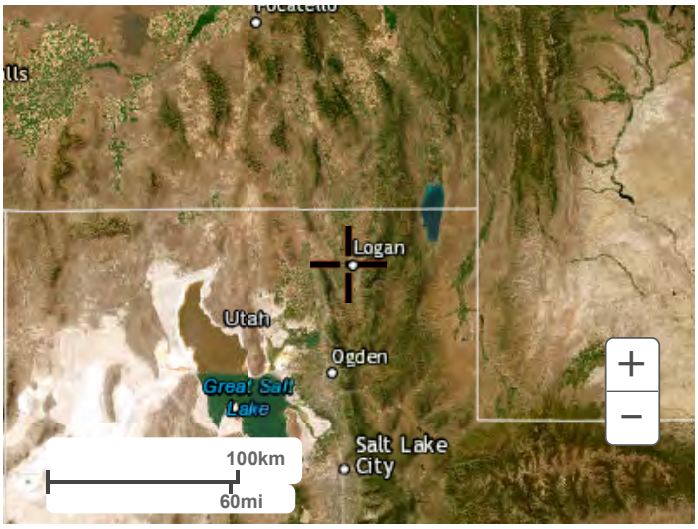
Large scale terrain



Large scale map



Large scale aerial



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US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

Table 2.2 Drainage Watershed Parameters (Existing)

Sub-watersheds	Area (acre)	Curve Number	Slope	Surface Storage (inch)	Flow Length (feet)	Time of Concentration (min)	Lag Time (min)
1B	9.28	86.0	0.0023	1.6	1681.7	83.0	49.8
2B	6.08	82.0	0.0098	2.2	872.4	24.4	14.6
3B	6.66	74.0	0.0122	3.5	782.7	26.9	16.1
4B	49.66	81.9	0.0048	2.2	2142.1	70.7	42.4
5B	12.29	79.6	0.0015	2.6	627.2	56.8	34.1
6B	13.44	82.0	0.0079	2.2	788.3	25.8	15.5
7B	28.99	76.1	0.0076	3.1	1916.4	69.1	41.5
8B	12.61	82.0	0.0078	2.2	761.5	21.3	12.8
9B	38.40	85.7	0.0089	1.7	1774.7	34.8	20.9
10B	34.30	85.3	0.0032	1.7	3844.4	139.2	83.5
11B	41.41	82.4	0.0046	2.1	3069.5	69.0	41.4
12B	3.33	80.0	0.0005	2.5	1022.6	30.0	18.0
13B	6.98	79.5	0.0063	2.6	947.5	29.5	17.7
14B	3.90	82.0	0.0025	2.2	782.7	49.2	29.5
15B	15.74	77.6	0.0051	2.9	4308.5	84.6	50.8
16B	2.37	78.0	0.0076	2.8	843.1	20.0	12.0
17B	31.62	85.3	0.0039	1.7	2458.4	88.1	52.9
18B	4.54	80.3	0.0050	2.4	993.1	27.3	16.4
19B	17.22	82.9	0.0065	2.1	2338.2	70.9	42.6
20B	3.58	84.0	0.0046	1.9	755.9	18.7	11.2
21B	13.76	84.3	0.0060	1.9	1443.8	33.6	20.2
22B	13.82	86.0	0.0065	1.6	1349.0	32.1	19.3
23B	29.70	86.0	0.0066	1.6	2919.6	59.4	35.6
24B	7.68	82.0	0.0059	2.2	1093.1	28.4	17.1
25B	130.75	76.5	0.0080	3.1	4356.3	111.0	66.6
26B	124.16	83.2	0.0055	2.0	4440.5	127.5	76.5
27B	7.81	79.5	0.0151	2.6	1077.6	23.7	14.2
28B	160.96	85.9	0.0065	1.6	4490.5	107.8	64.7
29B	70.21	85.9	0.0074	1.6	3536.0	73.0	43.8
30B	261.44	83.0	0.0152	2.0	5088.0	84.5	50.7
31B	25.02	77.6	0.0062	2.9	1653.0	53.3	32.0
32B	34.30	68.9	0.0073	4.5	2144.8	94.4	56.6
33B	10.75	61.0	0.0067	6.4	735.8	63.8	38.3
34B	3.26	86.0	0.0124	1.6	598.1	16.7	10.0
35B	3.65	86.0	0.0110	1.6	589.6	16.7	10.0
36B	66.69	70.1	0.0155	4.3	4954.1	117.2	70.3
37B	11.58	79.3	0.0040	2.6	1894.4	85.5	51.3
38B	9.60	82.0	0.0158	2.2	541.0	16.7	10.0
39B	5.38	75.0	0.0102	3.3	649.1	32.4	19.4
40B	28.61	74.9	0.0052	3.3	1723.0	79.3	47.6
41B	27.14	72.1	0.0081	3.9	1935.8	75.5	45.3
42B	85.44	77.8	0.0061	2.9	2992.2	104.6	62.7
43B	21.31	78.2	0.0060	2.8	2314.5	84.5	50.7
44B	26.56	77.4	0.0034	2.9	1095.2	62.9	37.8
45B	22.40	78.5	0.0052	2.7	1307.6	57.4	34.4
46B	12.93	68.7	0.0768	4.6	1780.3	23.2	13.9
47B	8.58	84.3	0.0078	1.9	701.5	23.7	14.2
48B	11.58	75.7	0.0072	3.2	1199.5	33.7	20.2
49B	37.70	73.0	0.0053	3.7	2209.6	100.9	60.5
50B	47.30	71.3	0.0066	4.0	4656.0	172.7	103.6
51B	27.90	77.1	0.0061	3.0	2455.8	91.4	54.9
52B	444.80	73.8	0.0142	3.6	12001.4	233.8	140.3
53B	28.80	73.0	0.0064	3.7	1861.0	80.3	48.2
54B	13.57	76.0	0.0058	3.2	2419.6	51.7	31.0
55B	99.01	49.2	0.0300	10.3	6841.4	187.9	112.7
56B	19.71	65.3	0.0116	5.3	2506.2	92.9	55.7
57B	513.15	77.2	0.0058	3.0	9395.8	273.0	163.8
58B	4.61	78.0	0.0056	2.8	841.1	39.4	23.6
59B	4.99	74.0	0.0100	3.5	970.8	33.0	19.8
60B	17.28	76.3	0.0055	3.1	1373.0	61.8	37.1
61B	10.94	76.8	0.0073	3.0	950.8	28.3	17.0

62B	30.91	81.4	0.0045	2.3	1781.7	40.3	24.2
63B	33.09	68.8	0.0154	4.5	1850.4	50.9	30.6
64B	29.70	79.3	0.0058	2.6	2484.2	87.9	52.7
65B	11.71	80.3	0.0078	2.4	1567.1	37.5	22.5
66B	33.09	71.7	0.0083	4.0	1502.2	61.5	36.9
67B	20.74	75.4	0.0058	3.3	2281.8	92.4	55.5
68B	90.43	70.3	0.0099	4.2	4091.0	130.3	78.2
69B	28.22	77.5	0.0074	2.9	1442.8	39.7	23.8
70B	26.11	78.0	0.0110	2.8	2158.5	59.7	35.8
71B	23.17	78.1	0.0260	2.8	1605.6	33.0	19.8
72B	6.53	74.0	0.0109	3.5	849.8	31.9	19.2
73B	53.89	79.5	0.0140	2.6	3038.7	52.7	31.6
74B	52.48	65.5	0.0084	5.3	3807.3	152.4	91.4
75B	46.66	70.5	0.0138	4.2	3193.2	90.1	54.1
76B	59.97	77.6	0.0079	2.9	3462.9	103.6	62.2
77B	38.91	80.3	0.0058	2.5	6834.2	83.0	49.8
78B	9.09	80.0	0.0085	2.5	1483.5	47.3	28.4
79B	20.67	79.8	0.0081	2.5	1782.5	40.0	24.0
80B	18.88	67.0	0.0080	4.9	2721.2	60.8	36.5
81B	20.54	79.2	0.0045	2.6	2754.3	65.0	39.0
82B	17.47	83.3	0.0065	2.0	1644.7	34.8	20.9
83B	105.47	85.7	0.0074	1.7	3694.7	73.0	43.8
84B	9.66	78.0	0.0078	2.8	900.7	35.1	21.1
85B	99.78	74.7	0.0078	3.4	6779.6	195.5	117.3
86B	71.94	78.0	0.0075	2.8	3324.4	78.2	46.9
87B	8.58	78.0	0.0080	2.8	2058.8	67.3	40.4
88B	2.50	92.0	0.0029	0.9	403.7	16.7	10.0
89B	108.61	66.7	0.0069	5.0	10851.7	145.1	87.1
90B	29.31	73.0	0.0093	3.7	2242.1	61.7	37.0
91B	1677.57	72.3	0.0149	3.8	16630.6	308.5	185.1
92B	24.45	84.3	0.0038	1.9	1808.3	72.3	43.4
93B	54.08	61.6	0.0086	6.2	5789.8	164.2	98.5
94B	10.75	74.0	0.0158	3.5	543.9	18.6	11.2
95B	16.13	63.0	0.0046	5.9	1876.2	55.1	33.1
96B	12.16	64.7	0.0101	5.5	2698.6	55.8	33.5
97B	38.02	78.0	0.0048	2.8	1559.6	69.8	41.9
98B	13.18	84.8	0.0085	1.8	1480.5	33.4	20.0
99B	4.61	86.0	0.0075	1.6	1057.3	29.1	17.5
100B	25.02	78.9	0.0116	2.7	1391.0	49.1	29.4
101B	64.26	80.6	0.0052	2.4	2364.1	69.1	41.4
102B	484.16	83.9	0.0066	1.9	15741.0	217.7	130.6
103B	85.50	77.7	0.0064	2.9	3164.4	107.1	64.2
104B	21.38	73.1	0.0051	3.7	1679.2	82.3	49.4
105B	6.27	70.3	0.0097	4.2	1098.1	35.3	21.2
106B	11.39	78.8	0.0280	2.7	1177.7	20.9	12.6
107B	6.91	82.0	0.0085	2.2	1149.5	34.6	20.7
108B	37.44	77.8	0.0051	2.9	2445.7	123.3	74.0
109B	8232.19	63.5	0.0386	5.7	23418.8	174.3	104.6
110B	20.48	85.3	0.0082	1.7	1498.4	44.0	26.4
111B	23.04	79.9	0.0058	2.5	1504.6	57.6	34.5
112B	86.27	74.5	0.0051	3.4	4286.2	99.4	59.6
113B	10.24	84.0	0.0006	1.9	816.6	24.8	14.9
114B	1.86	75.0	0.0062	3.3	385.5	19.7	11.8
115B	30.34	78.0	0.0116	2.8	2560.1	66.5	39.9
116B	2.05	84.0	0.0033	1.9	1152.8	20.5	12.3
117B	18.37	79.9	0.0070	2.5	489.7	48.4	29.0
118B	1.86	80.0	0.0096	2.5	578.0	20.9	12.6
119B	63.49	78.0	0.0046	2.8	3484.1	135.9	81.5
120B	51.52	69.8	0.0072	4.3	2809.2	114.7	68.8
121B	20.03	79.5	0.0059	2.6	1080.5	29.5	17.7
122B	8.70	74.0	0.0010	3.5	343.4	51.9	31.1
123B	133.82	78.0	0.0075	2.8	5581.2	154.0	92.4
124B	22.08	83.3	0.0059	2.0	1046.8	30.6	18.4
125B	17.92	78.9	0.0050	2.7	1176.4	48.0	28.8

Table 2.3 Drainage Watershed Parameters (Proposed)

Sub-watersheds	Area (acre)	Curve Number	Slope	Surface Storage (inch)	Flow Length (feet)	Time of Concentration (min)	Lag Time (min)
1B	9.28	86.0	0.0023	1.6	1681.7	83.0	49.8
2B	6.08	82.0	0.0098	2.2	872.4	24.4	14.6
3B	6.66	74.0	0.0122	3.5	782.7	26.9	16.1
4B	49.66	81.9	0.0048	2.2	2142.1	70.7	42.4
5B	12.29	79.6	0.0015	2.6	627.2	56.8	34.1
6B	13.44	82.0	0.0079	2.2	788.3	25.8	15.5
7B	28.99	76.1	0.0076	3.1	1916.4	69.1	41.5
8B	12.61	82.0	0.0078	2.2	761.5	21.3	12.8
9B	38.40	85.7	0.0089	1.7	1774.7	34.8	20.9
10B	34.30	85.3	0.0032	1.7	3844.4	139.2	83.5
11B	41.41	82.4	0.0046	2.1	3069.5	69.0	41.4
12B	3.33	80.0	0.0005	2.5	1022.6	30.0	18.0
13B	6.98	79.5	0.0063	2.6	947.5	29.5	17.7
14B	3.90	82.0	0.0025	2.2	782.7	49.2	29.5
15B	15.74	77.6	0.0051	2.9	4308.5	84.6	50.8
16B	2.37	78.0	0.0076	2.8	843.1	20.0	12.0
17B	31.62	85.3	0.0039	1.7	2458.4	88.1	52.9
18B	4.54	80.3	0.0050	2.4	993.1	27.3	16.4
19B	17.22	82.9	0.0065	2.1	2338.2	70.9	42.6
20B	3.58	84.0	0.0046	1.9	755.9	18.7	11.2
21B	13.76	84.3	0.0060	1.9	1443.8	33.6	20.2
22B	13.82	86.0	0.0065	1.6	1349.0	32.1	19.3
23B	29.70	86.0	0.0066	1.6	2919.6	59.4	35.6
24B	7.68	82.0	0.0059	2.2	1093.1	28.4	17.1
25B	130.75	80.0	0.0080	2.5	4356.3	33.3	20.0
26B	124.16	85.0	0.0055	1.8	4440.5	33.3	20.0
27B	7.81	79.5	0.0151	2.6	1077.6	23.7	14.2
28B	160.96	85.9	0.0065	1.6	4490.5	107.8	64.7
29B	70.21	85.9	0.0074	1.6	3536.0	73.0	43.8
30B	261.44	83.0	0.0152	2.0	5088.0	84.5	50.7
31B	25.02	77.6	0.0062	2.9	1653.0	53.3	32.0
32B	34.30	68.9	0.0073	4.5	2144.8	94.4	56.6
33B	10.75	61.0	0.0067	6.4	735.8	63.8	38.3
34B	3.26	86.0	0.0124	1.6	598.1	16.7	10.0
35B	3.65	86.0	0.0110	1.6	589.6	16.7	10.0
36B	66.69	70.1	0.0155	4.3	4954.1	117.2	70.3
37B	11.58	79.3	0.0040	2.6	1894.4	85.5	51.3
38B	9.60	82.0	0.0158	2.2	541.0	16.7	10.0
39B	5.38	75.0	0.0102	3.3	649.1	32.4	19.4
40B	28.61	74.9	0.0052	3.3	1723.0	79.3	47.6
41B	27.14	85.0	0.0081	1.8	1935.8	33.3	20.0
42B	85.44	77.8	0.0061	2.9	2992.2	104.6	62.7
43B	21.31	78.2	0.0060	2.8	2314.5	84.5	50.7
44B	26.56	77.4	0.0034	2.9	1095.2	62.9	37.8
45B	22.40	78.5	0.0052	2.7	1307.6	57.4	34.4
46B	12.93	68.7	0.0768	4.6	1780.3	23.2	13.9
47B	8.58	84.3	0.0078	1.9	701.5	23.7	14.2
48B	11.58	75.7	0.0072	3.2	1199.5	33.7	20.2
49B	37.70	73.0	0.0053	3.7	2209.6	100.9	60.5
50B	47.30	71.3	0.0066	4.0	4656.0	172.7	103.6
51B	27.90	77.1	0.0061	3.0	2455.8	91.4	54.9
52B	444.80	73.8	0.0142	3.6	12001.4	233.8	140.3
53B	28.80	73.0	0.0064	3.7	1861.0	80.3	48.2
54B	13.57	76.0	0.0058	3.2	2419.6	51.7	31.0
55B	99.01	49.2	0.0300	10.3	6841.4	187.9	112.7
56B	19.71	65.3	0.0116	5.3	2506.2	92.9	55.7
57B	513.15	77.2	0.0058	3.0	9395.8	273.0	163.8
58B	4.61	78.0	0.0056	2.8	841.1	39.4	23.6
59B	4.99	74.0	0.0100	3.5	970.8	33.0	19.8
60B	17.28	76.3	0.0055	3.1	1373.0	61.8	37.1
61B	10.94	76.8	0.0073	3.0	950.8	28.3	17.0

62B	30.91	81.4	0.0045	2.3	1781.7	40.3	24.2
63B	33.09	68.8	0.0154	4.5	1850.4	50.9	30.6
64B	29.70	79.3	0.0058	2.6	2484.2	87.9	52.7
65B	11.71	80.3	0.0078	2.4	1567.1	37.5	22.5
66B	33.09	71.7	0.0083	4.0	1502.2	61.5	36.9
67B	20.74	75.4	0.0058	3.3	2281.8	92.4	55.5
68B	90.43	70.3	0.0099	4.2	4091.0	130.3	78.2
69B	28.22	77.5	0.0074	2.9	1442.8	39.7	23.8
70B	26.11	78.0	0.0110	2.8	2158.5	59.7	35.8
71B	23.17	78.1	0.0260	2.8	1605.6	33.0	19.8
72B	6.53	74.0	0.0109	3.5	849.8	31.9	19.2
73B	53.89	79.5	0.0140	2.6	3038.7	52.7	31.6
74B	52.48	65.5	0.0084	5.3	3807.3	152.4	91.4
75B	46.66	70.5	0.0138	4.2	3193.2	90.1	54.1
76B	59.97	77.6	0.0079	2.9	3462.9	103.6	62.2
77B	38.91	80.3	0.0058	2.5	6834.2	83.0	49.8
78B	9.09	80.0	0.0085	2.5	1483.5	47.3	28.4
79B	20.67	79.8	0.0081	2.5	1782.5	40.0	24.0
80B	18.88	67.0	0.0080	4.9	2721.2	60.8	36.5
81B	20.54	79.2	0.0045	2.6	2754.3	65.0	39.0
82B	17.47	83.3	0.0065	2.0	1644.7	34.8	20.9
83B	105.47	85.7	0.0074	1.7	3694.7	73.0	43.8
84B	9.66	78.0	0.0078	2.8	900.7	35.1	21.1
85B	99.78	74.7	0.0078	3.4	6779.6	195.5	117.3
86B	71.94	78.0	0.0075	2.8	3324.4	78.2	46.9
87B	8.58	78.0	0.0080	2.8	2058.8	67.3	40.4
88B	2.50	92.0	0.0029	0.9	403.7	16.7	10.0
89B	108.61	66.7	0.0069	5.0	10851.7	145.1	87.1
90B	29.31	73.0	0.0093	3.7	2242.1	61.7	37.0
91B	1677.57	72.3	0.0149	3.8	16630.6	308.5	185.1
92B	24.45	84.3	0.0038	1.9	1808.3	72.3	43.4
93B	54.08	61.6	0.0086	6.2	5789.8	164.2	98.5
94B	10.75	74.0	0.0158	3.5	543.9	18.6	11.2
95B	16.13	63.0	0.0046	5.9	1876.2	55.1	33.1
96B	12.16	64.7	0.0101	5.5	2698.6	55.8	33.5
97B	38.02	78.0	0.0048	2.8	1559.6	69.8	41.9
98B	13.18	84.8	0.0085	1.8	1480.5	33.4	20.0
99B	4.61	86.0	0.0075	1.6	1057.3	29.1	17.5
100B	25.02	78.9	0.0116	2.7	1391.0	49.1	29.4
101B	64.26	80.6	0.0052	2.4	2364.1	69.1	41.4
102B	484.16	83.9	0.0066	1.9	15741.0	217.7	130.6
103B	85.50	77.7	0.0064	2.9	3164.4	107.1	64.2
104B	21.38	73.1	0.0051	3.7	1679.2	82.3	49.4
105B	6.27	70.3	0.0097	4.2	1098.1	35.3	21.2
106B	11.39	78.8	0.0280	2.7	1177.7	20.9	12.6
107B	6.91	82.0	0.0085	2.2	1149.5	34.6	20.7
108B	37.44	90.0	0.0051	1.1	2445.7	33.3	20.0
109B	8232.19	63.5	0.0386	5.7	23418.8	174.3	104.6
110B	20.48	85.3	0.0082	1.7	1498.4	44.0	26.4
111B	23.04	79.9	0.0058	2.5	1504.6	57.6	34.5
112B	86.27	74.5	0.0051	3.4	4286.2	99.4	59.6
113B	10.24	84.0	0.0006	1.9	816.6	24.8	14.9
114B	1.86	75.0	0.0062	3.3	385.5	19.7	11.8
115B	30.34	78.0	0.0116	2.8	2560.1	66.5	39.9
116B	2.05	84.0	0.0033	1.9	1152.8	20.5	12.3
117B	18.37	79.9	0.0070	2.5	489.7	48.4	29.0
118B	1.86	80.0	0.0096	2.5	578.0	20.9	12.6
119B	63.49	78.0	0.0046	2.8	3484.1	135.9	81.5
120B	51.52	69.8	0.0072	4.3	2809.2	114.7	68.8
121B	20.03	79.5	0.0059	2.6	1080.5	29.5	17.7
122B	8.70	74.0	0.0010	3.5	343.4	51.9	31.1
123B	133.82	78.0	0.0075	2.8	5581.2	154.0	92.4
124B	22.08	83.3	0.0059	2.0	1046.8	30.6	18.4
125B	17.92	78.9	0.0050	2.7	1176.4	48.0	28.8

Table 3.1.a Model & Analysis Results - Existing (Basins)

Basin ID	Basin Type	Depth (ft)	Peak Depth (ft)	Total Volume (ac-ft)	Peak Storage (ac-ft)	Discharge Volume (ac-ft)	Peak Discharge Rate (cfs)	Allowable Peak Discharge Rate (cfs)	Status	Surplus / Deficit (ac-ft)
1	Detention	1.5	1.3		Combined w/ Basin 1&3&4&7				Below Capacity	
2	Detention	2	1.0	0.38	0.2	0.43	0.52	1.00	Below Capacity	0.18
3	Detention	2	1.6		Combined w/ Basin 1&3&4&7				Below Capacity	
4	Detention	2	1.6	4.78	3.84	12.74	21.51	26.77	Below Capacity	0.94
5	Detention	2.5	2.6	0.69	0.71	2.06	10.87	4.01	Over Capacity	(0.02)
6	Detention	2	2.2	0.97	1.06	6.85	35.09	14.43	Over Capacity	(0.09)
7	Detention	2	1.6		Combined w/ Basin 1&3&4&7				Below Capacity	
8	Detention	2.5	2.7	0.96	1.03	6.36	25.87	6.34	Over Capacity	(0.07)
9	Retention	1	1.2		Route to Basin 10				Over Capacity	
10	Retention	1.25	1.3	1.36	1.6	2.95	21.99	0.00	Over Capacity	(0.24)
11	Detention	2	1.6	0.29	0.23	0.48	0.71	0.90	Below Capacity	0.06
12	Detention	1.75	1.8	0.73	0.74	1.77	5.13	2.73	Over Capacity	(0.01)
13	Detention	1.75	1.8	0.60	0.63	1.93	12.67	2.81	Over Capacity	(0.03)
14	Detention	2	2.0	0.71	0.72	2.09	7.64	3.46	Over Capacity	(0.01)
15	Detention	2	2.2	0.66	0.72	2.73	26.53	4.37	Over Capacity	(0.06)
16	Retention	1	1.1	0.08	0.09	0.81	9.97	0.00	Over Capacity	(0.01)
17	Retention	2	2.1	1.09	1.16	2.08	13.69	0.00	Over Capacity	(0.07)
18	Detention	2	2.0	2.14	2.18	9.49	16.93	12.64	Over Capacity	(0.04)
19	Detention	2	1.0		Route to Basin 18				Below Capacity	
20	Detention	2	1.1		Combined w/ Basin 21				Over Capacity	
21	Detention	2	2.1	0.97	1	3.62	15.19	7.51	Over Capacity	(0.03)
22	Detention	3	3.2	0.17	0.18	0.74	24.26	1.84	Over Capacity	(0.01)
23	Retention	4	4.3	0.35	0.37	9.13	38.34	0.00	Over Capacity	(0.02)
24	Detention	3	3.2	0.60	0.64	6.47	26.84	5.89	Over Capacity	(0.04)
25	Detention	2	2.2	0.17	0.19	3.92	29.40	4.25	Over Capacity	(0.02)
26	Retention	2.5	2.7	0.40	0.43	5.91	23.85	0.00	Over Capacity	(0.03)
27	Detention	3	1.6	1.53	0.81	2.21	3.49	6.60	Below Capacity	0.72
28	Retention	2	2.1	0.35	0.36	0.81	7.22	0.00	Over Capacity	(0.01)
29	Detention	2	1.4	0.28	0.19	0.44	0.67	0.96	Below Capacity	0.09
30	Retention	4	4.0	0.20	0.19	0.37	6.15	0.00	Over Capacity	(0.01)
31	Retention	1.5	2.2	0.33	0.37	2.41	25.78	0.00	Over Capacity	(0.04)
32	Detention	1.75	1.8	0.57	0.6	2.89	15.64	6.04	Over Capacity	(0.03)
33	Detention	3	2.1	1.47	1.05	2.48	3.75	5.25	Below Capacity	0.42
34	Detention	2.25	2.3		Route to Basin 63				Over Capacity	
35	Detention	2	2.0		Combined w/ Basin 74				Over Capacity	
36	Detention	2	2.0	0.18	0.18	0.71	3.17	0.37	Over Capacity	(0.00)
37	Detention	2	2.0	0.03	0.03	1.57	7.62	3.96	Over Capacity	(0.00)
38	Detention	2	2.0	0.07	0.07	0.45	5.02	0.48	Over Capacity	(0.00)
39	Detention	3	3.1	0.78	0.79	2.15	11.96	3.50	Over Capacity	(0.01)
40	Detention	2	2.0		Route to Basin 41				Over Capacity	
41	Detention	1.5	2.0	0.32	0.32	0.98	3.21	2.34	Over Capacity	(0.00)
42	Detention	2.5	2.5	1.20	1.22	3.17	9.75	4.87	Over Capacity	(0.02)
43	Detention	2.5	2.5		Route to Basin 42				Over Capacity	
44	Detention	2.5	2.5		Route to Basin 42				Over Capacity	
45	Detention	2.5	2.5		Route to Basin 42				Over Capacity	
46	Retention	2.5	2.5		Route to Basin 42				Over Capacity	
47	Retention	2.5	2.5		Route to Basin 42				Over Capacity	
48	Detention	2.5	2.5		Route to Basin 42				Over Capacity	
49	Retention	2.5	2.5		Route to Basin 42				Over Capacity	
50	Detention	2	1.1		Route to Basin 79				Below Capacity	
51	Detention	2	2.0	0.41	0.41	1.50	5.41	3.45	Over Capacity	(0.00)
52	Detention	2.75	2.4		Route to Basin 53				Below Capacity	
53	Detention	2.75	2.4	1.51	1.32	2.45	2.06	2.34	Below Capacity	0.19
54	Detention	2	2.0	0.06	0.06	2.73	10.44	7.52	Over Capacity	(0.00)
55	Detention	2	2.0	0.05	0.05	2.30	7.31	6.92	Over Capacity	(0.00)
56	Detention	2	2.1	0.18	0.19	2.34	20.20	5.03	Over Capacity	(0.01)
57	Detention	2	2.1		Route to Basin 56				Over Capacity	
58	Detention	1	2.1		Route to Basin 56				Over Capacity	

59	Detention	1.75	2.0			Route to Basin 8			Over Capacity	
60	Retention	2	2.0	0.28	0.28	0.28	2.05	0.00	Over Capacity	(0.00)
61	Detention	2	1.8	0.06	0.06	0.15	0.34	0.37	Below Capacity	0.00
62	Detention	2	2.0	0.19	0.19	0.51	3.68	0.71	Over Capacity	(0.00)
63	Detention	2.25	2.3	0.58	0.58	1.29	2.63	1.86	Over Capacity	(0.00)
64	Detention	2.25	2.4	1.20	1.3	4.91	28.38	8.31	Over Capacity	(0.10)
65	Detention	2.25	2.3			Route to Basin 64			Over Capacity	
66	Retention	1.75	1.9			Route to Basin 64			Over Capacity	
67	Retention	2.25	2.3			Route to Basin 64			Over Capacity	
68	Retention	2.25	2.3			Route to Basin 64			Over Capacity	
69	Retention	2.25	2.3			Route to Basin 64			Over Capacity	
70	Retention	2.25	2.3			Route to Basin 64			Over Capacity	
71	Detention	1.75	1.8			Combined w/ Basin 72			Over Capacity	
72	Detention	1.75	1.8	0.23	0.24	1.11	10.15	1.70	Over Capacity	(0.01)
73	Detention	1.75	1.8			Combined w/ Basin 72			Over Capacity	
74	Detention	2	2.0	0.23	0.23	0.80	7.01	1.56	Over Capacity	(0.00)
75	Detention	3	3.0	0.19	0.19	2.91	11.65	9.37	Over Capacity	(0.00)
76	Detention	2	0.7			Route to Basin 77			Below Capacity	
77	Detention	1.75	0.7	1.81	0.76	1.85	2.30	5.46	Below Capacity	1.05
78	Detention	1.5	0.7			Route to Basin 77			Below Capacity	
79	Detention	3	1.1	2.22	1.23	2.58	3.15	5.66	Below Capacity	0.99
80	Detention	3	1.1			Route to Basin 79			Below Capacity	
81	Detention	1.5	1.6			Route to Basin 56			Over Capacity	
82	Detention	1.5	1.6	0.10	0.1	6.81	26.57	17.26	Over Capacity	(0.00)
83	Retention	2	2.2			Combined w/ Basin 31			Over Capacity	
84	Detention	2.5	2.8	0.63	0.74	12.09	54.98	12.86	Over Capacity	(0.11)
85	Detention	2.5	2.9			Combined w/ Basin 84			Over Capacity	
86	Retention	1.5	2.2			Combined w/ Basin 31			Over Capacity	
87	Retention	2	2.1	0.14	0.16	1.67	18.80	0.00	Over Capacity	(0.02)
88	Retention	3	3.1	1.60	1.64	1.64	9.63	0.00	Over Capacity	(0.04)
89	Infiltration	1	1.0	0.20	0.21	0.75	6.60	0.12	Over Capacity	(0.01)
90	Infiltration	1	1.1	0.24	0.26	0.94	8.13	0.16	Over Capacity	(0.02)
91	Infiltration	1	1.1	0.38	0.47	2.23	17.39	0.27	Over Capacity	(0.09)
92	Retention	2	2.4	0.23	0.2	28.37	58.49	0.00	Over Capacity	(0.03)
93	Retention	2	2.4			Route to Basin 92			Over Capacity	

Table 3.1.b Model & Analysis Results - Existing (Reaches)

Hydrologic Element	Drainage Area (mi2)	Peak Discharge (cfs)	Conveyance Capacity per City Codes	Adequate Capacity	Type	Diameter (feet)	Width (feet)	Side Slope (H:V)	Slope (ft/ft)
Reach-101b	0.2252	35.8	6.852	No	Circle	1.5			0.004
Reach-102b	6.4552	433.9	268.7	No	Circle	5			0.01
Reach-102c	6.4552	436.8	80.21	No	Trapezoid		6	2	0.01
Reach-103c	1.0668	78.0	43.52	No	Circle	3			0.004
Reach-106b	0.0586	6.1	2.324	No	Circle	1			0.004
Reach-10c	0.8542	73.7	65.05	No	Trapezoid		3	1.5	0.004
Reach-111b	0.036	9.1	6.852	No	Circle	1.5			0.004
Reach-112b	0.1348	14.8	6.852	No	Circle	1.5			0.004
Reach-119b	0.41	28.8	14.76	No	Circle	2			0.004
Reach-15d	5.6987	355.4	80.21	No	Trapezoid		6	2	0.01
Reach-18b	5.2663	320.7	80.21	No	Trapezoid		6	2	0.01
Reach-20b	5.2592	319.6	80.21	No	Trapezoid		6	2	0.01
Reach-21b	0.5366	81.6	26.76	No	Circle	2.5			0.004
Reach-21c	0.5366	82.8	65.05	No	Trapezoid		3	1.5	0.004
Reach-23b	0.4935	76.9	26.76	No	Circle	2.5			0.004
Reach-24b	4.717	238.7	80.21	No	Trapezoid		6	2	0.01
Reach-25b	0.2115	25.0	14.76	No	Circle	2			0.004
Reach-26c	0.4471	69.3	65.05	No	Trapezoid		3	1.5	0.004
Reach-28b	0.0122	63.1	4.214	No	Circle	1.25			0.004
Reach-29c	0.6254	130.2	65.05	No	Trapezoid		3	1.5	0.004
Reach-29d	0.6254	186.4	113.5	No	Trapezoid		6	2	0.004
Reach-30c	0.5157	100.6	65.05	No	Trapezoid		3	1.5	0.004
Reach-31b	0.5157	9.8	4.214	No	Circle	1.25			0.004
Reach-32b	0.1011	3.5	0.799	No	Circle	0.67			0.004
Reach-38b	0.0451	25.9	14.76	No	Circle	2			0.004
Reach-3b	0.1782	32.1	4.214	No	Circle	1.25			0.004
Reach-44b	0.5089	48.9	6.852	No	Circle	1.5			0.004
Reach-4b	0.1406	28.2	6.85	No	Circle	1.5			0.004
Reach-50b	0.2133	14.2	2.32	No	Circle	1			0.004
Reach-51b	0.2652	27.4	14.76	No	Circle	2			0.004
Reach-51d	0.2709	28.1	14.76	No	Circle	2			0.004
Reach-53b	0.2684	24.4	14.76	No	Circle	2			0.004
Reach-57b	1.8686	123.5	43.52	No	Circle	3			0.004
Reach-67b	0.3402	14.7	6.852	No	Circle	1.5			0.004
Reach-6b	0.021	8.7	2.324	No	Circle	1			0.004
Reach-71b	0.0879	11.2	2.324	No	Circle	1			0.004
Reach-73b	0.0944	23.6	2.324	No	Circle	1			0.004
Reach-79b	0.0705	9.9	6.852	No	Circle	1.5			0.004
Reach-83b	0.4163	103.5	26.76	No	Circle	2.5			0.004
Reach-83c	0.4483	112.0	65.05	No	Trapezoid		3	1.5	0.004
Reach-86b	0.3663	33.4	6.852	No	Circle	1.5			0.004
Reach-91b	3.6313	162.3	80.21	No	Trapezoid		6	2	0.01
Reach-98b	0.8748	74.7	6.852	No	Circle	1.5			0.004
Reach-98c	0.8748	74.6	65.05	No	Trapezoid		3	1.5	0.004
Reach-108b	0.1038	7.5	6.852	Yes	Circle	1.5			0.004
Reach-26b	0.2115	68.8	4.214	Yes	Circle	1.25			0.004
Reach-29b	0.2515	130.2	128.3	Yes	Circle	4.5			0.004
Reach-36b	0.2234	8.9	2.324	Yes	Circle	1			0.004
Reach-47b	0.0134	5.4	4.214	Yes	Circle	1.25			0.004
Reach-103b	0.8558	59.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-104b	0.0334	3.6	6.852	Yes	Circle	1.5			0.004
Reach-105b	0.0137	4.8	43.52	Yes	Circle	3			0.004
Reach-105c	0.0137	4.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-105d	0.0578	5.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-107b	0.2142	40.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-108c	0.1038	7.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-108d	0.1248	10.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-10b	0.8542	74.8	152.7	Yes	Rectangle		6	NA	0.004
Reach-110b	0.032	13.4	26.76	Yes	Circle	2.5			0.004
Reach-110c	0.032	12.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-111c	0.036	8.9	14.76	Yes	Circle	2			0.004
Reach-111d	0.036	8.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-112c	0.1348	14.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-113b	0.016	7.5	14.76	Yes	Circle	2			0.004
Reach-115b	0.1203	10.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-116b	0.0032	1.5	6.852	Yes	Circle	1.5			0.004
Reach-117b	0.0287	5.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-118b	0.0165	0.3	2.324	Yes	Circle	1			0.004
Reach-120b	0.1394	10.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-121b	0.0313	2.9	3.532	Yes	Circle	1.17			0.004
Reach-122b	0.0136	0.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-12b	0.0052	1.9	4.214	Yes	Circle	1.25			0.004
Reach-15a	0.3226	8.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-15b	0.0617	8.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-15c	0.3278	32.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-19b	0.0269	2.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-19c	0.0269	2.6	4.214	Yes	Circle	1.25			0.004
Reach-1b	0.0145	1.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-22b	0.0216	2.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-25c	0.2115	25.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-27b	0.4471	1.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-28c	0.2515	62.8	65.05	Yes	Trapezoid		3	1.5	0.004

Reach-30b	4.2567	100.3	103.8	Yes	Circle	3.5			0.01
Reach-31c	0.0391	11.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-32c	0.062	3.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-33b	0.062	19.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-34b	0.211	20.7	26.76	Yes	Circle	2.5			0.004
Reach-34c	0.2234	21.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-37b	0.1207	1.3	6.852	Yes	Circle	1.5			0.004
Reach-39b	0.0084	0.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-41b	0.0424	1.3	6.85	Yes	Circle	1.5			0.004
Reach-42b	0.1687	23.8	43.52	Yes	Circle	3			0.004
Reach-42c	0.1687	24.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-43b	0.0683	13.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-45b	0.035	8.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-46b	0.0202	2.1	1382	Yes	Trapezoid		25	2	0.01
Reach-48b	0.0181	1.4	6.852	Yes	Circle	1.5			0.004
Reach-49b	0.0589	5.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-4c	0.1438	29.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-50c	0.2133	14.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-51c	0.2652	27.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-51e	0.6838	56.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-52b	0.695	40.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-52c	0.695	39.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-54b	13.5111	284.3	1382	Yes	Trapezoid		25	2	0.01
Reach-55b	0.2415	0.8	1382	Yes	Trapezoid		25	2	0.01
Reach-55c	0.2688	2.5	1382	Yes	Trapezoid		25	2	0.01
Reach-56b	0.0476	1.9	2.324	Yes	Circle	1			0.004
Reach-58b	0.0072	0.4	6.852	Yes	Circle	1.5			0.004
Reach-58c	0.0072	0.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-59b	0.2183	20.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-5b	0.063	8.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-60b	0.027	2.2	6.852	Yes	Circle	1.5			0.004
Reach-61b	0.0171	4.8	65.65	Yes	Circle	3.5			0.004
Reach-61c	0.0171	4.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-62b	0.76	58.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-63b	0.2214	7.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-64b	0.1667	16.4	26.76	Yes	Circle	2.5			0.004
Reach-65b	0.2216	23.7	26.76	Yes	Circle	2.5			0.004
Reach-65c	0.2216	22.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-67c	0.3402	14.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-68b	0.1413	8.6	14.76	Yes	Circle	2			0.004
Reach-68c	0.1413	8.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-69b	0.0441	1.9	6.852	Yes	Circle	1.5			0.004
Reach-69c	0.0441	1.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-6c	0.021	8.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-70b	0.0408	2.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-71c	0.2409	33.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-72b	0.0102	2.1	2.324	Yes	Circle	1			0.004
Reach-72c	0.0102	2.1	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-73c	0.0944	22.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-73d	0.153	24.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-74b	0.1072	3.1	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-75b	0.0729	5.3	26.76	Yes	Circle	2.5			0.004
Reach-76b	0.3151	18.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-76c	0.3151	20.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-77b	13.4899	283.8	1382	Yes	Trapezoid		25	2	0.01
Reach-7b	0.0453	1.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-80b	0.5663	16.8	1382	Yes	Trapezoid		25	2	0.01
Reach-81b	0.0899	11.0	26.76	Yes	Circle	2.5			0.004
Reach-81c	0.135	10.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-84b	0.0151	0.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-85b	0.5092	13.9	1382	Yes	Trapezoid		25	2	0.01
Reach-87b	0.0134	0.5	2.324	Yes	Circle	1			0.004
Reach-88b	0.0039	3.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-89b	0.1697	6.4	65.65	Yes	Circle	3.5			0.004
Reach-89c	0.1697	6.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-8b	0.0438	10.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-90b	0.1665	5.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-92b	0.0382	3.6	6.852	Yes	Circle	1.5			0.004
Reach-92c	0.0382	3.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-93b	0.0845	1.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-93c	0.0845	1.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-94b	0.0168	1.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-95b	0.0252	0.8	65.65	Yes	Circle	3.5			0.004
Reach-95c	0.0252	0.8	65.65	Yes	Circle	3.5			0.004
Reach-95d	0.0252	0.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-96b	0.0392	0.0	1382	Yes	Trapezoid		25	2	0.01
Reach-97b	0.0594	5.2	14.76	Yes	Circle	2			0.004
Reach-97c	0.1942	19.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-9b	6.5152	441.4	1423.00	Yes	Rectangle		8.5	NA	0.01

Table 3.2.a Model & Analysis Results - Proposed (Basins)

Basin ID	Basin Type	Depth (ft)	Peak Depth (ft)	Total Volume (ac-ft)	Peak Storage (ac-ft)	Discharge Volume (ac-ft)	Peak Discharge Rate (cfs)	Allowable Peak Discharge Rate (cfs)	Status	Surplus / Deficit (ac-ft)
1	Detention	1.5	N/A	0.14		Eliminate Basin 1		0.90	Below Capacity	
2	Detention	2	1.0	0.38	0.2	0.43	0.52	1.00	Below Capacity	0.18
3	Detention	2	1.6			Combined w/ Basin 3&4&7			Below Capacity	
4	Detention	2	1.6	4.78	3.84	12.74	21.51	26.77	Below Capacity	0.94
5	Detention	2.5	2.6	0.69	0.71	2.06	10.87	4.01	Over Capacity	(0.02)
6	Detention	2	2.2	0.97	1.06	6.85	35.09	14.43	Over Capacity	(0.09)
7	Detention	2	1.6			Combined w/ Basin 3&4&7			Below Capacity	
8	Detention	2.5	2.7	0.96	1.03	6.36	25.87	6.34	Over Capacity	(0.07)
9	Retention	1	1.2			Route to Basin 10			Over Capacity	
10	Retention	1.25	1.3	1.36	1.6	2.95	21.99	0.00	Over Capacity	(0.24)
11	Detention	2	1.6	0.29	0.23	0.48	0.71	0.90	Below Capacity	0.06
12	Detention	1.75	1.8	0.73	0.74	1.77	5.13	2.73	Over Capacity	(0.01)
13	Detention	1.75	1.8	0.60	0.63	1.93	12.67	2.81	Over Capacity	(0.03)
14	Detention	2	2.0	0.71	0.72	2.09	7.64	3.46	Over Capacity	(0.01)
15	Detention	2	2.2	0.66	0.72	2.73	26.53	4.37	Over Capacity	(0.06)
16	Retention	1	1.1	0.08	0.09	0.81	9.97	0.00	Over Capacity	(0.01)
17	Retention	2	2.1	1.09	1.16	2.08	13.69	0.00	Over Capacity	(0.07)
18	Detention	2	2.0	2.14	2.18	9.49	16.93	12.64	Over Capacity	(0.04)
19	Detention	2	1.0			Route to Basin 18			Below Capacity	
20	Detention	2	1.1			Combined w/ Basin 21			Over Capacity	
21	Detention	2	2.1	0.97	1	3.62	15.19	7.51	Over Capacity	(0.03)
22	Detention	3	3.2	0.17	0.18	0.74	24.26	1.84	Over Capacity	(0.01)
23	Retention	4	4.3	0.35	0.37	9.13	38.34	0.00	Over Capacity	(0.02)
24	Detention	3	3.2	0.60	0.64	6.47	26.84	5.89	Over Capacity	(0.04)
25	Detention	2	2.2	0.17	0.19	3.92	29.17	4.25	Over Capacity	(0.02)
26	Retention	2.5	2.7	0.40	0.43	5.91	23.85	0.00	Over Capacity	(0.03)
27	Detention	3	1.6	1.53	0.81	2.21	3.49	6.60	Below Capacity	0.72
28	Retention	2	2.1	0.35	0.36	0.81	7.22	0.00	Over Capacity	(0.01)
29	Detention	2	1.4	0.28	0.19	0.44	0.67	0.96	Below Capacity	0.09
30	Retention	4	4.0	0.20	0.19	0.37	6.15	0.00	Over Capacity	(0.01)
31	Retention	1.5	2.2	0.33	0.37	2.41	25.78	0.00	Over Capacity	(0.04)
32	Detention	1.75	1.8	0.57	0.6	2.89	15.64	6.04	Over Capacity	(0.03)
33	Detention	3	2.1	1.47	1.05	2.48	3.75	5.25	Below Capacity	0.42
34	Detention	2.25	2.3			Route to Basin 63			Over Capacity	
35	Detention	2	2.0			Combined w/ Basin 74			Over Capacity	
36	Detention	2	2.0	0.18	0.18	0.71	3.17	0.37	Over Capacity	(0.00)
37	Detention	2	2.0	0.03	0.03	1.57	7.62	3.96	Over Capacity	(0.00)
38	Detention	2	2.0	0.07	0.07	0.45	4.22	0.48	Over Capacity	(0.00)
39	Detention	3	3.1	0.78	0.79	2.15	11.96	3.50	Over Capacity	(0.01)
40	Detention	2	2.0			Route to Basin 41			Over Capacity	
41	Detention	1.5	2.0	0.32	0.32	0.98	3.21	2.34	Over Capacity	(0.00)
42	Detention	2.5	2.5	1.20	1.22	3.17	9.75	4.87	Over Capacity	(0.02)
43	Detention	2.5	2.5			Route to Basin 42			Over Capacity	
44	Detention	2.5	2.5			Route to Basin 42			Over Capacity	
45	Detention	2.5	2.5			Route to Basin 42			Over Capacity	
46	Retention	2.5	2.5			Route to Basin 42			Over Capacity	
47	Retention	2.5	2.5			Route to Basin 42			Over Capacity	
48	Detention	2.5	2.5			Route to Basin 42			Over Capacity	
49	Retention	2.5	2.5			Route to Basin 42			Over Capacity	
50	Detention	2	1.1			Route to Basin 79			Below Capacity	
51	Detention	2	2.0	0.41	0.41	1.50	5.41	3.45	Over Capacity	(0.00)
52	Detention	2.75	2.4			Route to Basin 53			Below Capacity	
53	Detention	2.75	2.4	1.51	1.32	2.45	2.06	2.34	Below Capacity	0.19
54	Detention	2	2.0	0.06	0.06	2.73	10.44	7.52	Over Capacity	(0.00)
55	Detention	2	2.0	0.05	0.05	2.30	7.31	6.92	Over Capacity	(0.00)
56	Detention	2	2.1	0.18	0.19	2.34	20.20	5.03	Over Capacity	(0.01)
57	Detention	2	2.1			Route to Basin 56			Over Capacity	
58	Detention	1	2.1			Route to Basin 56			Over Capacity	
59	Detention	1.75	2.0			Route to Basin 8			Over Capacity	

60	Retention	2	2.0	0.28	0.28	0.28	2.05	0.00	Over Capacity	(0.00)
61	Detention	2	1.8	0.06	0.06	0.15	0.34	0.37	Below Capacity	0.00
62	Detention	2	2.0	0.19	0.19	0.51	3.68	0.71	Over Capacity	(0.00)
63	Detention	2.25	2.3	0.58	0.58	1.29	2.63	1.86	Over Capacity	(0.00)
64	Detention	2.25	2.4	1.20	1.3	4.91	28.38	8.31	Over Capacity	(0.10)
65	Detention	2.25	2.3			Route to Basin 64			Over Capacity	
66	Retention	1.75	1.9			Route to Basin 64			Over Capacity	
67	Retention	2.25	2.3			Route to Basin 64			Over Capacity	
68	Retention	2.25	2.3			Route to Basin 64			Over Capacity	
69	Retention	2.25	2.3			Route to Basin 64			Over Capacity	
70	Retention	2.25	2.3			Route to Basin 64			Over Capacity	
71	Detention	1.75	1.8			Combined w/ Basin 72			Over Capacity	
72	Detention	1.75	1.8	0.23	0.24	1.11	10.15	1.70	Over Capacity	(0.01)
73	Detention	1.75	1.8			Combined w/ Basin 72			Over Capacity	
74	Detention	2	2.0	0.23	0.23	0.80	7.01	1.56	Over Capacity	(0.00)
75	Detention	3	3.0	0.19	0.19	2.91	11.65	9.37	Over Capacity	(0.00)
76	Detention	2	1.2			Route to Basin 77			Below Capacity	
77	Detention	1.75	1.2	2.75	1.95	3.51	3.87	5.46	Below Capacity	0.80
78	Detention	1.5	1.2			Route to Basin 77			Below Capacity	
79	Detention	3	1.1	2.22	1.23	2.58	3.15	5.66	Below Capacity	0.99
80	Detention	3	1.1			Route to Basin 79			Below Capacity	
81	Detention	1.5	1.6			Route to Basin 56			Over Capacity	
82	Detention	1.5	1.6	0.10	0.1	6.81	26.57	17.26	Over Capacity	(0.00)
83	Retention	2	2.2			Combined w/ Basin 31			Over Capacity	
84	Detention	2.5	2.8	0.63	0.74	12.09	54.98	12.86	Over Capacity	(0.11)
85	Detention	2.5	2.9			Combined w/ Basin 84			Over Capacity	
86	Retention	1.5	2.2			Combined w/ Basin 31			Over Capacity	
87	Retention	2	2.1	0.14	0.16	1.67	18.80	0.00	Over Capacity	(0.02)
88	Retention	3	3.1	1.60	1.64	1.64	9.63	0.00	Over Capacity	(0.04)
89	Infiltration	1	1.0	0.20	0.21	0.75	6.60	0.12	Over Capacity	(0.01)
90	Infiltration	1	1.1	0.24	0.26	0.94	8.13	0.16	Over Capacity	(0.02)
91	Infiltration	1	1.1	0.38	0.47	2.23	17.39	0.27	Over Capacity	(0.09)
92	Retention	2	2.4	0.23	0.2	28.37	58.49	0.00	Over Capacity	(0.03)
93	Retention	2	2.4			Route to Basin 92			Over Capacity	
94	Detention	3	1.2	20.36	8.33	13.74	11.47	28.03	Below Capacity	12.03
95	Detention	3	0.9	18.44	5.52	3.92	2.25	7.52	Below Capacity	12.92
96	Detention	3	1.2	45.52	18.02	16.35	9.88	24.96	Below Capacity	27.50

Table 3.2.b Model & Analysis Results - Proposed (Reaches)

Hydrologic Element	Drainage Area (mi2)	Peak Discharge (cfs)	Conveyance Capacity per City Codes	Adequate Capacity	Type	Diameter (feet)	Width (feet)	Side Slope (H:V)	Slope (ft/ft)
Reach-101b	0.2252	32.4	6.852	No	Circle	1.5			0.004
Reach-102b	6.4553	358.5	268.7	No	Circle	5			0.010
Reach-102c	6.4553	357.6	80.21	No	Trapezoid		6	2	0.010
Reach-103c	0.9003	76.5	43.52	No	Circle	3			0.004
Reach-106b	0.0586	6.1	2.324	No	Circle	1			0.004
Reach-10c	0.8784	75.5	65.05	No	Trapezoid		3	1.5	0.004
Reach-111b	0.036	9.1	6.852	No	Circle	1.5			0.004
Reach-112b	0.1348	14.8	6.852	No	Circle	1.5			0.004
Reach-119b	0.41	29.6	14.76	No	Circle	2			0.004
Reach-15d	5.6988	276.3	80.21	No	Trapezoid		6	2	0.010
Reach-18b	5.2663	254.2	80.21	No	Trapezoid		6	2	0.010
Reach-20b	5.2592	253.1	80.21	No	Trapezoid		6	2	0.010
Reach-24b	4.717	238.7	80.21	No	Trapezoid		6	2	0.010
Reach-25b	0.2115	71.3	14.76	No	Circle	2			0.004
Reach-25c	0.2115	70.9	65.05	No	Trapezoid		3	1.5	0.004
Reach-26b	0.4471	6.3	4.214	No	Circle	1.25			0.004
Reach-28b	0.2515	63.1	4.214	No	Circle	1.25			0.004
Reach-29c	0.6254	130.2	65.05	No	Trapezoid		3	1.5	0.004
Reach-29d	4.2567	186.4	113.5	No	Trapezoid		6	2	0.004
Reach-30b	0.5157	100.3	65.68	No	Circle	3.5			0.004
Reach-30c	0.5157	100.6	65.05	No	Trapezoid		3	1.5	0.004
Reach-31b	0.0391	9.8	4.214	No	Circle	1.25			0.004
Reach-32b	0.062	3.5	0.799	No	Circle	0.67			0.004
Reach-3b	0.1541	23.0	4.214	No	Circle	1.25			0.004
Reach-44b	0.5088	35.7	6.852	No	Circle	1.5			0.004
Reach-4b	0.1165	19.3	6.852	No	Circle	1.5			0.004
Reach-50b	0.2133	14.2	2.324	No	Circle	1			0.004
Reach-51b	0.2652	27.4	14.76	No	Circle	2			0.004
Reach-51d	0.2709	28.1	14.76	No	Circle	2			0.004
Reach-53b	0.2684	24.4	14.76	No	Circle	2			0.004
Reach-57b	1.7021	121.0	43.52	No	Circle	3			0.004
Reach-67b	0.1737	11.3	6.852	No	Circle	1.5			0.004
Reach-6b	0.021	8.7	2.324	No	Circle	1			0.004
Reach-71b	0.0879	11.2	2.324	No	Circle	1			0.004
Reach-73b	0.0944	23.6	2.324	No	Circle	1			0.004
Reach-79b	0.0705	9.9	6.852	No	Circle	1.5			0.004
Reach-83b	0.4163	103.5	26.76	No	Circle	2.5			0.004
Reach-83c	0.4483	112.0	65.05	No	Trapezoid		3	1.5	0.004
Reach-86b	0.3662	25.6	6.852	No	Circle	1.5			0.004
Reach-86c	0.3662	25.6	6.852	No	Circle	1.5			0.004
Reach-91b	3.6313	162.3	80.21	No	Trapezoid		6	2	0.010
Reach-98b	0.899	76.6	6.852	No	Circle	1.5			0.004
Reach-98c	0.899	77.1	65.05	No	Trapezoid		3	1.5	0.004
Reach-29b	0.6254	130.2	128.3	Yes	Circle	4.5			0.004
Reach-36b	0.1207	8.9	2.324	Yes	Circle	1			0.004
Reach-47b	0.0134	5.4	4.214	Yes	Circle	1.25			0.004
Reach-87b	0.1799	6.4	2.324	Yes	Circle	1			0.004
Reach-103b	0.6893	58.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-104b	0.0334	3.6	6.852	Yes	Circle	1.5			0.004
Reach-105b	0.0137	4.8	43.52	Yes	Circle	3			0.004
Reach-105c	0.0137	4.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-105d	0.0578	5.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-107b	0.1901	31.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-108b	0.1038	1.5	6.852	Yes	Circle	1.5			0.004
Reach-108c	0.1038	1.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-108d	0.1248	9.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-10b	0.8784	75.5	152.7	Yes	Rectangle		6		0.004
Reach-110b	0.032	13.4	26.76	Yes	Circle	2.5			0.004
Reach-110c	0.032	12.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-111c	0.036	8.9	14.76	Yes	Circle	2			0.004
Reach-111d	0.036	8.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-112c	0.1348	14.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-113b	0.016	7.5	14.76	Yes	Circle	2			0.004
Reach-115b	0.1203	10.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-116b	0.0032	1.5	6.852	Yes	Circle	1.5			0.004
Reach-117b	0.0287	5.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-118b	0.0165	0.3	2.324	Yes	Circle	1			0.004
Reach-120b	0.1394	10.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-121b	0.0313	2.9	3.532	Yes	Circle	1.17			0.004
Reach-122b	0.0136	0.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-12b	0.0052	1.9	4.214	Yes	Circle	1.25			0.004
Reach-15a	0.0962	13.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-15b	0.0617	8.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-15c	0.3279	18.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-19b	0.0269	2.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-19c	0.0269	2.6	4.214	Yes	Circle	1.25			0.004
Reach-1b	0.0145	1.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-21b	0.5366	20.5	26.76	Yes	Circle	2.5			0.004
Reach-21c	0.5366	20.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-22b	0.0216	2.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-23b	0.4935	17.3	26.76	Yes	Circle	2.5			0.004
Reach-26c	0.4471	6.2	65.05	Yes	Trapezoid		3	1.5	0.004

Reach-27b	0.0122	1.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-28c	0.2515	62.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-31c	0.1011	11.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-32c	0.062	3.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-33b	0.211	19.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-34b	0.2234	20.7	26.76	Yes	Circle	2.5			0.004
Reach-34c	0.2234	21.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-37b	0.0451	1.3	6.852	Yes	Circle	1.5			0.004
Reach-38b	0.2265	7.3	14.76	Yes	Circle	2			0.004
Reach-39b	0.0084	0.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-41b	0.0424	2.6	6.852	Yes	Circle	1.5			0.004
Reach-42b	0.1687	23.8	43.52	Yes	Circle	3			0.004
Reach-42c	0.1687	24.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-43b	0.0683	13.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-45b	0.035	8.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-46b	0.0202	2.1	1382	Yes	Trapezoid		25	2	0.010
Reach-48b	0.0181	1.4	6.852	Yes	Circle	1.5			0.004
Reach-49b	0.0589	5.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-4c	0.1197	20.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-50c	0.2133	14.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-51c	0.2652	27.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-51e	0.6838	56.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-51f	0.7118	58.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-52b	0.695	40.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-52c	0.695	39.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-54b	13.6776	284.5	1382	Yes	Trapezoid		25	2	0.010
Reach-55b	0.2415	0.8	1382	Yes	Trapezoid		25	2	0.010
Reach-55c	0.2688	2.5	1382	Yes	Trapezoid		25	2	0.010
Reach-56b	0.0476	1.9	2.324	Yes	Circle	1			0.004
Reach-58b	0.0072	0.4	6.852	Yes	Circle	1.5			0.004
Reach-58c	0.0072	0.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-59b	0.2183	20.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-5b	0.0389	0.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-60b	0.027	2.2	6.852	Yes	Circle	1.5			0.004
Reach-61b	0.0171	4.8	65.65	Yes	Circle	3.5			0.004
Reach-61c	0.0171	4.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-62b	0.7601	59.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-63b	0.2214	7.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-64b	0.1667	16.4	26.76	Yes	Circle	2.5			0.004
Reach-65b	0.2216	23.7	26.76	Yes	Circle	2.5			0.004
Reach-65c	0.2216	22.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-67c	0.1737	11.1	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-68b	0.1413	8.6	14.76	Yes	Circle	2			0.004
Reach-68c	0.1413	8.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-69b	0.0441	1.9	6.852	Yes	Circle	1.5			0.004
Reach-69c	0.0441	1.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-6c	0.021	8.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-70b	0.0408	2.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-71c	0.2409	33.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-72b	0.0102	2.1	2.324	Yes	Circle	1			0.004
Reach-72c	0.0102	2.1	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-73c	0.0944	22.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-73d	0.153	24.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-74b	0.1072	3.1	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-75b	0.0729	5.3	26.76	Yes	Circle	2.5			0.004
Reach-76b	0.3151	18.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-76c	0.3151	20.6	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-77b	13.6564	283.9	1382	Yes	Trapezoid		25	2	0.010
Reach-7b	0.0453	1.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-80b	0.7328	22.6	1382	Yes	Trapezoid		25	2	0.010
Reach-81b	0.0899	11.0	26.76	Yes	Circle	2.5			0.004
Reach-81c	0.135	10.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-84b	0.0151	0.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-85b	0.5092	13.9	1382	Yes	Trapezoid		25	2	0.010
Reach-88b	0.0039	3.8	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-89b	0.1697	6.4	65.65	Yes	Circle	3.5			0.004
Reach-89c	0.1697	6.2	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-8b	0.0197	10.3	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-90b	0.1665	5.7	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-92b	0.0382	3.6	6.852	Yes	Circle	1.5			0.004
Reach-92c	0.0382	3.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-93b	0.0845	1.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-93c	0.0845	1.4	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-94b	0.0168	1.0	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-95b	0.0252	0.8	65.65	Yes	Circle	3.5			0.004
Reach-95c	0.0252	0.8	65.65	Yes	Circle	3.5			0.004
Reach-95d	0.0252	0.9	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-96b	0.0392	0.0	1382	Yes	Trapezoid		25	2	0.010
Reach-97b	0.0594	5.2	14.76	Yes	Circle	2			0.004
Reach-97c	0.1942	19.5	65.05	Yes	Trapezoid		3	1.5	0.004
Reach-9b	6.5153	362.2	1423	Yes	Rectangle		8.5		0.010

Table 3.4. Conveyance Capacity of Pipe Storm Drain System

Open Channels		**Manning's n = 0.045**			
Channel Type	Bottom Width (feet)	Maximum Depth (feet)	Side Slope (H:V)	Longitutial Slope (ft/ft)	Maximum Capacity (cfs)
Regular Channels	3	3	1.5 : 1	0.004	102.9
Hyrum Slough	6	3	2 : 1	0.01	179.5
Blacksmith Fork River	25	10	2 : 1	0.01	5155

Notes:
The maximum capacity occurs when the peak flow hits the assumed maximum depth for the channels.

n = 0.013	Slope (ft/ft)	0.001
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	0.395	0.412
12	1.164	1.215
15	2.111	2.202
18	3.432	3.581
24	7.39	7.71
30	13.40	13.98
36	21.79	22.74
42	32.87	34.30
48	46.93	48.97
54	64.3	67.0
60	85.1	88.8
66	109.7	114.5
72	138.4	144.4

n = 0.013	Slope (ft/ft)	0.002
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	0.558	0.583
12	1.646	1.718
15	2.985	3.114
18	4.854	5.065
24	10.453	10.907
30	18.953	19.776
36	30.819	32.158
42	46.488	48.507
48	66.373	69.255
54	90.865	94.811
60	120.342	125.568
66	155.166	161.905
72	195.689	204.188

n = 0.013	Slope (ft/ft)	0.003
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	0.684	0.714
12	2.016	2.104
15	3.656	3.814
18	5.945	6.203
24	12.802	13.358
30	23.212	24.220
36	37.746	39.385
42	56.937	59.409
48	81.290	84.820
54	111.287	116.120
60	147.388	153.789
66	190.039	198.293
72	239.670	250.078

n = 0.013	Slope (ft/ft)	0.004
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	0.790	0.824
12	2.328	2.429
15	4.221	4.405
18	6.864	7.162
24	14.78	15.42
30	26.80	27.97
36	43.58	45.48
42	65.74	68.60
48	93.87	97.94
54	128.5	134.1
60	170.2	177.6
66	219.4	229.0
72	276.7	288.8

n = 0.013	Slope (ft/ft)	0.005
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	0.883	0.921
12	2.603	2.716
15	4.719	4.924
18	7.674	8.008
24	16.528	17.246
30	29.967	31.268
36	48.729	50.846
42	73.505	76.697
48	104.945	109.502
54	143.670	149.910
60	190.277	198.541
66	245.340	255.995
72	309.412	322.850

n = 0.013	Slope (ft/ft)	0.006
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	0.967	1.009
12	2.851	2.975
15	5.170	5.394
18	8.407	8.772
24	18.105	18.892
30	32.827	34.253
36	53.380	55.699
42	80.520	84.017
48	114.961	119.954
54	157.383	164.218
60	208.439	217.491
66	268.756	280.428
72	338.944	353.664

n = 0.013	Slope (ft/ft)	0.007
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.045	1.090
12	3.080	3.214
15	5.584	5.827
18	9.080	9.475
24	19.56	20.41
30	35.46	37.00
36	57.66	60.16
42	86.97	90.75
48	124.17	129.57
54	170.0	177.4
60	225.1	234.9
66	290.3	302.9
72	366.1	382.0

n = 0.013	Slope (ft/ft)	0.008
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.117	1.165
12	3.293	3.436
15	5.970	6.229
18	9.707	10.129
24	20.906	21.814
30	37.905	39.552
36	61.638	64.315
42	92.977	97.015
48	132.746	138.511
54	181.730	189.623
60	240.684	251.137
66	310.333	323.811
72	391.379	408.376

n = 0.013	Slope (ft/ft)	0.009
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.184	1.236
12	3.492	3.644
15	6.332	6.607
18	10.296	10.743
24	22.174	23.137
30	40.205	41.951
36	65.377	68.217
42	98.617	102.900
48	140.798	146.913
54	192.754	201.125
60	255.284	266.371
66	329.158	343.453
72	415.120	433.148

n = 0.013	Slope (ft/ft)	0.010
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.249	1.303
12	3.681	3.841
15	6.674	6.964
18	10.853	11.325
24	23.37	24.39
30	42.38	44.22
36	68.91	71.91
42	103.95	108.47
48	148.41	154.86
54	203.2	212.0
60	269.1	280.8
66	347.0	362.0
72	437.6	456.6

n = 0.013	Slope (ft/ft)	0.011
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.309	1.366
12	3.861	4.028
15	7.000	7.304
18	11.383	11.877
24	24.515	25.579
30	44.448	46.378
36	72.277	75.416
42	109.025	113.760
48	155.658	162.418
54	213.098	222.352
60	282.227	294.484
66	363.898	379.702
72	458.932	478.864

n = 0.013	Slope (ft/ft)	0.012
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.368	1.427
12	4.032	4.208
15	7.311	7.629
18	11.889	12.405
24	25.605	26.717
30	46.424	48.441
36	75.491	78.770
42	113.873	118.819
48	162.580	169.640
54	222.573	232.240
60	294.777	307.579
66	380.079	396.585
72	479.339	500.157

HDPE Pipe (n = 0.013)	0.013
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.424	1.485
12	4.197	4.379
15	7.610	7.940
18	12.375	12.912
24	26.65	27.81
30	48.32	50.42
36	78.57	81.99
42	118.52	123.67
48	169.22	176.57
54	231.7	241.7
60	306.8	320.1
66	395.6	412.8
72	498.9	520.6

HDPE Pipe (n = 0.013)	0.014
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.477	1.541
12	4.356	4.545
15	7.897	8.240
18	12.842	13.399
24	27.656	28.857
30	50.144	52.322
36	81.540	85.081
42	122.997	128.339
48	175.606	183.233
54	240.407	250.847
60	318.395	332.223
66	410.532	428.361
72	517.746	540.231

HDPE Pipe (n = 0.013)	0.015
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.529	1.596
12	4.508	4.704
15	8.174	8.529
18	13.292	13.870
24	28.627	29.870
30	51.904	54.158
36	84.402	88.067
42	127.314	132.843
48	181.770	189.664
54	248.844	259.652
60	329.570	343.883
66	424.941	443.396
72	535.918	559.192

n = 0.013	Slope (ft/ft)	0.016
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.579	1.648
12	4.656	4.859
15	8.442	8.809
18	13.728	14.325
24	29.566	30.850
30	53.606	55.934
36	87.170	90.955
42	131.489	137.200
48	187.731	195.884
54	257.005	268.167
60	340.379	355.161
66	438.877	457.937
72	553.493	577.531

n = 0.013	Slope (ft/ft)	0.017
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.628	1.699
12	4.800	5.008
15	8.702	9.080
18	14.151	14.765
24	30.476	31.799
30	55.256	57.656
36	89.852	93.755
42	135.536	141.422
48	193.509	201.913
54	264.915	276.420
60	350.854	366.092
66	452.384	472.031
72	570.528	595.306

n = 0.013	Slope (ft/ft)	0.018
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.675	1.748
12	4.939	5.153
15	8.955	9.343
18	14.561	15.194
24	31.359	32.721
30	56.858	59.327
36	92.457	96.473
42	139.465	145.522
48	199.119	207.766
54	272.595	284.434
60	361.026	376.705
66	465.499	485.716
72	587.068	612.564

n = 0.013	Slope (ft/ft)	0.019
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.721	1.796
12	5.074	5.294
15	9.200	9.600
18	14.960	15.610
24	32.219	33.618
30	58.416	60.953
36	94.991	99.116
42	143.287	149.510
48	204.575	213.460
54	280.065	292.228
60	370.919	387.028
66	478.255	499.026
72	603.155	629.350

n = 0.013	Slope (ft/ft)	0.020
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.766	1.842
12	5.206	5.432
15	9.439	9.849
18	15.349	16.015
24	33.056	34.491
30	59.934	62.537
36	97.459	101.691
42	147.010	153.394
48	209.889	219.005
54	287.341	299.820
60	380.555	397.082
66	490.679	511.989
72	618.824	645.700

n = 0.013	Slope (ft/ft)	0.021
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.809	1.888
12	5.334	5.566
15	9.672	10.092
18	15.728	16.411
24	33.872	35.343
30	61.414	64.081
36	99.865	104.203
42	150.640	157.182
48	215.073	224.413
54	294.437	307.224
60	389.953	406.888
66	502.797	524.633
72	634.106	661.645

n = 0.013	Slope (ft/ft)	0.022
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.852	1.932
12	5.460	5.697
15	9.900	10.330
18	16.098	16.797
24	34.669	36.175
30	62.859	65.589
36	102.216	106.655
42	154.185	160.881
48	220.134	229.694
54	301.366	314.454
60	399.129	416.463
66	514.629	536.979
72	649.028	677.215

n = 0.013	Slope (ft/ft)	0.023
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.894	1.976
12	5.583	5.825
15	10.122	10.562
18	16.460	17.175
24	35.448	36.988
30	64.272	67.063
36	104.513	109.052
42	157.650	164.497
48	225.081	234.857
54	308.139	321.521
60	408.100	425.823
66	526.195	549.048
72	663.615	692.436

n = 0.013	Slope (ft/ft)	0.024
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.934	2.018
12	5.703	5.950
15	10.340	10.789
18	16.814	17.544
24	36.211	37.783
30	65.654	68.505
36	106.761	111.397
42	161.041	168.035
48	229.922	239.908
54	314.766	328.436
60	416.877	434.982
66	537.512	560.856
72	677.888	707.328

n = 0.013	Slope (ft/ft)	0.025
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	1.974	2.060
12	5.820	6.073
15	10.553	11.011
18	17.160	17.906
24	36.957	38.562
30	67.008	69.918
36	108.962	113.694
42	164.362	171.500
48	234.664	244.855
54	321.257	335.209
60	425.473	443.952
66	548.596	572.422
72	691.867	721.914

n = 0.013	Slope (ft/ft)	0.026
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.013	2.101
12	5.936	6.193
15	10.762	11.229
18	17.500	18.260
24	37.689	39.326
30	68.335	71.303
36	111.120	115.946
42	167.617	174.896
48	239.311	249.704
54	327.619	341.847
60	433.899	452.743
66	559.461	583.758
72	705.568	736.211

n = 0.013	Slope (ft/ft)	0.027
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.052	2.141
12	6.049	6.311
15	10.967	11.443
18	17.834	18.608
24	38.407	40.075
30	69.637	72.661
36	113.237	118.155
42	170.810	178.228
48	243.870	254.461
54	333.860	348.359
60	442.165	461.368
66	570.118	594.878
72	719.009	750.235

n = 0.013	Slope (ft/ft)	0.028
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.089	2.180
12	6.160	6.427
15	11.168	11.653
18	18.161	18.950
24	39.112	40.810
30	70.914	73.994
36	115.315	120.323
42	173.944	181.498
48	248.345	259.130
54	339.986	354.752
60	450.279	469.834
66	580.580	605.794
72	732.203	764.002

n = 0.013	Slope (ft/ft)	0.029
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.126	2.219
12	6.269	6.541
15	11.366	11.860
18	18.482	19.285
24	39.804	41.533
30	72.170	75.304
36	117.356	122.453
42	177.023	184.711
48	252.740	263.717
54	346.004	361.031
60	458.249	478.150
66	590.856	616.517
72	745.163	777.525

n = 0.013	Slope (ft/ft)	0.030
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.163	2.256
12	6.376	6.653
15	11.560	12.062
18	18.798	19.615
24	40.485	42.243
30	73.403	76.591
36	119.362	124.546
42	180.049	187.869
48	257.061	268.225
54	351.919	367.203
60	466.083	486.325
66	600.957	627.056
72	757.902	790.817

n = 0.013	Slope (ft/ft)	0.031
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.198	2.294
12	6.481	6.763
15	11.751	12.262
18	19.109	19.939
24	41.154	42.941
30	74.617	77.857
36	121.335	126.605
42	183.025	190.974
48	261.310	272.659
54	357.736	373.273
60	473.787	494.363
66	610.891	637.422
72	770.430	803.890

n = 0.013	Slope (ft/ft)	0.032
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.233	2.330
12	6.585	6.871
15	11.939	12.458
18	19.415	20.258
24	41.812	43.628
30	75.811	79.103
36	123.277	128.630
42	185.954	194.030
48	265.492	277.022
54	363.461	379.246
60	481.368	502.274
66	620.666	647.621
72	782.758	816.753

n = 0.013	Slope (ft/ft)	0.033
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.268	2.367
12	6.687	6.978
15	12.125	12.651
18	19.716	20.572
24	42.461	44.305
30	76.986	80.330
36	125.188	130.625
42	188.837	197.038
48	269.608	281.317
54	369.096	385.126
60	488.832	510.061
66	630.289	657.662
72	794.894	829.416

n = 0.013	Slope (ft/ft)	0.034
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.302	2.402
12	6.788	7.082
15	12.307	12.841
18	20.012	20.881
24	43.099	44.971
30	78.144	81.538
36	127.071	132.589
42	191.677	200.001
48	273.662	285.547
54	374.647	390.917
60	496.183	517.732
66	639.768	667.553
72	806.848	841.889

n = 0.013	Slope (ft/ft)	0.035
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.336	2.437
12	6.887	7.186
15	12.487	13.029
18	20.305	21.186
24	43.728	45.627
30	79.285	82.728
36	128.926	134.525
42	194.475	202.921
48	277.658	289.716
54	380.116	396.625
60	503.427	525.291
66	649.108	677.298
72	818.628	854.180

n = 0.013	Slope (ft/ft)	0.036
D (in)	0.85*D Flow	0.93*D Flow
	Compliance Flow (cfs)	Maximum Flow (cfs)
8	2.369	2.472
12	6.984	7.288
15	12.664	13.214
18	20.593	21.487
24	44.349	46.275
30	80.409	83.902
36	130.755	136.433
42	197.234	205.800
48	281.596	293.826
54	385.508	402.251
60	510.568	532.742
66	658.316	686.906
72	830.240	866.297

Table 3.5 Recommended Improvements for Reaches

SUNRISE ENGINEERING, INC.
CONSULTING ENGINEERS AND SURVEYORS

Project: Stormwater Master Plan - Capital Improvement Project List
Reaches

Project No:
Date:

Owner: Nibley City

By:

Project #	Reaches Project Description	Urgency(1 for lowest, 5 for highest)	Magnitude(1 for lowest, 5 for highest)	Priority(1 for lowest, 10 for highest)
1	Reach 10b: the west side of the box culvert needs to be cleaned up since it was blocked by a few black barrels.	5	4	9
2	Reach 86b: upsized from 18" to 30" @ 0.4% slope.	5	4	9
3	Reach 15d (Hyrum Slough): the peak flow is 3.7' & 5.57 ft/s @ 1.0% in 25-year storm event, and it needs to be upsized.	4	4	8
4	Reach 21b: upsized from 30" to 48" in the current case, and can be upsized only to 42" if Regional Pond #96 is constructed in Watershed 26.	4	4	8
5	Reach 23b: upsized from 30" to 48" in the current case. It can be omitted if Regional Pond #96 is constructed in Watershed 26.	4	4	8
6	Reach 57b: upsized from 36" to 54" @ 0.4% slope in 25-year storm event, and can be upsized only to 48" @ 1.0% slope.	4	4	8
7	Reach 102b (Hyrum Slough): upsized from 60" to 66" if the slope is over 1.0%, if it's flatter than 1%, the pipe needs to be upsized to 72".	4	4	8
8	Reach 38b: upsized from 24" to 30" in the current case. It can be omitted if Regional Pond #94 is constructed in Watershed 38.	4	4	8
9	Reach 86c: upsized from 18" to 30" @ 0.4% slope.	4	4	8
10	Reach 30b: upsized from 42" to 54" @ 0.4% slope.	4	4	8
11	Reach 4b: upsized from 18" to 30" @ 0.4% slope in 25-year storm event, and can be upsized only to 24" @ 1.0% slope.	4	3	7
12	Reach 18b (Hyrum Slough): the peak flow is 3.56' & 5.44 ft/s @ 1.0% in 25-year storm event, and it needs to be upsized.	4	3	7
13	Reach 20b (Hyrum Slough): the peak flow is 3.55' & 5.44 ft/s @ 1.0% in 25-year storm event, and it needs to be upsized.	4	3	7
14	Reach 21c: the City is planning to pipe this earthen caanal, a 42" pipe is needed.	4	3	7
15	Reach 25b: upsized from 24" to 30" in current case. If there is future development onsite with 111 cfs runoff (CN=80), this pipe shall be upsized to 48" @ 0.4% slope, or to 42" @ 1.0%.	3	4	7
16	Reach 26b: upsized from 15" to 48" in current case, or to 30" if a regional pond #96 was built in Watershed 26 due to future development (CN=85).	3	4	7
17	Reach 26c: the City is planning to pipe this earthen canal, a 30" pipe is needed.	3	4	7
18	Reach 102c (Hyrum Slough), the peak flow is 4.18' @ 5.96 ft/s in 25-year storm event, and it needs to be upsized.	4	3	7
19	Reach 111b: upsized from 18" to 24" at a 0.4% slope, but can remain unchanged at a 1.0% slope.	4	3	7
20	Reach 3b: upsized from 15" to 30" at a 0.4% slope in 25-year storm event, or to 24" at a 1.0% slope.	4	2	6
21	Reach 6b: upsized from 12" to 24" @ 0.4% slope in 25-year storm event, or to 18" @ 1.0% slope.	3	3	6
22	Reach 10c, the peak flow is 3.22' & 2.99 ft/s @ 0.4% in 25-year storm event, the City is planning to pipe this earthern canal with 48" HDPE.	3	3	6
23	Reach 28b: upsized from 15" to 42" @ 0.4% slope.	3	3	6
24	Reach 30c: the peak flow is 3.67' & 3.22 ft/s @ 0.4% slope in 25-year storm event, the City is planning to pipe this earthern canal with 54" HDPE.	3	3	6
25	Reach 44b: upsized from 18" to 36" @ 0.4% slope in 25-year storm event, or to 30" @ 1.0% slope.	3	3	6
26	Reach 50b: upsized from 12" to 24" @ 0.4% slope.	3	3	6
27	Reach 73b: upsized from 12" to 30" @ 0.4% slope.	4	2	6
28	Reach 24b (Hyrum Slough): the peak flow is 3.45' & 5.36 ft/s in 25-year storm event, and it needs to be upsized.	3	2	5
29	Reach 29d (Hyrum Slough): the peak flow is 3.06' & 5.03 ft/s @ 1.0% slope in 25-year storm event, and it needs to be upsized.	3	2	5
30	Reach 31b: upsized from 15" to 24" @ 0.4% slope in 25-year storm event, or to 18" @ 1.0% slope.	3	2	5
31	Reach 51b: upsized from 24" to 36" @ 0.4% slope in 25-year storm event, or to 30" @ 1.0% slope.	2	3	5
32	Reach 51d: upsized from 24" to 36" @ 0.4% slope in 25-year storm event, or to 30" @ 1.0% slope.	2	3	5
33	Reach 67b: upsized from 18" to 24" @ 0.4% slope.	2	3	5
34	Reach 71b: upsized from 12" to 24" @ 0.4% slope.	3	2	5
35	Reach 83b: upsized from 30" to 54" @ 0.4% slope in 25-year storm event, or to 42" @ 1.0% slope.	3	2	5
36	Reach 83c: the peak flow is 3.85' & 3.31 ft/s @ 0.4% slope in 25-year storm event, and it needs to be upsized.	3	2	5
37	Reach 98b: upsized from 18" to 48" @ 0.4% slope in 25-year storm event, or to 42" @ 1.0% slope.	3	2	5
38	Reach 101b: upsized from 18" to 36" @ 0.4% slope, or to 30" @ 1.0%.	2	3	5
39	Reach 119b shall be upsized from 24" to 36" @ 0.4% slope in 25-year storm event, and can be upsized only to 30" @ 1.0% slope.	2	3	5
40	Reach 29c: the peak flow is 4.12' & 3.44 ft/s @ 1.0% slope in 25-year storm event, it needs to be upsized.	2	2	4
41	Reach 32b: upsized from 8" to 18" @ 0.4% slope in 25-year storm event, or to 12" @ 1.0% slope.	2	2	4
42	Reach 106b: upsized from 12" to 18" @ 0.4% slope.	2	2	4
43	Reach 112b: upsized from 18" to 24" @ 0.4% slope.	2	2	4
44	Reach 53b: upsized from 24" to 30" @ 0.4% slope.	1	2	3
45	Reach 103c: upsized from 36" to 48" @ 0.4% slope in 25-year storm event, or to 42" @ 1.0% slope.	1	2	3
46	Reach 29b: the peak flow is 130.23 cfs in 25-year storm event, and it needs to be upsized to 54".	1	2	3
47	Reach 91b (Hyrum Slough): the peak flow is 2.86' & 4.84 ft/s @ 1.0% slope in 25-year storm event, and it needs to be upszied.	1	1	2
48	Reach 98c: the peak flow is 3.25' & 3.01 ft/s @ 0.4% slope in 25-year storm event, and it needs to be upszied.	1	1	2
49	Reach 79b: upsized from 18" to 24" @ 0.4% slope in 25-year storm event, or to 18" @ 1.0% slope.	1	1	2

Table 3.6 Recommended Improvements for Basins

SUNRISE ENGINEERING, INC.
CONSULTING ENGINEERS AND SURVEYORS

SUNRISE ENGINEERING

Project: Stormwater Master Plan - Capital Improvement Project List
Basins

Project No:
Date:

Owner: Nibley City

By:

Project #	Basins Project Description	Urgency(1 for lowest, 5 for highest)	Magnitude(1 for lowest, 5 for highest)	Priority(1 for lowest, 10 for highest)
1	Watershed 38: a regional pond #94 should be built to handle runoff from Watershed 25 and its future development.	5	4	9
2	Watershed 108: a regional pond #95 should be built to handle runoff from its future development and upstream Watershed 7.	5	4	9
3	Watershed 26: a regional pond #96 should be built to handle runoff from its future development and multiple upstream watersheds.	5	4	9
4	Basin 1: the City is planning to eliminate this basin.	5	4	9
5	Basin 8 & 59: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	4	8
6	Basin 15: severely overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	4	8
7	Basin 24: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	4	8
8	Basin 28: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	5	3	8
9	Basin 82: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	4	8
10	Basin 9 & 10: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	3	4	7
11	Basin 13: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	4	7
12	Basin 14: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	4	7
13	Basin 16: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	4	3	7
14	Basin 17: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	3	4	7
15	Basin 25: severely overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	3	7
16	Basin 31 & 83 & 86: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	4	3	7
17	Basin 35 & 74: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	4	7
18	Basin 42 - 49 don't have enough Detention/Retention volume, overflow occurs in 100-year, 24-hr storm event.	3	4	7
19	Basin 56 & 57 & 58 & 81: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	3	7
20	Basin 62: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	4	7
21	Basin 66 & 87: severely overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	4	3	7
22	Basin 84 & 85: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	3	7
23	Basin 12: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	3	6
24	Basin 23: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	3	6
25	Basin 26: severely overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	3	6
26	Basin 30: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	3	3	6
27	Basin 32: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	3	6
28	Basin 38: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	3	6
29	Basin 51: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	2	6
30	Basin 64 & 65 & 67 - 70: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	4	2	6
31	Basin 75: slightly overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	2	4	6
32	Infiltration Swale #91: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	3	3	6
33	Basin 36: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	2	5
34	Basin 39: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	3	2	5
35	Basin 55: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	2	3	5
36	Basin 60 don't have enough Retention volume, overflow occurs in 100-year, 48-hr storm event.	2	3	5
37	Infiltration Swale #90: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	2	3	5
38	Basin 5: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	2	2	4
39	Basin 20 & 21: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	2	2	4
40	Basin 22: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	2	2	4
41	Basin 37: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	2	2	4
42	Basin 71 & 72 & 73: overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	2	2	4
43	Infiltration Swale #89: overflow occurs in 100-year, 48-hr storm event, and needs to be upsized for more storage volume.	2	2	4
44	Basin 34 & 63: slightly overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	2	1	3
45	Basin 40 & 41: slight overflow occurs in 100-year, 24-hr storm event, and needs to be upsized for more storage volume.	1	2	3

Table 3.7 Trunk Line Projects (TLP) Segment Details

Trunk Line	Project Description	Total (ft)	Elevation Difference (ft)	Rough Slope (ft/ft)	15" Parallel Pipes	18" Parallel Pipes	24" Parallel Pipes	30" Single Pipe	36" Single Pipe	42" Single Pipe	48" Single Pipe
1	3600 South Road (East Section)	7348	78	0.0106	6150	1198					
2	3700 South Road (East Section)	6774	66	0.0097	4025	2749					
3	3800 South Road (East Section)	7058	54	0.0077	3950	2398	710				
4	3900 South Road (East Section)	6885	46	0.0067	2965	2150	1770				
5	4000 South Road (East Section)	6268	56	0.0089	3870	2398					
6	4000 South Road (West Section)	6858	26	0.0038	3050	1670	2138				
7	3900 South Road (West Section)	5179	12	0.0023	1970	1290	1919				
8	3800 South Road (West Section)	5016	16	0.0032	2260	1457	1299				
9	3700 South Road (West Section)	5205	14	0.0027	2260	1457	1488				
10	3600 South Road (West Section)	5310	12	0.0023	1970	1290	2050				
11	3500 South Road (West Section)	4590	10	0.0022	1940	1230	1420				
12	3400 South Road (West Section)	4133	10	0.0024	2010	1230	893				
13	3300 South Road (West Section)	3476	8	0.0023	2140	1336					
14	Hwy 91 & 3200 W Crossing	1863	2	0.0011				960	903		
15	Hwy 91 & 3400 W Crossing	1766	4	0.0023				950	816		
16	Hwy 91 & 3600 W Crossing	2790	10	0.0036				690	690	670	740
				Total Length (ft)	38560	21853	13687	2600	2409	670	740

Table 5.4 Impact Fee Summary

Total Cost for Impact Eligible Projects within City Limits	$	1,057,585.92
Total Cost for Impact Eligible Projects withinAnnex Limits	$	790,000.00
Growth % in City Area		50%
Growth % in Annex Area		50%
New Connections in City by 2035		753.5987789
New Connections in Annex by 2035		753.5987789
ERU Value (Res Imperv Area)		3000

Impact Fee for City Area Only			Factor
Residential	$	1,403.38	1
Commercial	$	12,278.24	8.75
Institutional	$	25,994.78	18.52
Industrial	$	34,159.79	24.34

Impact Fee for Annex Area Only			
Residential	$	1,048.30	1
Commercial	$	9,171.65	8.75
Institutional	$	19,417.69	18.52
Industrial	$	25,516.82	24.34

Impect Fee for Whole System			
Residential	$	1,225.84	1
Commercial	$	10,724.94	8.75
Institutional	$	22,706.23	18.52
Industrial	$	29,838.31	24.34

APPENDIX B

HYDROLOGIC MODEL OUTPUT

Project: Existing_Nibley_City
Simulation Run: 25-Year
Simulation Start: 31 December 2023, 24:00
Simulation End: 2 January 2024, 12:00

HMS Version: 4.11
Executed: 02 October 2024, 19:49

Global Parameter Summary - Reach

	Downstream
Element Name	**Downstream**
Reach - 46b	102c
Reach - 94b	Reservoir - 37
Reach - 56b	105c
Reach - 96b	105c
Reach - 55b	93c
Reach - 55c	97c
Reach - 93b	Junction - 36
Reach - 93c	97c
Reach - 85b	95c
Reach - 122b	Reservoir - 36
Reach - 118b	Reservoir - 26
Reach - 36b	Reservoir - 24
Reach - 90b	Reservoir - 23
Reach - 87b	Reservoir - 22
Reach - 80b	88c
Reach - 77b	113c
Reach - 15b	Junction - 15b
Reach - 58b	Junction - 25
Reach - 58c	41c
Reach - 25b	Junction - 38
Reach - 25c	Junction - 38a
Reach - 38b	Junction - 15a
Reach - 15a	Junction - 15a
Reach - 12b	Junction - 15a
Reach - 72b	Junction - 73
Reach - 72c	84c
Reach - 73b	Junction - 28
Reach - 73c	Junction - 28a
Reach - 70b	81c
Reach - 106b	Junction - 28a
Reach - 73d	Junction - 26
Reach - 71b	Junction - 26
Reach - 71c	39c
Reach - 27b	39c
Reach - 26b	Junction - 23
Reach - 26c	38c
Reach - 23b	33c
Reach - 22b	33c
Reach - 21b	Junction - 20
Reach - 28b	Junction - 83

Reach - 28c	35c
Reach - 83b	Junction - 24
Reach - 110b	Junction - 102a
Reach - 110c	Junction - 24
Reach - 95b	Junction - 68
Reach - 95c	Junction - 73a
Reach - 95d	85c
Reach - 74b	45c
Reach - 30b	Junction - 29
Reach - 30c	44c
Reach - 29b	Junction - 102
Reach - 89b	Junction - 63
Reach - 89c	86c
Reach - 63b	87c
Reach - 76b	Junction - 76
Reach - 52b	Junction - 52
Reach - 52c	115c
Reach - 76c	115c
Reach - 91b	Junction - 102b
Reach - 29c	Junction - 102b
Reach - 29d	36c
Reach - 83c	36c
Reach - 24b	32c
Reach - 21c	32c
Reach - 20b	Junction - 18
Reach - 18b	16c
Reach - 15c	16c
Reach - 19b	Junction - 17
Reach - 19c	Reservoir - 8&59
Reach - 15d	106c
Reach - 102b	Junction - 9
Reach - 102c	26c
Reach - 49b	59c
Reach - 120b	63c
Reach - 50b	Junction - 103a
Reach - 68b	Junction - 67
Reach - 68c	68c
Reach - 67b	Junction - 57
Reach - 67c	58c
Reach - 50c	58c
Reach - 61b	Junction - 42
Reach - 48b	60c
Reach - 61c	60c
Reach - 42b	Junction - 103
Reach - 42c	58c
Reach - 103b	Junction - 57a
Reach - 112b	Junction - 57b
Reach - 112c	Junction - 33
Reach - 97b	Junction - 33
Reach - 97c	50c
Reach - 33b	Junction - 57a
Reach - 103c	112c
Reach - 60b	Reservoir - 52&53
Reach - 69b	Junction - 61
Reach - 69c	Junction - 81a
Reach - 88b	94c

Reach - 105b	Junction - 81
Reach - 105c	Junction - 81a
Reach - 105d	66c
Reach - 81b	Junction - 65
Reach - 37b	Junction - 65
Reach - 81c	64c
Reach - 45b	Reservoir - 25
Reach - 43b	64c
Reach - 65b	Junction - 51
Reach - 65c	55c
Reach - 51b	Junction - 86
Reach - 51c	13c
Reach - 75b	78c
Reach - 115b	73c
Reach - 64b	72c
Reach - 117b	72c
Reach - 84b	72c
Reach - 59b	57c
Reach - 34b	Junction - 53
Reach - 34c	56c
Reach - 53b	52c
Reach - 41b	Reservoir - 18&19
Reach - 119b	Junction - 7
Reach - 51d	Junction - 7
Reach - 51e	Junction - 51a
Reach - 51f	12c
Reach - 62b	11c
Reach - 10b	Junction - 98
Reach - 10c	108c
Reach - 98b	Junction - 99
Reach - 98c	109c
Reach - 39b	Reservoir - 55
Reach - 32b	Junction - 57c
Reach - 32c	Junction - 44
Reach - 31b	Junction - 44
Reach - 121b	49c
Reach - 47b	49c
Reach - 86b	Reservoir - 92&93
Reach - 86c	47c
Reach - 31c	47c
Reach - 7b	22c
Reach - 108b	Junction - 101a
Reach - 108c	Junction - 101c
Reach - 6b	Junction - 101b
Reach - 6c	Junction - 101c
Reach - 108d	Reservoir - 84&85
Reach - 101b	9c
Reach - 1b	7c
Reach - 8b	Reservoir - 88
Reach - 5b	25c
Reach - 4b	Junction - 3
Reach - 116b	Junction - 3
Reach - 4c	20c
Reach - 3b	Junction - 107
Reach - 111b	Junction - 101
Reach - 111c	Junction - 100

Reach - 111d	Junction - 107
Reach - 107b	8c
Reach - 92b	Junction - 79
Reach - 92c	111c

Route: Muskingum Cunge

Element Name	Method	Channel	Length (FT)	Energy Slope (FT/FT)	Mannings n	Bottom Width (FT)	Side Slope (FT/FT)	Initial Variable	Space - Time Method	Index Parameter Type	Ind Flo
Reach - 46b	Muskingum Cunge	0.4	2970	0.01	0.04	25	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 94b	Muskingum Cunge	Trapezoid	1550	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 56b	Muskingum Cunge	Circular	380	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 96b	Muskingum Cunge	0.4	9670	0.01	0.04	25	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 55b	Muskingum Cunge	0.4	5450	0.01	0.04	25	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 55c	Muskingum Cunge	0.4	1490	0.01	0.04	25	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 93b	Muskingum Cunge	Trapezoid	1490	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 93c	Muskingum Cunge	Trapezoid	8500	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 85b	Muskingum Cunge	0.4	3080	0.01	0.04	25	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 122b	Muskingum Cunge	Trapezoid	550	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 118b	Muskingum Cunge	Circular	3430	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 36b	Muskingum Cunge	Circular	1600	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 90b	Muskingum Cunge	0.4	2070	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 87b	Muskingum Cunge	Circular	1580	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 80b	Muskingum Cunge	0.4	8750	0.01	0.04	25	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 77b	Muskingum Cunge	0.4	2800	0.01	0.04	25	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 54b	Muskingum Cunge	0.4	90	0.01	0.04	25	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 15b	Muskingum Cunge	0.4	430	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 58b	Muskingum Cunge	Circular	100	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.

Reach - 58c	Muskingum Cunge	0.4	4250	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 25b	Muskingum Cunge	Circular	80	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 25c	Muskingum Cunge	0.4	680	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 38b	Muskingum Cunge	Circular	2310	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 15a	Muskingum Cunge	0.4	670	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 12b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 72b	Muskingum Cunge	Circular	500	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 72c	Muskingum Cunge	0.4	1170	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 73b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 73c	Muskingum Cunge	0.4	650	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 70b	Muskingum Cunge	0.4	940	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 106b	Muskingum Cunge	Circular	80	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 73d	Muskingum Cunge	0.4	670	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 71b	Muskingum Cunge	Circular	100	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 71c	Muskingum Cunge	0.4	4350	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 27b	Muskingum Cunge	0.4	3040	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 26b	Muskingum Cunge	Circular	110	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 26c	Muskingum Cunge	0.4	2230	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 23b	Muskingum Cunge	Circular	460	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 22b	Muskingum Cunge	0.4	1030	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 21b	Muskingum Cunge	Circular	150	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.

Reach - 28b	Muskingum Cunge	Circular	80	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 28c	Muskingum Cunge	0.4	2650	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 83b	Muskingum Cunge	Circular	60	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 110b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 110c	Muskingum Cunge	0.4	2030	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 95b	Muskingum Cunge	Circular	2460	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 95c	Muskingum Cunge	Circular	910	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 95d	Muskingum Cunge	0.4	1260	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 74b	Muskingum Cunge	0.4	1700	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 30b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 30c	Muskingum Cunge	0.4	3320	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 29b	Muskingum Cunge	Circular	60	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 89b	Muskingum Cunge	Circular	250	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 89c	Muskingum Cunge	0.4	1830	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 63b	Muskingum Cunge	0.4	1140	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 76b	Muskingum Cunge	0.4	3230	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 52b	Muskingum Cunge	0.4	1460	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 52c	Muskingum Cunge	0.4	8800	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 76c	Muskingum Cunge	0.4	4270	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 91b	Muskingum Cunge	0.4	7850	0.01	0.04	6	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 29c	Muskingum Cunge	0.4	2030	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.

Reach - 29d	Muskingum Cunge	0.4	3770	0.01	0.04	6	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 83c	Muskingum Cunge	0.4	480	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 24b	Muskingum Cunge	0.4	1500	0.01	0.04	6	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 21c	Muskingum Cunge	0.4	750	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 20b	Muskingum Cunge	0.4	300	0.01	0.04	6	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 18b	Muskingum Cunge	0.4	1100	0.01	0.04	6	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 15c	Muskingum Cunge	0.4	1300	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 19b	Muskingum Cunge	0.4	140	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 19c	Muskingum Cunge	Circular	1300	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 15d	Muskingum Cunge	0.4	770	0.01	0.04	6	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 102b	Muskingum Cunge	Circular	100	0.01	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 102c	Muskingum Cunge	0.4	2300	0.01	0.04	6	2	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 9b	Muskingum Cunge	Rectangular	170	0.01	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 49b	Muskingum Cunge	0.4	1900	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 120b	Muskingum Cunge	Trapezoid	290	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 50b	Muskingum Cunge	Circular	60	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 68b	Muskingum Cunge	Circular	225	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 68c	Muskingum Cunge	0.4	2000	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 67b	Muskingum Cunge	Circular	2600	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 67c	Muskingum Cunge	0.4	4320	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 50c	Muskingum Cunge	0.4	2980	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.

Reach - 61b	Muskingum Cunge	Circular	70	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 48b	Muskingum Cunge	Circular	740	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 61c	Muskingum Cunge	0.4	2900	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 42b	Muskingum Cunge	Circular	70	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 42c	Muskingum Cunge	0.4	3830	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 103b	Muskingum Cunge	0.4	4500	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 112b	Muskingum Cunge	Circular	1400	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 112c	Muskingum Cunge	0.4	480	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 97b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 97c	Muskingum Cunge	0.4	960	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 33b	Muskingum Cunge	0.4	3000	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 103c	Muskingum Cunge	Circular	1430	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 57b	Muskingum Cunge	Circular	150	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 60b	Muskingum Cunge	Circular	400	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 69b	Muskingum Cunge	Circular	300	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 69c	Muskingum Cunge	0.4	730	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 88b	Muskingum Cunge	0.4	900	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 105b	Muskingum Cunge	Circular	300	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 105c	Muskingum Cunge	0.4	1800	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 105d	Muskingum Cunge	0.4	580	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 81b	Muskingum Cunge	Circular	770	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.

Reach - 37b	Muskingum Cunge	Circular	380	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 81c	Muskingum Cunge	0.4	290	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 45b	Muskingum Cunge	Trapezoid	1800	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 43b	Muskingum Cunge	0.4	1020	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 65b	Muskingum Cunge	Circular	910	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 65c	Muskingum Cunge	0.4	1400	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 51b	Muskingum Cunge	Circular	1840	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 51c	Muskingum Cunge	0.4	920	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 75b	Muskingum Cunge	Circular	1450	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 115b	Muskingum Cunge	0.4	1710	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 64b	Muskingum Cunge	Circular	1260	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 117b	Muskingum Cunge	Trapezoid	630	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 84b	Muskingum Cunge	0.4	970	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 59b	Muskingum Cunge	0.4	600	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 34b	Muskingum Cunge	Circular	60	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 34c	Muskingum Cunge	0.4	1380	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 53b	Muskingum Cunge	Circular	2650	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 41b	Muskingum Cunge	Circular	1420	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 119b	Muskingum Cunge	Circular	490	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 51d	Muskingum Cunge	Circular	1090	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 51e	Muskingum Cunge	0.4	1270	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.

Reach - 51f	Muskingum Cunge	0.4	1360	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 62b	Muskingum Cunge	0.4	2200	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 10b	Muskingum Cunge	Rectangular	150	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 10c	Muskingum Cunge	0.4	1350	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 98b	Muskingum Cunge	Circular	60	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 98c	Muskingum Cunge	0.4	890	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 39b	Muskingum Cunge	0.4	1200	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 32b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 32c	Muskingum Cunge	Trapezoid	1400	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 31b	Muskingum Cunge	Circular	75	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 121b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 47b	Muskingum Cunge	Circular	70	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 86b	Muskingum Cunge	0.4	1100	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 86c	Muskingum Cunge	Circular	250	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 31c	Muskingum Cunge	0.4	1020	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 44b	Muskingum Cunge	Circular	130	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 7b	Muskingum Cunge	0.4	1530	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 108b	Muskingum Cunge	Circular	100	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 108c	Muskingum Cunge	0.4	620	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 6b	Muskingum Cunge	Circular	100	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 6c	Muskingum Cunge	0.4	1350	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.

Reach - 108d	Muskingum Cunge	0.4	1100	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 101b	Muskingum Cunge	Circular	1800	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 1b	Muskingum Cunge	0.4	420	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 8b	Muskingum Cunge	0.4	800	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 5b	Muskingum Cunge	0.4	1320	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 4b	Muskingum Cunge	Circular	110	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 116b	Muskingum Cunge	Circular	850	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 4c	Muskingum Cunge	0.4	970	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 3b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 111b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 111c	Muskingum Cunge	Circular	430	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 111d	Muskingum Cunge	0.4	900	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 107b	Muskingum Cunge	0.4	1130	0	0.01	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 92b	Muskingum Cunge	Circular	125	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 92c	Muskingum Cunge	0.4	1800	0	0.04	3	1.5	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 79b	Muskingum Cunge	Circular	60	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 104b	Muskingum Cunge	Circular	50	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.
Reach - 113b	Muskingum Cunge	Circular	140	0	0.01	Not Specified	Not Specified	Combined Inflow	Automatic DX and DT	Index Flow	0.

Global Results Summary

Hydrologic Element	Drainage Area (MI2)	Peak Discharge (CFS)	Time of Peak	Volume (IN)
109b	12.86	279.01	01Jan2024, 14:15	0.23
114c	12.86	279.01	01Jan2024, 14:15	0.23
82b	0.03	11.74	01Jan2024, 12:15	1

55b	0.15	0.15	02Jan2024, 00:15	0.01
46b	0.02	2.46	01Jan2024, 12:15	0.37
101c	0.02	2.46	01Jan2024, 12:15	0.37
Reach - 46b	0.02	2.14	01Jan2024, 13:15	0.09
96b	0.02	0.85	01Jan2024, 12:45	0.26
102c	0.04	2.76	01Jan2024, 13:15	0.17
56b	0.03	1.21	01Jan2024, 13:15	0.27
94b	0.02	4.25	01Jan2024, 12:00	0.56
Reservoir - 90	0.02	1.09	01Jan2024, 13:15	0.43
Reach - 94b	0.02	0.99	01Jan2024, 13:30	0.43
Reservoir - 37	0.05	1.89	01Jan2024, 13:30	0.33
Reach - 56b	0.05	1.85	01Jan2024, 13:30	0.33
Reach - 96b	0.04	0	01Jan2024, 18:15	0
105c	0.24	1.85	01Jan2024, 13:30	0.07
Reach - 55b	0.24	0.82	01Jan2024, 15:30	0
Reservoir - 39	0.03	2.75	01Jan2024, 13:15	1
93c	0.27	2.75	01Jan2024, 13:15	0.1
Reach - 55c	0.27	2.52	01Jan2024, 13:00	0.07
85b	0.16	11.16	01Jan2024, 14:15	0.59
93b	0.08	1.38	01Jan2024, 14:15	0.18
104c	0.08	1.38	01Jan2024, 14:15	0.18
Reach - 93b	0.08	1.38	01Jan2024, 14:30	0.18
Junction - 36	0.08	1.38	01Jan2024, 14:30	0.18
Reach - 93c	0.08	1.41	01Jan2024, 15:00	0.19
97c	0.51	14.36	01Jan2024, 14:15	0.25
Reach - 85b	0.51	13.87	01Jan2024, 14:45	0.21
87b	0.01	2.55	01Jan2024, 12:45	0.73
90b	0.05	5.84	01Jan2024, 12:30	0.52
36b	0.1	6.63	01Jan2024, 13:15	0.42
96c	0.1	6.63	01Jan2024, 13:15	0.42
122b	0.01	2.18	01Jan2024, 12:30	0.56
Reservoir - 89	0.01	0.62	01Jan2024, 14:00	0.41
Reach - 122b	0.01	0.6	01Jan2024, 14:00	0.41
118b	0	1.12	01Jan2024, 12:00	0.83
Reservoir - 36	0.02	0.27	01Jan2024, 17:45	0.43
Reach - 118b	0.02	0.27	01Jan2024, 18:30	0.43
Reservoir - 26	0.12	11.12	01Jan2024, 13:30	0.36
Reach - 36b	0.12	8.94	01Jan2024, 13:45	0.36
91c	0.05	5.84	01Jan2024, 12:30	0.52
Reservoir - 24	0.17	5.86	01Jan2024, 14:30	0.4
Reach - 90b	0.17	5.74	01Jan2024, 15:00	0.38
90c	0.01	2.55	01Jan2024, 12:45	0.73
Reservoir - 23	0.18	6.4	01Jan2024, 14:45	0.37
Reach - 87b	0.18	6.42	01Jan2024, 14:30	0.37
78b	0.01	3.89	01Jan2024, 12:30	0.83
Reservoir - 22	0.19	7.08	01Jan2024, 14:30	0.41
80b	0.03	1.85	01Jan2024, 12:45	0.32
95c	0.73	20.92	01Jan2024, 14:45	0.27
Reach - 80b	0.73	22.63	01Jan2024, 15:00	0.19
77b	0.06	12.5	01Jan2024, 12:45	0.84
88c	13.66	284.07	01Jan2024, 14:45	0.23
Reach - 77b	13.66	283.89	01Jan2024, 14:30	0.23
54b	0.02	4.1	01Jan2024, 12:30	0.64
113c	13.68	284.62	01Jan2024, 14:30	0.23
Reach - 54b	13.68	284.47	01Jan2024, 14:30	0.23
12b	0.01	1.88	01Jan2024, 12:15	0.83

27c	0.01	1.88	01Jan2024, 12:15	0.83
124b	0.03	15.56	01Jan2024, 12:15	1.01
40b	0.04	6.03	01Jan2024, 12:45	0.6
54c	0.04	6.03	01Jan2024, 12:45	0.6
Reservoir - 16	0.01	3.7	01Jan2024, 12:30	0.66
14b	0.01	1.91	01Jan2024, 12:30	0.93
Reservoir - 60	0.01	0.12	01Jan2024, 21:00	0.09
Junction - 15	0.06	8.85	01Jan2024, 12:30	0.56
Reach - 15b	0.06	8.49	01Jan2024, 12:30	0.55
13b	0.01	3.8	01Jan2024, 12:15	0.8
Reservoir - 15	0.03	6.14	01Jan2024, 12:45	1.01
Junction - 15b	0.1	13.52	01Jan2024, 12:45	0.71
25b	0.2	25.05	01Jan2024, 13:15	0.66
58b	0.01	1.93	01Jan2024, 12:15	0.73
Reservoir - 29	0.01	0.4	01Jan2024, 13:30	0.73
Reach - 58b	0.01	0.4	01Jan2024, 13:45	0.73
Junction - 25	0.01	0.4	01Jan2024, 13:45	0.73
Reach - 58c	0.01	0.24	01Jan2024, 16:00	0.29
41c	0.21	25.05	01Jan2024, 13:15	0.65
Reach - 25b	0.21	25.04	01Jan2024, 13:15	0.65
Junction - 38	0.21	25.04	01Jan2024, 13:15	0.65
Reach - 25c	0.21	24.95	01Jan2024, 13:15	0.64
38b	0.01	8.22	01Jan2024, 12:00	0.93
Junction - 38a	0.23	25.88	01Jan2024, 13:15	0.66
Reach - 38b	0.23	25.87	01Jan2024, 13:15	0.66
Reach - 15a	0.1	13.21	01Jan2024, 12:45	0.71
Reach - 12b	0.01	1.87	01Jan2024, 12:15	0.83
Junction - 15a	0.33	36.75	01Jan2024, 13:15	0.68
18b	0.01	2.65	01Jan2024, 12:15	0.84
22b	0.02	11.39	01Jan2024, 12:15	1.17
Reservoir - 13	0.02	2.7	01Jan2024, 13:00	1.17
34c	0.02	2.7	01Jan2024, 13:00	1.17
27b	0.01	4.23	01Jan2024, 12:15	0.8
Reservoir - 35&74	0.01	1.28	01Jan2024, 12:45	0.8
66b	0.05	5.71	01Jan2024, 12:30	0.47
Reservoir - 27	0.05	1.88	01Jan2024, 14:00	0.47
71b	0.04	11.01	01Jan2024, 12:15	0.74
76c	0.09	11.28	01Jan2024, 12:15	0.58
73b	0.08	21.56	01Jan2024, 12:30	0.8
72b	0.01	2.18	01Jan2024, 12:15	0.56
83c	0.01	2.18	01Jan2024, 12:15	0.56
Reach - 72b	0.01	2.06	01Jan2024, 12:15	0.56
Junction - 73	0.01	2.06	01Jan2024, 12:15	0.56
Reach - 72c	0.01	2.07	01Jan2024, 12:30	0.5
84c	0.09	23.63	01Jan2024, 12:30	0.77
Reach - 73b	0.09	23.58	01Jan2024, 12:30	0.77
Junction - 28	0.09	23.58	01Jan2024, 12:30	0.77
Reach - 73c	0.09	22.47	01Jan2024, 12:30	0.76
70b	0.04	8.63	01Jan2024, 12:30	0.73
Reservoir - 33	0.04	2.28	01Jan2024, 14:00	0.73
Reach - 70b	0.04	2.24	01Jan2024, 14:15	0.7
106b	0.02	6.22	01Jan2024, 12:00	0.77
81c	0.06	6.23	01Jan2024, 12:00	0.72
Reach - 106b	0.06	6.12	01Jan2024, 12:00	0.72
Junction - 28a	0.15	25.77	01Jan2024, 12:30	0.75
Reach - 73d	0.15	24.74	01Jan2024, 12:30	0.74

Reach - 71b	0.09	11.17	01Jan2024, 12:15	0.58
Junction - 26	0.24	33.16	01Jan2024, 12:30	0.68
Reach - 71c	0.24	33.83	01Jan2024, 13:00	0.65
26b	0.19	36.54	01Jan2024, 13:15	1
Reach - 27b	0.01	1.31	01Jan2024, 13:15	0.63
39c	0.45	69.01	01Jan2024, 13:00	0.8
Reach - 26b	0.45	68.81	01Jan2024, 13:00	0.8
Junction - 23	0.45	68.81	01Jan2024, 13:00	0.8
Reach - 26c	0.45	69.26	01Jan2024, 13:15	0.79
23b	0.05	17.43	01Jan2024, 12:30	1.17
38c	0.49	77.02	01Jan2024, 13:15	0.83
Reach - 23b	0.49	76.94	01Jan2024, 13:15	0.83
Reach - 22b	0.02	2.66	01Jan2024, 13:15	1.11
21b	0.02	10.04	01Jan2024, 12:15	1.06
Reservoir - 12	0.02	2.02	01Jan2024, 13:15	1.06
33c	0.54	81.62	01Jan2024, 13:15	0.85
Reach - 21b	0.54	81.56	01Jan2024, 13:15	0.85
Junction - 20	0.54	81.56	01Jan2024, 13:15	0.85
28b	0.25	63.19	01Jan2024, 13:00	1.16
43c	0.25	63.19	01Jan2024, 13:00	1.16
Reach - 28b	0.25	63.1	01Jan2024, 13:00	1.16
Junction - 83	0.25	63.1	01Jan2024, 13:00	1.16
Reach - 28c	0.25	62.75	01Jan2024, 13:15	1.14
83b	0.16	52.01	01Jan2024, 12:45	1.15
35c	0.42	103.52	01Jan2024, 13:00	1.15
Reach - 83b	0.42	103.47	01Jan2024, 13:00	1.15
110b	0.03	13.43	01Jan2024, 12:15	1.12
37c	0.03	13.43	01Jan2024, 12:15	1.12
Reach - 110b	0.03	13.38	01Jan2024, 12:15	1.12
Junction - 102a	0.03	13.38	01Jan2024, 12:15	1.12
Reach - 110c	0.03	12.83	01Jan2024, 12:30	1.07
Junction - 24	0.45	111.47	01Jan2024, 13:00	1.14
30b	0.41	100.3	01Jan2024, 12:45	0.99
74b	0.08	2.53	01Jan2024, 14:00	0.28
95b	0.03	0.85	01Jan2024, 12:45	0.21
99c	0.03	0.85	01Jan2024, 12:45	0.21
Reach - 95b	0.03	0.84	01Jan2024, 12:45	0.22
Junction - 68	0.03	0.84	01Jan2024, 12:45	0.22
Reach - 95c	0.03	0.83	01Jan2024, 13:00	0.22
Junction - 73a	0.03	0.83	01Jan2024, 13:00	0.22
Reach - 95d	0.03	0.91	01Jan2024, 13:15	0.19
85c	0.11	3.16	01Jan2024, 13:45	0.26
Reach - 74b	0.11	3.08	01Jan2024, 13:45	0.24
45c	0.52	100.4	01Jan2024, 12:45	0.83
Reach - 30b	0.52	100.33	01Jan2024, 12:45	0.83
Junction - 29	0.52	100.33	01Jan2024, 12:45	0.83
Reach - 30c	0.52	100.62	01Jan2024, 13:00	0.82
29b	0.11	35.21	01Jan2024, 12:45	1.17
44c	0.63	130.27	01Jan2024, 13:00	0.88
Reach - 29b	0.63	130.23	01Jan2024, 13:00	0.88
Junction - 102	0.63	130.23	01Jan2024, 13:00	0.88
91b	2.62	111.38	01Jan2024, 15:45	0.49
89b	0.17	6.36	01Jan2024, 13:45	0.31
103c	0.17	6.36	01Jan2024, 13:45	0.31
Reach - 89b	0.17	6.35	01Jan2024, 13:45	0.31
Junction - 63	0.17	6.35	01Jan2024, 13:45	0.31

Reach - 89c	0.17	6.24	01Jan2024, 14:00	0.3
63b	0.05	4.65	01Jan2024, 12:30	0.37
86c	0.22	7.75	01Jan2024, 13:45	0.32
Reach - 63b	0.22	7.74	01Jan2024, 14:00	0.31
76b	0.09	13.4	01Jan2024, 13:00	0.71
87c	0.32	19.21	01Jan2024, 13:15	0.43
Reach - 76b	0.32	18.52	01Jan2024, 13:15	0.42
Junction - 76	0.32	18.52	01Jan2024, 13:15	0.42
52b	0.69	40.62	01Jan2024, 14:45	0.55
100c	0.69	40.62	01Jan2024, 14:45	0.55
Reach - 52b	0.69	40.56	01Jan2024, 14:45	0.55
Junction - 52	0.69	40.56	01Jan2024, 14:45	0.55
Reach - 52c	0.69	39.53	01Jan2024, 15:30	0.52
Reach - 76c	0.32	20.62	01Jan2024, 13:45	0.4
115c	3.63	162.33	01Jan2024, 15:30	0.49
Reach - 91b	3.63	162.25	01Jan2024, 15:45	0.48
Reach - 29c	0.63	130.18	01Jan2024, 13:00	0.88
Junction - 102b	4.26	187.15	01Jan2024, 15:45	0.54
Reach - 29d	4.26	186.37	01Jan2024, 16:00	0.54
Reach - 83c	0.45	111.99	01Jan2024, 13:00	1.14
24b	0.01	5.01	01Jan2024, 12:15	0.93
36c	4.72	236.56	01Jan2024, 13:15	0.6
Reach - 24b	4.72	238.65	01Jan2024, 13:15	0.59
Reach - 21c	0.54	82.81	01Jan2024, 13:15	0.85
20b	0.01	3.21	01Jan2024, 12:00	1.05
32c	5.26	321.85	01Jan2024, 13:15	0.62
Reach - 20b	5.26	319.58	01Jan2024, 13:15	0.62
Reservoir - 11	0.01	0.44	01Jan2024, 13:30	0.84
Junction - 18	5.27	320.02	01Jan2024, 13:15	0.62
Reach - 18b	5.27	320.67	01Jan2024, 13:15	0.62
Reach - 15c	0.33	36.54	01Jan2024, 13:15	0.67
17b	0.05	13.66	01Jan2024, 12:45	1.13
19b	0.03	7.17	01Jan2024, 12:45	0.98
Reservoir - 14	0.03	2.6	01Jan2024, 13:45	0.98
Reach - 19b	0.03	2.58	01Jan2024, 13:45	0.97
Junction - 17	0.03	2.58	01Jan2024, 13:45	0.97
Reach - 19c	0.03	2.58	01Jan2024, 14:00	0.97
Reservoir - 8&59	0.08	15.02	01Jan2024, 13:30	1.07
15b	0.02	3.99	01Jan2024, 12:45	0.71
16b	0	1.28	01Jan2024, 12:00	0.73
16c	5.7	367.4	01Jan2024, 13:15	0.63
Reach - 15d	5.7	359.69	01Jan2024, 13:15	0.63
102b	0.76	101.75	01Jan2024, 14:15	1.04
106c	6.46	437.97	01Jan2024, 13:30	0.68
Reach - 102b	6.46	437.92	01Jan2024, 13:30	0.68
Junction - 9	6.46	437.92	01Jan2024, 13:30	0.68
Reach - 102c	6.46	440.69	01Jan2024, 13:30	0.68
9b	0.06	30.17	01Jan2024, 12:15	1.15
26c	6.52	445.49	01Jan2024, 13:30	0.68
Reach - 9b	6.52	445.29	01Jan2024, 13:30	0.68
120b	0.08	5.01	01Jan2024, 13:15	0.41
49b	0.06	5.62	01Jan2024, 13:00	0.52
Reservoir - 54	0.06	5.58	01Jan2024, 13:15	0.52
Reach - 49b	0.06	5.5	01Jan2024, 13:30	0.49
59c	0.14	10.43	01Jan2024, 13:30	0.44
Reach - 120b	0.14	10.41	01Jan2024, 13:30	0.44

50b	0.07	4.19	01Jan2024, 14:00	0.46
63c	0.21	14.21	01Jan2024, 13:30	0.45
Reach - 50b	0.21	14.2	01Jan2024, 13:30	0.45
Junction - 103a	0.21	14.2	01Jan2024, 13:30	0.45
68b	0.14	8.65	01Jan2024, 13:30	0.42
79c	0.14	8.65	01Jan2024, 13:30	0.42
Reach - 68b	0.14	8.64	01Jan2024, 13:30	0.42
Junction - 67	0.14	8.64	01Jan2024, 13:30	0.42
Reach - 68c	0.14	8.48	01Jan2024, 13:45	0.41
67b	0.03	4.13	01Jan2024, 13:00	0.62
68c	0.17	11.39	01Jan2024, 13:30	0.45
Reach - 67b	0.17	11.28	01Jan2024, 13:45	0.45
Junction - 57	0.17	11.28	01Jan2024, 13:45	0.45
Reach - 67c	0.17	11.08	01Jan2024, 14:15	0.42
Reach - 50c	0.21	14.03	01Jan2024, 13:45	0.43
42b	0.13	19.2	01Jan2024, 13:00	0.72
61b	0.02	4.83	01Jan2024, 12:15	0.67
67c	0.02	4.83	01Jan2024, 12:15	0.67
Reach - 61b	0.02	4.81	01Jan2024, 12:15	0.67
Junction - 42	0.02	4.81	01Jan2024, 12:15	0.67
48b	0.02	4.41	01Jan2024, 12:15	0.63
Reservoir - 40&41	0.02	1.38	01Jan2024, 13:00	0.63
Reach - 48b	0.02	1.37	01Jan2024, 13:15	0.63
Reach - 61c	0.02	4.9	01Jan2024, 12:45	0.58
60c	0.17	23.8	01Jan2024, 13:00	0.7
Reach - 42b	0.17	23.79	01Jan2024, 13:00	0.7
Junction - 103	0.17	23.79	01Jan2024, 13:00	0.7
Reach - 42c	0.17	24.26	01Jan2024, 13:15	0.67
103b	0.13	18.75	01Jan2024, 13:00	0.72
58c	0.69	59.13	01Jan2024, 13:30	0.54
Reach - 103b	0.69	58.37	01Jan2024, 13:45	0.53
97b	0.06	11.16	01Jan2024, 12:45	0.73
Reservoir - 20&21	0.06	5.24	01Jan2024, 13:30	0.73
112b	0.13	15.09	01Jan2024, 13:00	0.58
Reservoir - 82	0.13	14.85	01Jan2024, 13:00	0.58
Reach - 112b	0.13	14.78	01Jan2024, 13:15	0.58
Junction - 57b	0.13	14.78	01Jan2024, 13:15	0.58
Reach - 112c	0.13	14.8	01Jan2024, 13:15	0.58
Reach - 97b	0.06	5.24	01Jan2024, 13:30	0.73
Junction - 33	0.19	19.83	01Jan2024, 13:15	0.62
Reach - 97c	0.19	19.52	01Jan2024, 13:30	0.62
33b	0.02	0.35	01Jan2024, 13:00	0.17
50c	0.21	19.82	01Jan2024, 13:15	0.58
Reach - 33b	0.21	19.57	01Jan2024, 13:45	0.56
Junction - 57a	0.9	77.94	01Jan2024, 13:45	0.54
Reach - 103c	0.9	76.46	01Jan2024, 14:00	0.54
57b	0.8	55.9	01Jan2024, 15:00	0.69
112c	1.7	121	01Jan2024, 14:15	0.61
Reach - 57b	1.7	121	01Jan2024, 14:15	0.61
62b	0.05	16.65	01Jan2024, 12:15	0.9
60b	0.03	4.76	01Jan2024, 12:30	0.65
Reservoir - 51	0.03	2.21	01Jan2024, 13:30	0.65
Reach - 60b	0.03	2.21	01Jan2024, 13:30	0.65
37b	0.02	3.35	01Jan2024, 12:45	0.79
Reservoir - 52&53	0.05	1.28	01Jan2024, 17:00	0.65
69b	0.04	11.24	01Jan2024, 12:15	0.71

Reservoir - 50&79&80	0.04	1.91	01Jan2024, 14:00	0.7
Reach - 69b	0.04	1.91	01Jan2024, 14:00	0.7
Junction - 61	0.04	1.91	01Jan2024, 14:00	0.7
Reach - 69c	0.04	1.87	01Jan2024, 14:15	0.67
105b	0.01	1.29	01Jan2024, 12:15	0.42
88b	0	3.83	01Jan2024, 12:00	1.61
Reservoir - 38	0	4.92	01Jan2024, 12:15	1.61
Reach - 88b	0	3.8	01Jan2024, 12:30	1.5
94c	0.01	4.9	01Jan2024, 12:30	0.73
Reach - 105b	0.01	4.81	01Jan2024, 12:30	0.73
Junction - 81	0.01	4.81	01Jan2024, 12:30	0.73
Reach - 105c	0.01	4.5	01Jan2024, 12:45	0.65
Junction - 81a	0.06	5.71	01Jan2024, 12:45	0.67
Reach - 105d	0.06	5.04	01Jan2024, 13:00	0.65
81b	0.03	6.99	01Jan2024, 12:30	0.79
66c	0.09	11.37	01Jan2024, 12:45	0.7
Reach - 81b	0.09	11.01	01Jan2024, 12:45	0.7
Reach - 37b	0.05	1.27	01Jan2024, 17:00	0.65
Junction - 65	0.14	11.27	01Jan2024, 12:45	0.68
Reach - 81c	0.14	10.85	01Jan2024, 12:45	0.68
45b	0.04	7.89	01Jan2024, 12:30	0.75
Reservoir - 31&83&86	0.04	7.76	01Jan2024, 12:45	0.57
Reach - 45b	0.04	8.03	01Jan2024, 13:00	0.58
43b	0.03	5.7	01Jan2024, 12:45	0.74
Reservoir - 25	0.07	16.4	01Jan2024, 13:00	0.66
Reach - 43b	0.07	13.76	01Jan2024, 13:15	0.65
65b	0.02	6.12	01Jan2024, 12:15	0.84
64c	0.22	23.95	01Jan2024, 13:15	0.68
Reach - 65b	0.22	23.72	01Jan2024, 13:15	0.68
Junction - 51	0.22	23.72	01Jan2024, 13:15	0.68
Reach - 65c	0.22	22.66	01Jan2024, 13:15	0.67
51b	0.04	6.44	01Jan2024, 13:00	0.69
55c	0.27	28.49	01Jan2024, 13:15	0.67
Reach - 51b	0.27	27.38	01Jan2024, 13:30	0.67
Junction - 86	0.27	27.38	01Jan2024, 13:30	0.67
Reach - 51c	0.27	27.93	01Jan2024, 13:30	0.67
35b	0.01	4.05	01Jan2024, 12:00	1.17
Reservoir - 62	0.01	0.61	01Jan2024, 13:00	1.17
13c	0.27	28.51	01Jan2024, 13:30	0.68
119b	0.1	12.11	01Jan2024, 13:30	0.73
84b	0.02	4.39	01Jan2024, 12:15	0.73
Reservoir - 28	0.02	0.86	01Jan2024, 14:00	0.3
115b	0.05	9.1	01Jan2024, 12:30	0.73
75b	0.07	5.74	01Jan2024, 13:00	0.43
Reservoir - 75	0.07	5.4	01Jan2024, 13:15	0.43
Reach - 75b	0.07	5.29	01Jan2024, 13:15	0.43
Reservoir - 32	0.05	4.94	01Jan2024, 13:15	0.73
78c	0.12	10.23	01Jan2024, 13:15	0.55
Reach - 115b	0.12	10.19	01Jan2024, 13:30	0.53
64b	0.05	8.38	01Jan2024, 12:45	0.79
73c	0.17	16.65	01Jan2024, 13:15	0.61
Reach - 64b	0.17	16.42	01Jan2024, 13:15	0.61
117b	0.03	7.76	01Jan2024, 12:30	0.82
Reservoir - 91	0.03	6.28	01Jan2024, 12:45	0.71
Reach - 117b	0.03	5.86	01Jan2024, 12:45	0.72
Reach - 84b	0.02	0.75	01Jan2024, 14:30	0.27

59b	0.01	1.64	01Jan2024, 12:15	0.56
72c	0.22	20.3	01Jan2024, 13:00	0.6
Reach - 59b	0.22	20.27	01Jan2024, 13:15	0.59
34b	0.01	3.62	01Jan2024, 12:00	1.17
Reservoir - 30	0.01	0.98	01Jan2024, 13:00	0.5
57c	0.22	20.71	01Jan2024, 13:00	0.59
Reach - 34b	0.22	20.66	01Jan2024, 13:00	0.59
Junction - 53	0.22	20.66	01Jan2024, 13:00	0.59
Reach - 34c	0.22	21.47	01Jan2024, 13:15	0.58
53b	0.04	4.96	01Jan2024, 12:45	0.52
56c	0.27	25.49	01Jan2024, 13:15	0.57
Reach - 53b	0.27	24.44	01Jan2024, 13:15	0.57
41b	0.04	4.44	01Jan2024, 12:45	0.49
Reservoir - 76 - 78	0.04	1.27	01Jan2024, 14:45	0.48
Reach - 41b	0.04	1.27	01Jan2024, 15:00	0.48
Reservoir - 18&19	0.14	7.33	01Jan2024, 15:00	0.65
52c	0.41	28.89	01Jan2024, 13:30	0.6
Reach - 119b	0.41	28.82	01Jan2024, 13:30	0.6
Reach - 51d	0.27	28.1	01Jan2024, 13:30	0.68
114b	0	0.77	01Jan2024, 12:00	0.6
Reservoir - 61	0	0.19	01Jan2024, 13:00	0.6
Junction - 7	0.68	57.1	01Jan2024, 13:30	0.63
Reach - 51e	0.68	56.18	01Jan2024, 13:30	0.63
125b	0.03	7.06	01Jan2024, 12:30	0.77
Junction - 51a	0.71	58.24	01Jan2024, 13:30	0.63
Reach - 51f	0.71	58.1	01Jan2024, 13:45	0.63
Reservoir - 9&10	0.05	2.67	01Jan2024, 14:00	0.37
12c	0.76	59.99	01Jan2024, 13:45	0.61
Reach - 62b	0.76	58.39	01Jan2024, 14:00	0.6
11b	0.06	16.95	01Jan2024, 12:30	0.95
4c	0.06	16.95	01Jan2024, 12:30	0.95
Reservoir - 64 - 70	0.06	7.49	01Jan2024, 13:30	0.95
10b	0.05	10.78	01Jan2024, 13:30	1.12
11c	0.88	74.82	01Jan2024, 13:45	0.66
Reach - 10b	0.88	74.75	01Jan2024, 13:45	0.66
Junction - 98	0.88	74.75	01Jan2024, 13:45	0.66
Reach - 10c	0.88	74.71	01Jan2024, 14:00	0.66
98b	0.02	9.98	01Jan2024, 12:15	1.09
108c	0.9	75.82	01Jan2024, 14:00	0.67
Reach - 98b	0.9	75.81	01Jan2024, 14:00	0.67
Junction - 99	0.9	75.81	01Jan2024, 14:00	0.67
Reach - 98c	0.9	76.29	01Jan2024, 14:00	0.66
99b	0.01	3.85	01Jan2024, 12:15	1.17
109c	0.91	76.68	01Jan2024, 14:00	0.67
31b	0.04	8.6	01Jan2024, 12:30	0.71
Reservoir - 56&57&58&81	0.04	9.82	01Jan2024, 12:45	0.71
39b	0.01	1.96	01Jan2024, 12:15	0.6
Reservoir - 2	0.01	0.3	01Jan2024, 14:00	0.59
32b	0.05	3.4	01Jan2024, 13:00	0.38
Reach - 39b	0.01	0.26	01Jan2024, 15:00	0.44
Reservoir - 55	0.06	3.5	01Jan2024, 13:15	0.39
Reach - 32b	0.06	3.5	01Jan2024, 13:15	0.39
Junction - 57c	0.06	3.5	01Jan2024, 13:15	0.39
Reach - 32c	0.06	3.5	01Jan2024, 13:15	0.39
Reach - 31b	0.04	9.75	01Jan2024, 12:45	0.71
Junction - 44	0.1	12.14	01Jan2024, 12:45	0.51

47b	0.01	6.37	01Jan2024, 12:15	1.07
Reservoir - 71&72&73	0.01	5.45	01Jan2024, 12:30	1.07
121b	0.03	10.92	01Jan2024, 12:15	0.8
Reservoir - 5	0.03	2.93	01Jan2024, 13:00	0.8
123b	0.21	23.3	01Jan2024, 13:45	0.73
Reservoir - 1&3&4&7	0.21	13.14	01Jan2024, 15:00	0.73
86b	0.11	20.12	01Jan2024, 12:45	0.73
Reservoir - 6	0.11	13.14	01Jan2024, 13:15	0.73
Reach - 121b	0.03	2.93	01Jan2024, 13:00	0.8
Reach - 47b	0.01	5.39	01Jan2024, 12:30	1.07
49c	0.37	25.66	01Jan2024, 14:00	0.75
Reach - 86b	0.37	25.57	01Jan2024, 14:00	0.75
Reservoir - 92&93	0.37	26.18	01Jan2024, 14:00	0.74
Reach - 86c	0.37	26.09	01Jan2024, 14:00	0.74
Reach - 31c	0.1	10.97	01Jan2024, 13:00	0.5
44b	0.04	8.01	01Jan2024, 12:30	0.7
47c	0.51	36.77	01Jan2024, 13:00	0.69
Reach - 44b	0.51	36.61	01Jan2024, 13:00	0.69
7b	0.05	7.28	01Jan2024, 12:45	0.64
Reservoir - 17	0.05	1.15	01Jan2024, 16:30	0.19
108b	0.06	7.53	01Jan2024, 13:15	0.72
Reach - 7b	0.05	1.18	01Jan2024, 17:00	0.18
22c	0.1	7.53	01Jan2024, 13:15	0.48
Reach - 108b	0.1	7.52	01Jan2024, 13:15	0.48
Junction - 101a	0.1	7.52	01Jan2024, 13:15	0.48
Reach - 108c	0.1	7.36	01Jan2024, 13:15	0.48
6b	0.02	8.75	01Jan2024, 12:15	0.93
24c	0.02	8.75	01Jan2024, 12:15	0.93
Reach - 6b	0.02	8.72	01Jan2024, 12:15	0.93
Junction - 101b	0.02	8.72	01Jan2024, 12:15	0.93
Reach - 6c	0.02	8.46	01Jan2024, 12:30	0.89
Junction - 101c	0.12	11.39	01Jan2024, 12:30	0.55
Reach - 108d	0.12	10.82	01Jan2024, 12:45	0.54
101b	0.1	22.95	01Jan2024, 12:45	0.86
Reservoir - 84&85	0.23	45.63	01Jan2024, 12:45	0.68
Reach - 101b	0.23	35.8	01Jan2024, 13:00	0.68
100b	0.04	9.81	01Jan2024, 12:30	0.77
9c	0.26	40.96	01Jan2024, 13:00	0.69
1b	0.01	4.39	01Jan2024, 12:45	1.17
Reservoir - 34&63	0.01	1.3	01Jan2024, 14:15	1.16
Reach - 1b	0.01	1.28	01Jan2024, 14:15	1.13
2b	0.01	3.93	01Jan2024, 12:15	0.93
4b	0.08	19.33	01Jan2024, 12:45	0.93
8b	0.02	8.75	01Jan2024, 12:00	0.93
Reservoir - 87	0.02	15.11	01Jan2024, 12:15	0.81
Reach - 8b	0.02	10.34	01Jan2024, 12:30	0.8
5b	0.02	4.78	01Jan2024, 12:30	0.81
Reservoir - 88	0.04	0.51	01Jan2024, 23:15	0.04
124c	0.04	0.51	01Jan2024, 23:15	0.04
Reach - 5b	0.04	0.52	01Jan2024, 24:00	0.03
25c	0.12	19.33	01Jan2024, 12:45	0.63
Reach - 4b	0.12	19.33	01Jan2024, 12:45	0.63
116b	0	1.69	01Jan2024, 12:00	1.05
107c	0	1.69	01Jan2024, 12:00	1.05
Reach - 116b	0	1.47	01Jan2024, 12:15	1.05
Junction - 3	0.12	19.83	01Jan2024, 12:30	0.64

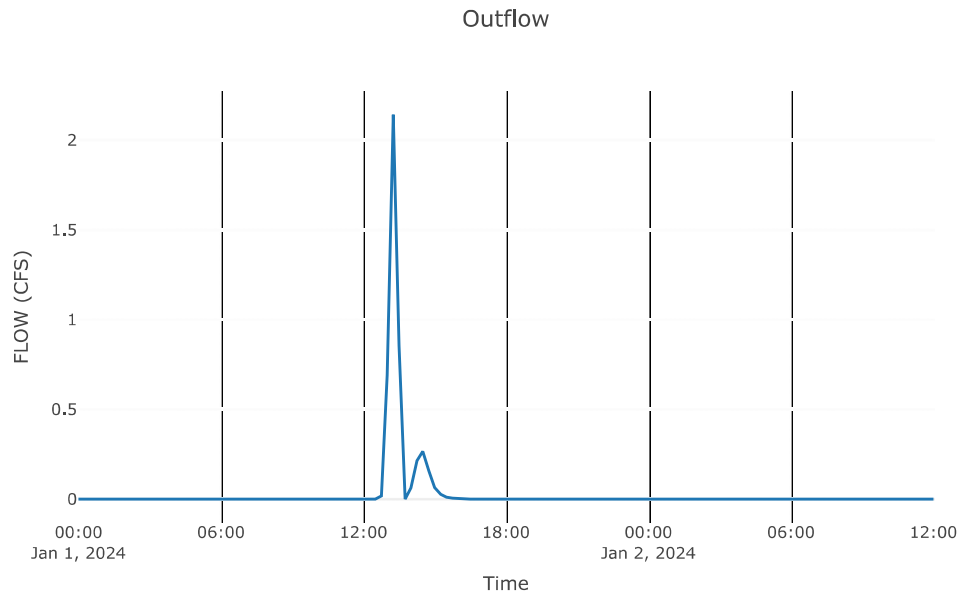
Reach - 4c	0.12	20.25	01Jan2024, 12:45	0.63
7c	0.02	4.1	01Jan2024, 12:15	1.05
3b	0.01	2.31	01Jan2024, 12:15	0.56
20c	0.15	23.05	01Jan2024, 12:45	0.69
Reach - 3b	0.15	23.04	01Jan2024, 12:45	0.69
111b	0.04	9.07	01Jan2024, 12:30	0.82
21c	0.04	9.07	01Jan2024, 12:30	0.82
Reach - 111b	0.04	9.05	01Jan2024, 12:30	0.82
Junction - 101	0.04	9.05	01Jan2024, 12:30	0.82
Reach - 111c	0.04	8.92	01Jan2024, 12:30	0.82
Junction - 100	0.04	8.92	01Jan2024, 12:30	0.82
Reach - 111d	0.04	8.9	01Jan2024, 12:30	0.81
Junction - 107	0.19	31.26	01Jan2024, 12:45	0.71
Reach - 107b	0.19	31.69	01Jan2024, 12:45	0.71
107b	0.01	4.28	01Jan2024, 12:15	0.93
8c	0.2	33.61	01Jan2024, 12:45	0.72
92b	0.04	11.13	01Jan2024, 12:45	1.07
Reservoir - 42 - 49	0.04	3.62	01Jan2024, 14:00	1.06
Reach - 92b	0.04	3.62	01Jan2024, 14:00	1.06
Junction - 79	0.04	3.62	01Jan2024, 14:00	1.06
Reach - 92c	0.04	3.53	01Jan2024, 14:15	1
79b	0.03	9.89	01Jan2024, 12:15	0.81
111c	0.07	9.92	01Jan2024, 12:15	0.92
Reach - 79b	0.07	9.87	01Jan2024, 12:15	0.92
104b	0.03	3.64	01Jan2024, 12:45	0.52
110c	0.03	3.64	01Jan2024, 12:45	0.52
Reach - 104b	0.03	3.64	01Jan2024, 12:45	0.52
113b	0.02	7.52	01Jan2024, 12:15	1.05
10c	0.02	7.52	01Jan2024, 12:15	1.05
Reach - 113b	0.02	7.51	01Jan2024, 12:15	1.05

Reach: Reach-46b

Downstream : 102c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2970
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	25
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-46b	
Peak Discharge (CFS)	2.14
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.09
Peak Inflow (CFS)	2.46
Inflow Volume (AC - FT)	0.4

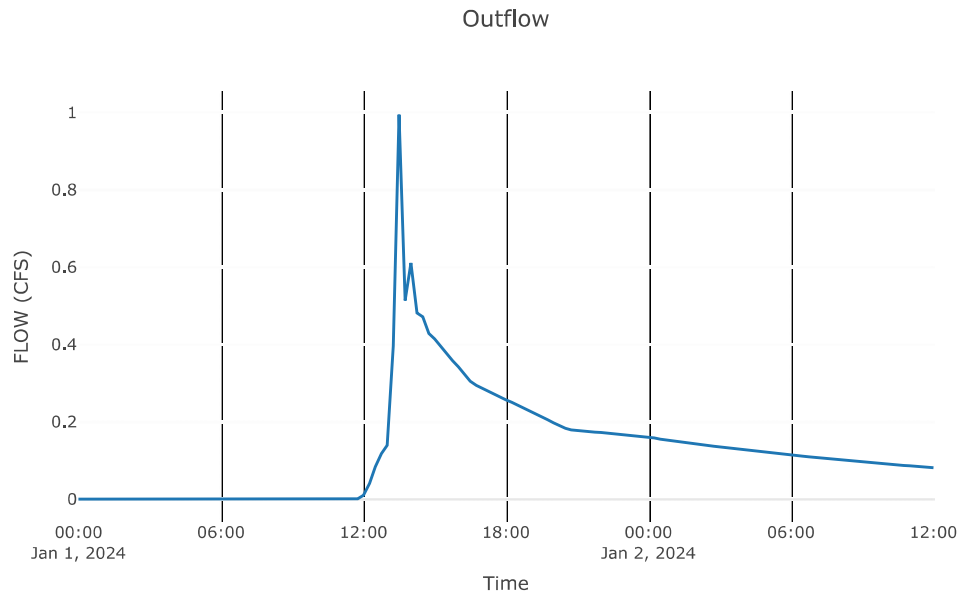


Reach: Reach-94b

Downstream : Reservoir - 37

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1550
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-94b	
Peak Discharge (CFS)	0.99
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.43
Peak Inflow (CFS)	1.09
Inflow Volume (AC - FT)	0.38

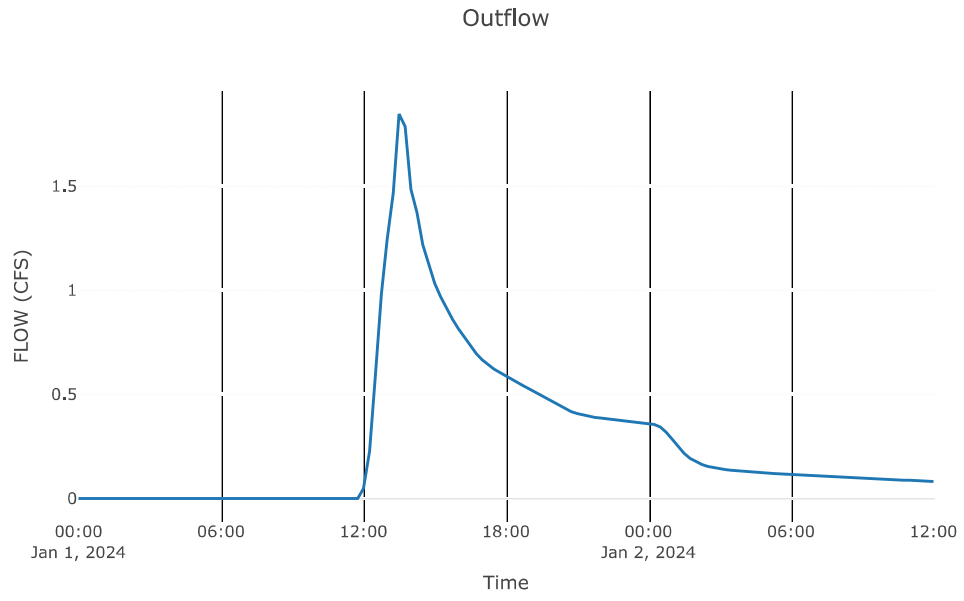


Reach: Reach-56b

Downstream : 105c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	380
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-56b	
Peak Discharge (CFS)	1.85
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.33
Peak Inflow (CFS)	1.89
Inflow Volume (AC - FT)	0.83

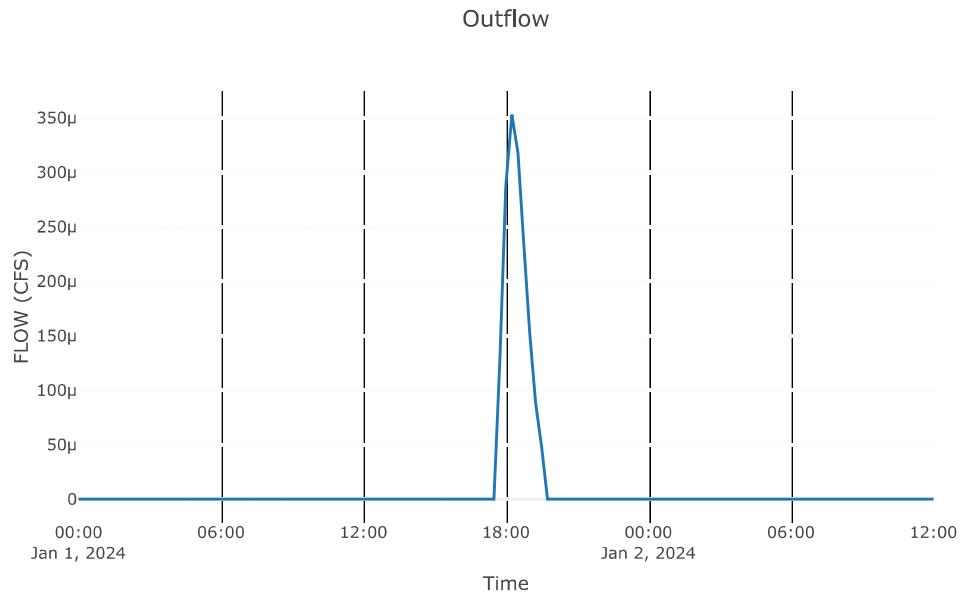


Reach: Reach-96b

Downstream : 105c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	9670
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	25
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-96b	
Peak Discharge (CFS)	0
Time of Peak Discharge	01Jan2024, 18:15
Volume (IN)	0
Peak Inflow (CFS)	2.76
Inflow Volume (AC - FT)	0.35

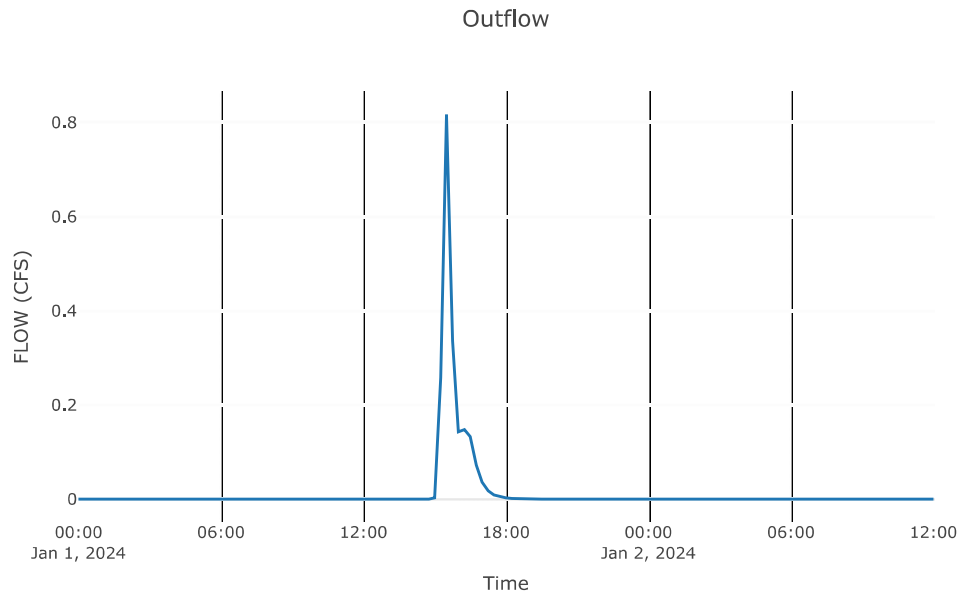


Reach: Reach-55b

Downstream : 93c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	5450
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	25
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-55b	
Peak Discharge (CFS)	0.82
Time of Peak Discharge	01Jan2024, 15:30
Volume (IN)	0
Peak Inflow (CFS)	1.85
Inflow Volume (AC - FT)	0.92

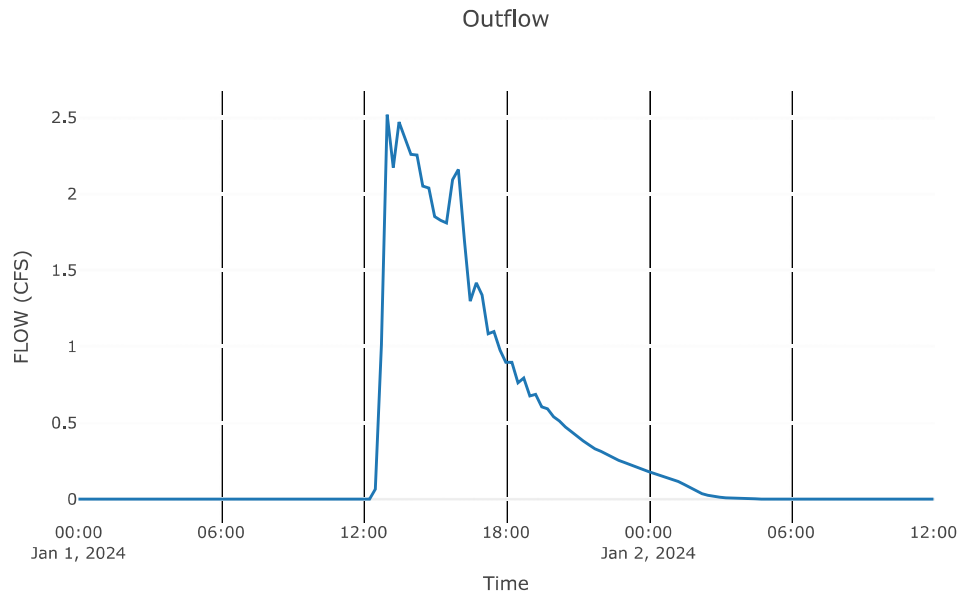


Reach: Reach-55c

Downstream : 97c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1490
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	25
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-55c	
Peak Discharge (CFS)	2.52
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.07
Peak Inflow (CFS)	2.75
Inflow Volume (AC - FT)	1.5

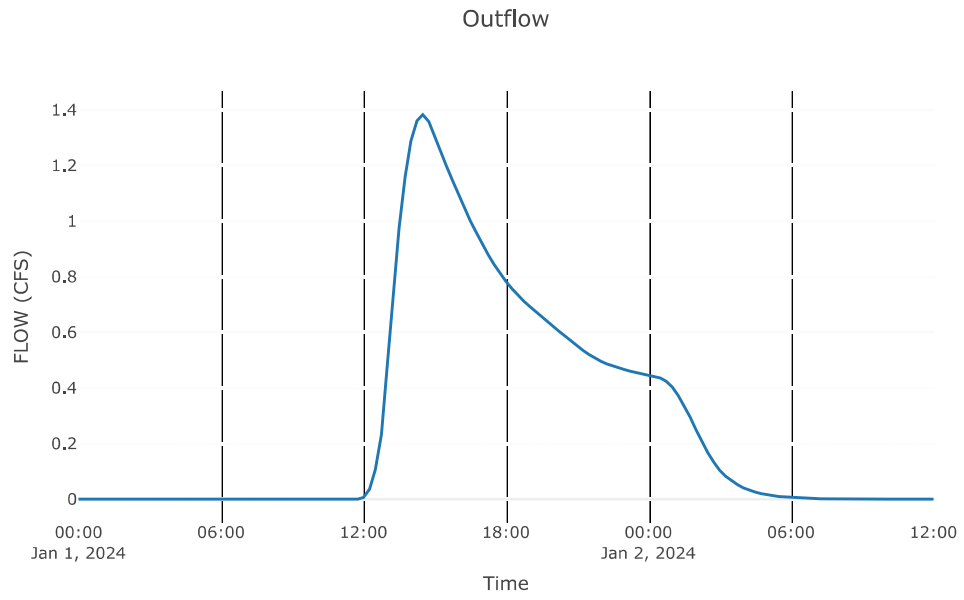


Reach: Reach-93b

Downstream : Junction - 36

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1490
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-93b	
Peak Discharge (CFS)	1.38
Time of Peak Discharge	01Jan2024, 14:30
Volume (IN)	0.18
Peak Inflow (CFS)	1.38
Inflow Volume (AC - FT)	0.82

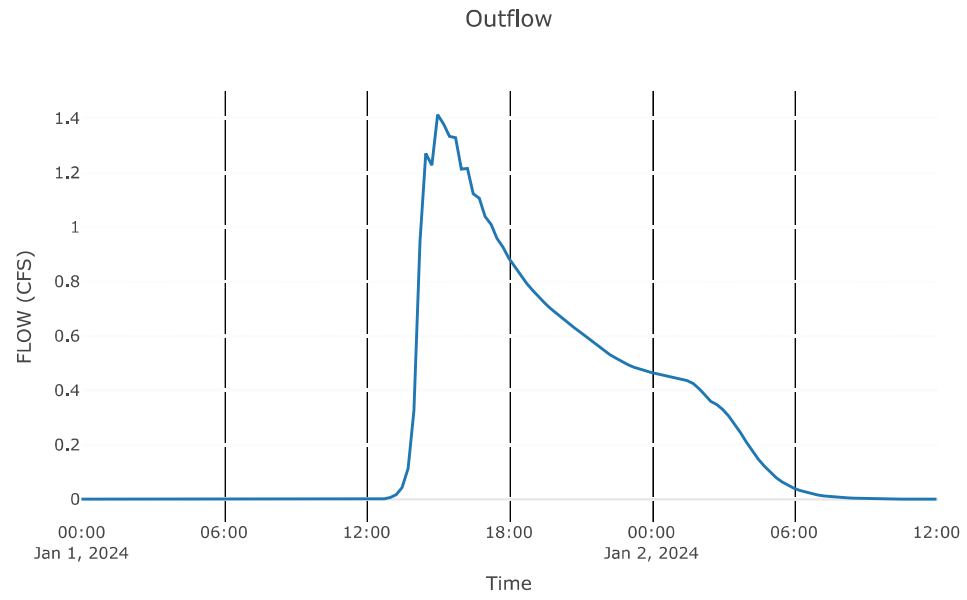


Reach: Reach-93c

Downstream : 97c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	8500
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-93c	
Peak Discharge (CFS)	1.41
Time of Peak Discharge	01Jan2024, 15:00
Volume (IN)	0.19
Peak Inflow (CFS)	1.38
Inflow Volume (AC - FT)	0.82

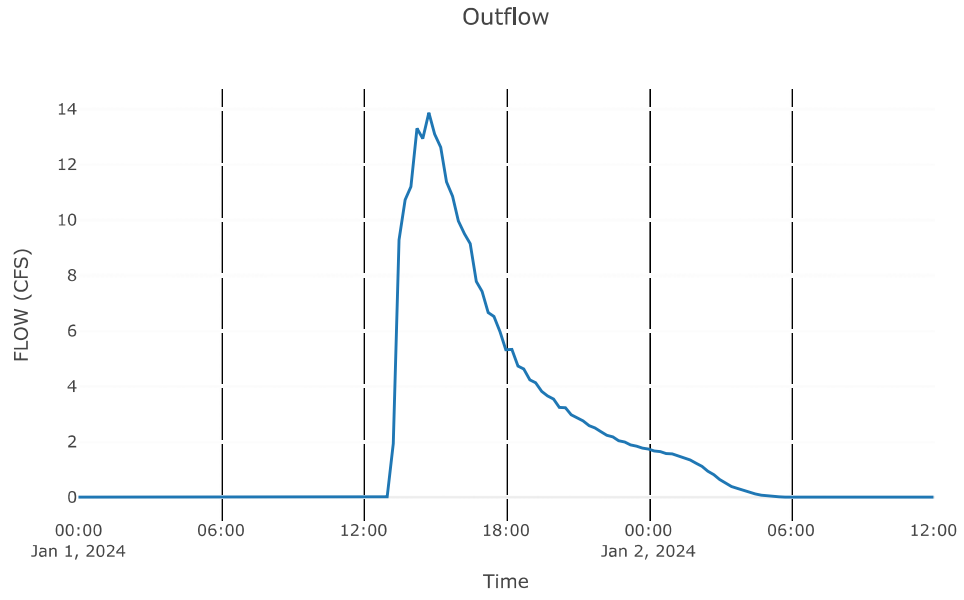


Reach: Reach-85b

Downstream : 95c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	3080
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	25
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-85b	
Peak Discharge (CFS)	13.87
Time of Peak Discharge	01Jan2024, 14:45
Volume (IN)	0.21
Peak Inflow (CFS)	14.36
Inflow Volume (AC - FT)	6.75

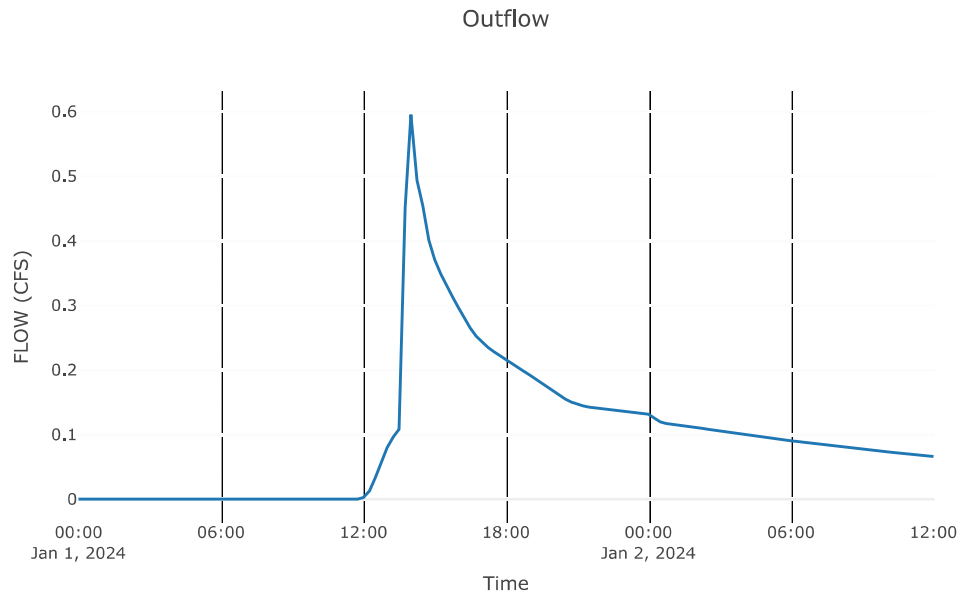


Reach: Reach-122b

Downstream : Reservoir - 36

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	550
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-122b	
Peak Discharge (CFS)	0.6
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.41
Peak Inflow (CFS)	0.62
Inflow Volume (AC - FT)	0.3

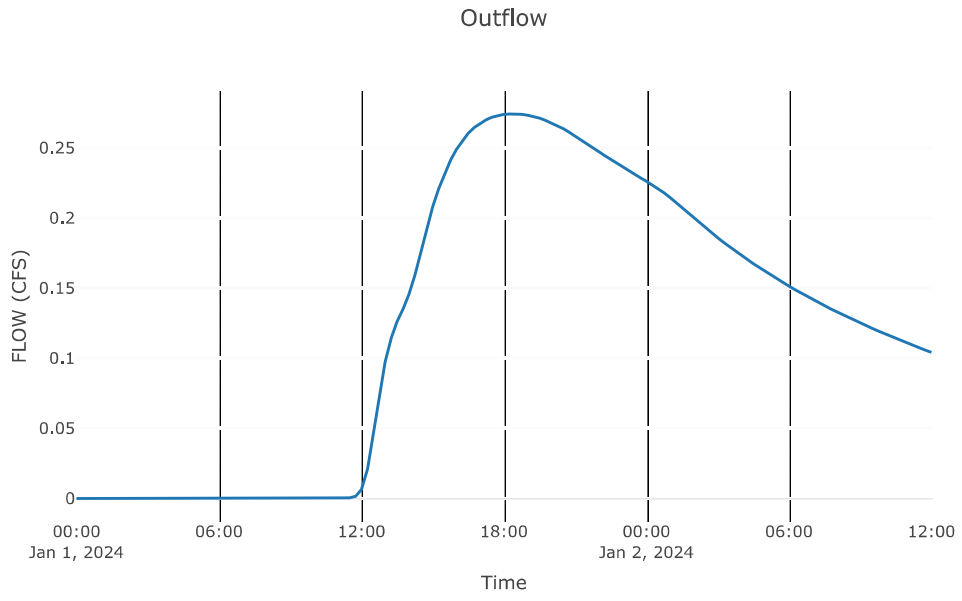


Reach: Reach-118b

Downstream : Reservoir - 26

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	3430
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-118b	
Peak Discharge (CFS)	0.27
Time of Peak Discharge	01Jan2024, 18:30
Volume (IN)	0.43
Peak Inflow (CFS)	0.27
Inflow Volume (AC - FT)	0.38

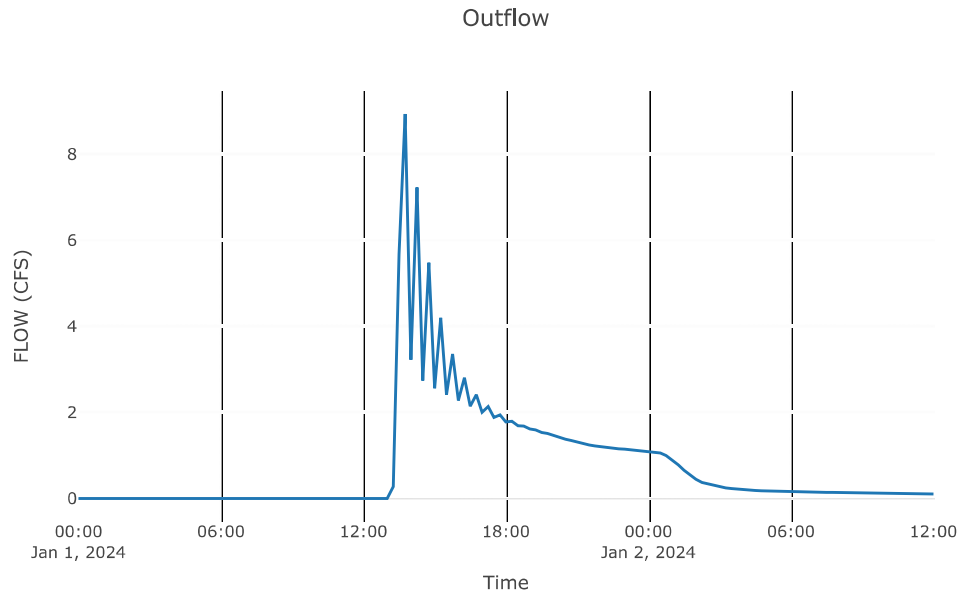


Reach: Reach-36b

Downstream : Reservoir - 24

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1600
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-36b	
Peak Discharge (CFS)	8.94
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.36
Peak Inflow (CFS)	11.12
Inflow Volume (AC - FT)	2.29

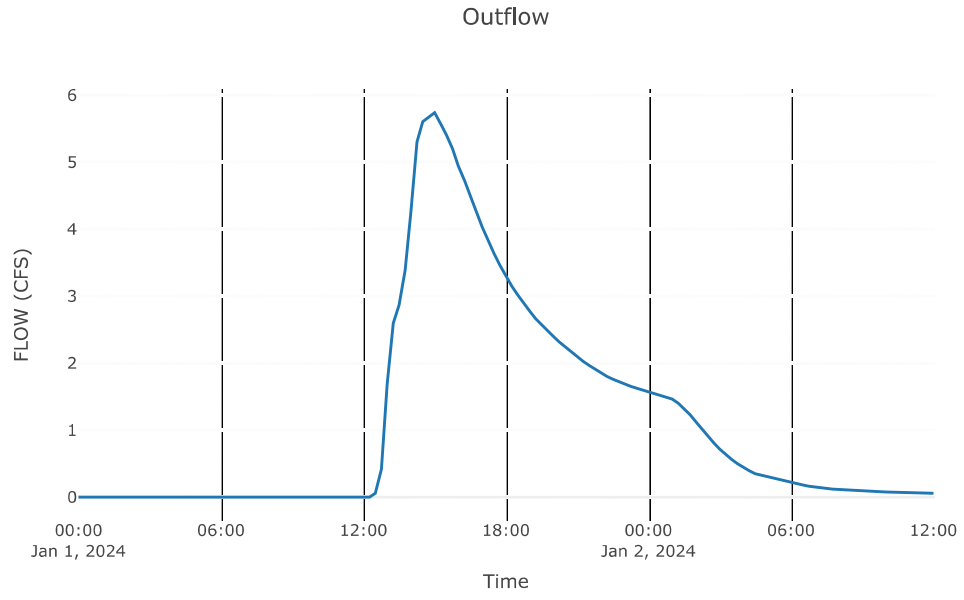


Reach: Reach-90b

Downstream : Reservoir - 23

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2070
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-90b	
Peak Discharge (CFS)	5.74
Time of Peak Discharge	01Jan2024, 15:00
Volume (IN)	0.38
Peak Inflow (CFS)	5.86
Inflow Volume (AC - FT)	3.55

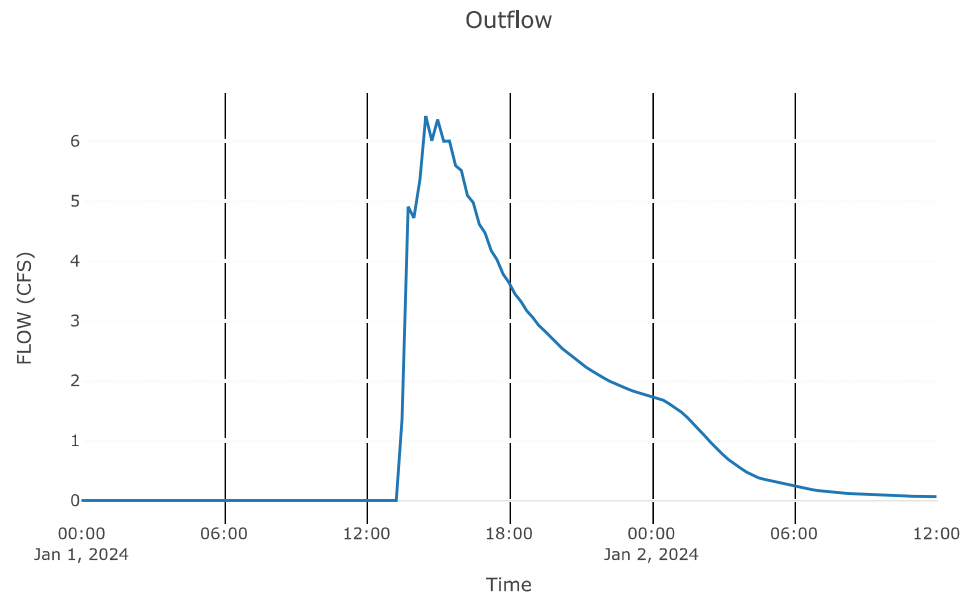


Reach: Reach-87b

Downstream : Reservoir - 22

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1580
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-87b	
Peak Discharge (CFS)	6.42
Time of Peak Discharge	01Jan2024, 14:30
Volume (IN)	0.37
Peak Inflow (CFS)	6.4
Inflow Volume (AC - FT)	3.58

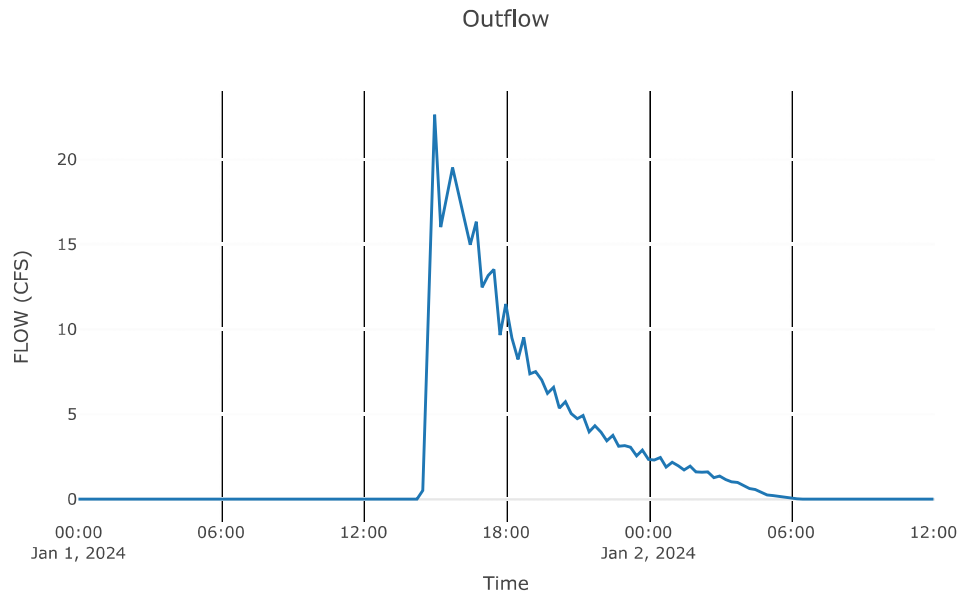


Reach: Reach-80b

Downstream : 88c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	8750
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	25
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-80b	
Peak Discharge (CFS)	22.63
Time of Peak Discharge	01Jan2024, 15:00
Volume (IN)	0.19
Peak Inflow (CFS)	20.92
Inflow Volume (AC - FT)	10.47

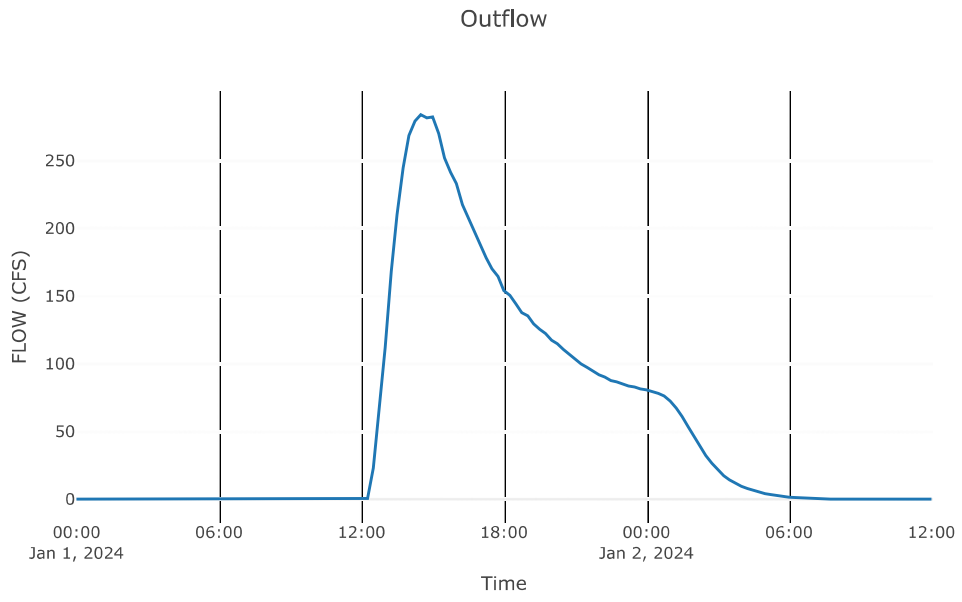


Reach: Reach-77b

Downstream : 113c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2800
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	25
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

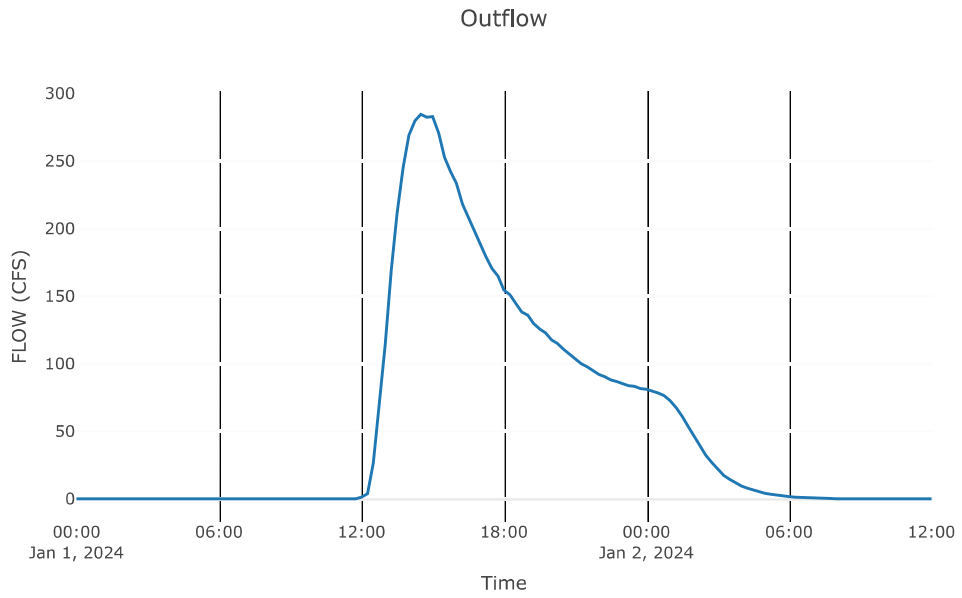
Results: Reach-77b	
Peak Discharge (CFS)	283.89
Time of Peak Discharge	01Jan2024, 14:30
Volume (IN)	0.23
Peak Inflow (CFS)	284.07
Inflow Volume (AC - FT)	166.46



Reach: Reach-54b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	90
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	25
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-54b	
Peak Discharge (CFS)	284.47
Time of Peak Discharge	01Jan2024, 14:30
Volume (IN)	0.23
Peak Inflow (CFS)	284.62
Inflow Volume (AC - FT)	166.01

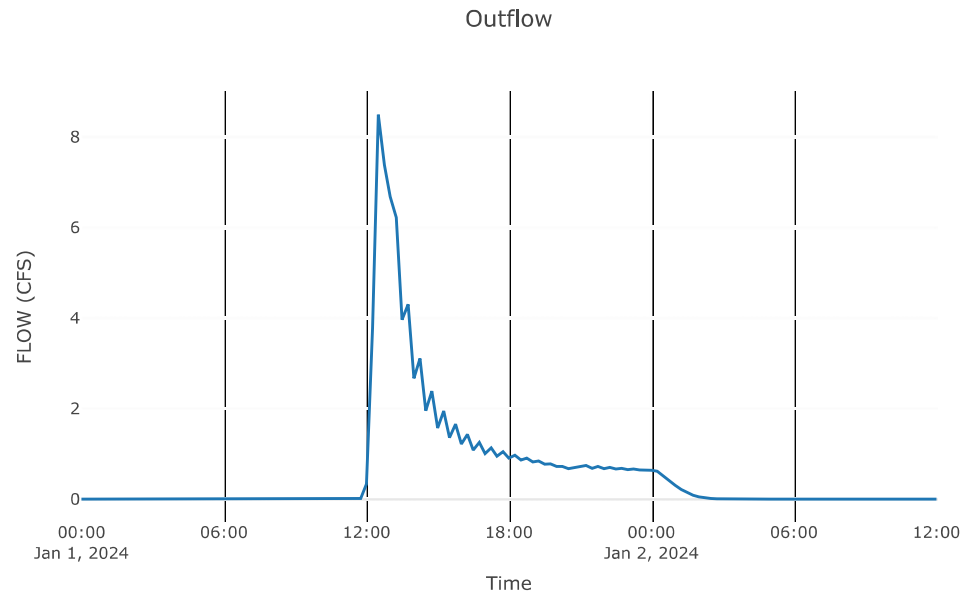


Reach: Reach-15b

Downstream : Junction - 15b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	430
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-15b	
Peak Discharge (CFS)	8.49
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.55
Peak Inflow (CFS)	8.85
Inflow Volume (AC - FT)	1.83

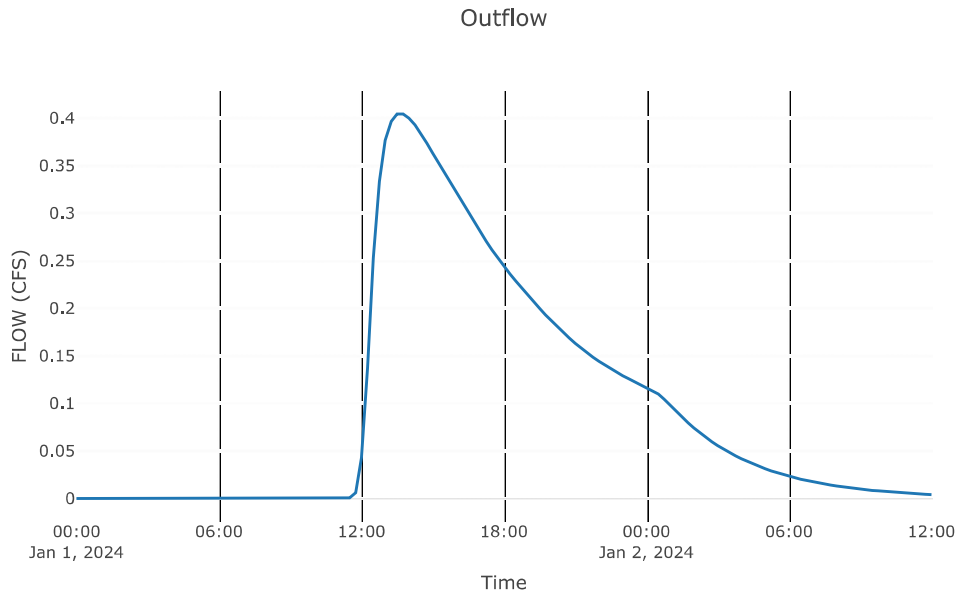


Reach: Reach-58b

Downstream : Junction - 25

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	100
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-58b	
Peak Discharge (CFS)	0.4
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.73
Peak Inflow (CFS)	0.4
Inflow Volume (AC - FT)	0.28

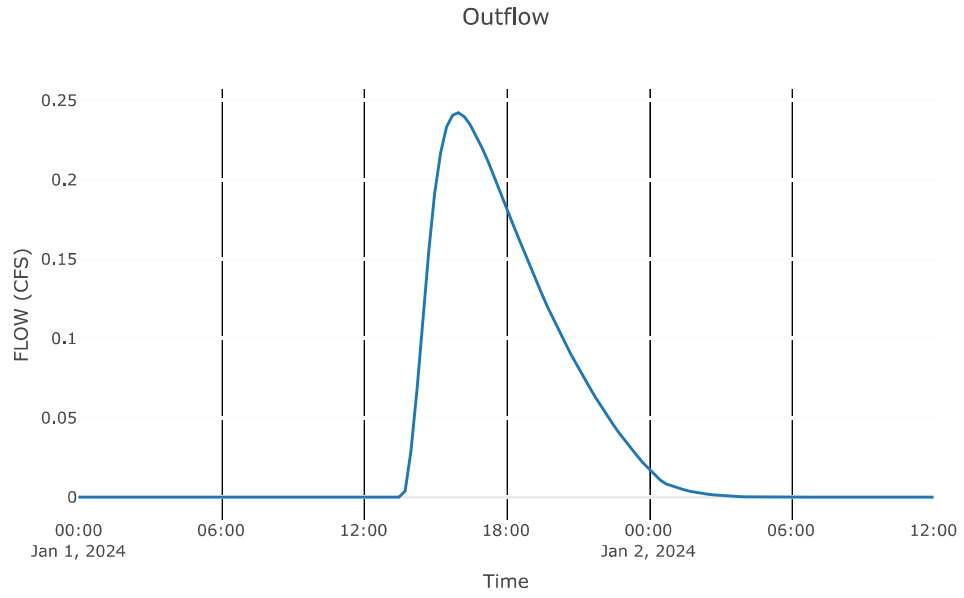


Reach: Reach-58c

Downstream : 41c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	4250
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-58c	
Peak Discharge (CFS)	0.24
Time of Peak Discharge	01Jan2024, 16:00
Volume (IN)	0.29
Peak Inflow (CFS)	0.4
Inflow Volume (AC - FT)	0.28

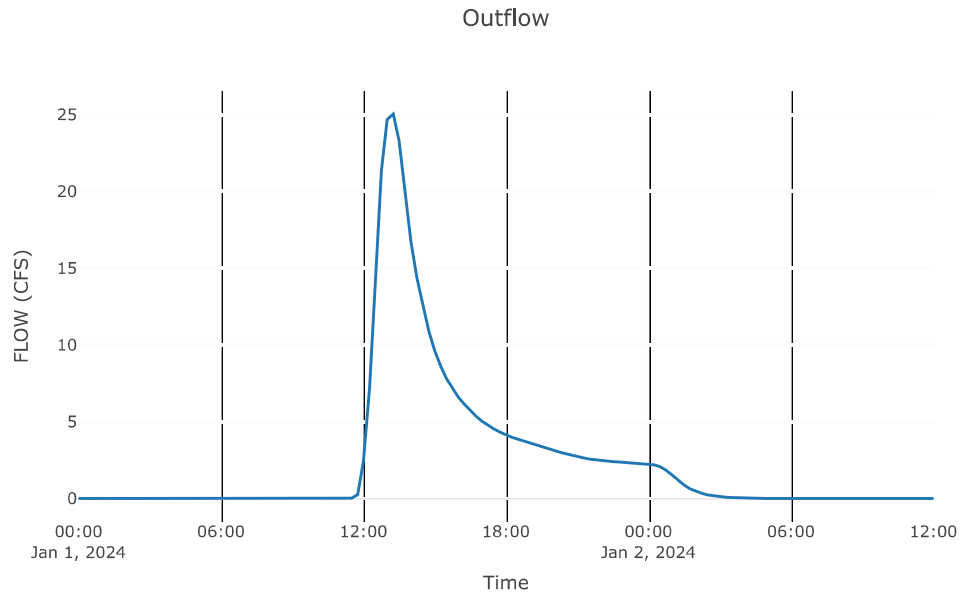


Reach: Reach-25b

Downstream : Junction - 38

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	80
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	4
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-25b	
Peak Discharge (CFS)	25.04
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.65
Peak Inflow (CFS)	25.05
Inflow Volume (AC - FT)	7.3

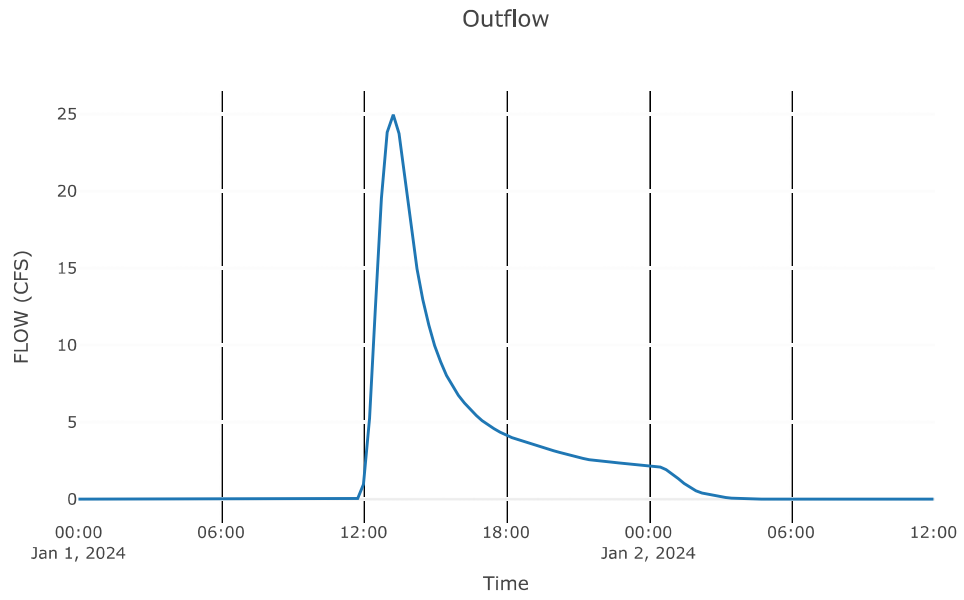


Reach: Reach-25c

Downstream : Junction - 38a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	680
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-25c	
Peak Discharge (CFS)	24.95
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.64
Peak Inflow (CFS)	25.04
Inflow Volume (AC - FT)	7.3

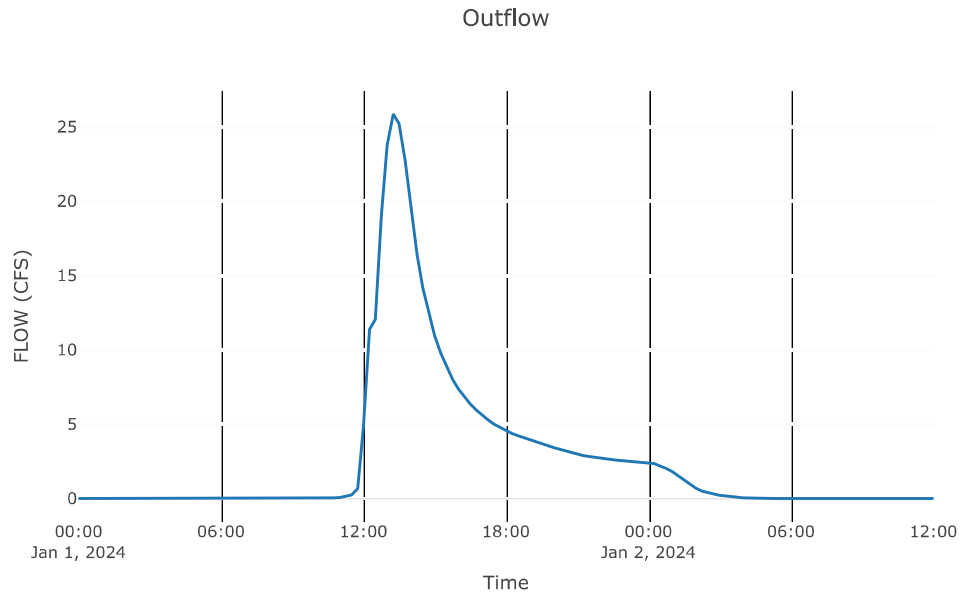


Reach: Reach-38b

Downstream : Junction - 15a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	2310
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-38b	
Peak Discharge (CFS)	25.87
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.66
Peak Inflow (CFS)	25.88
Inflow Volume (AC - FT)	8

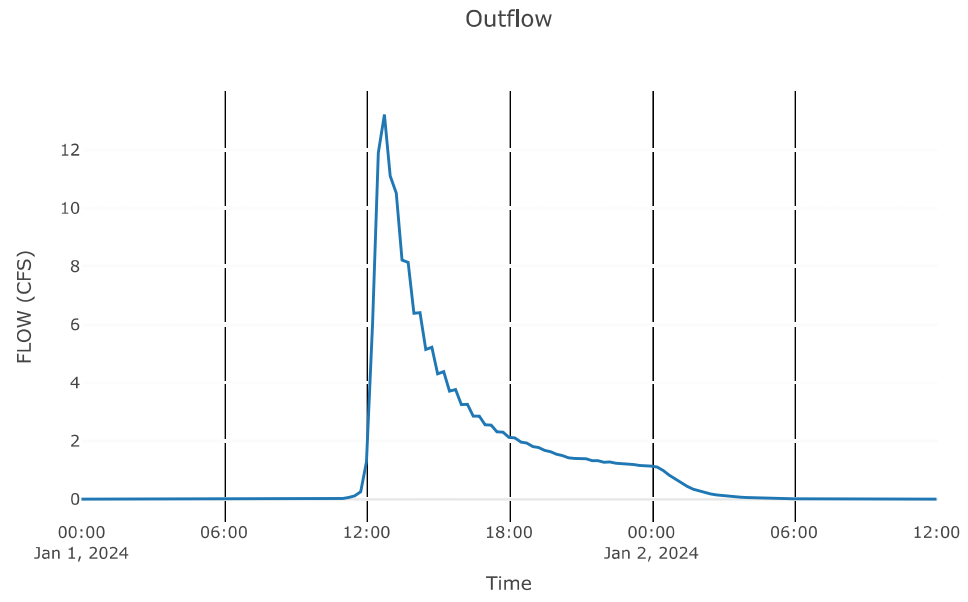


Reach: Reach-15a

Downstream : Junction - 15a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	670
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-15a	
Peak Discharge (CFS)	13.21
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.71
Peak Inflow (CFS)	13.52
Inflow Volume (AC - FT)	3.66

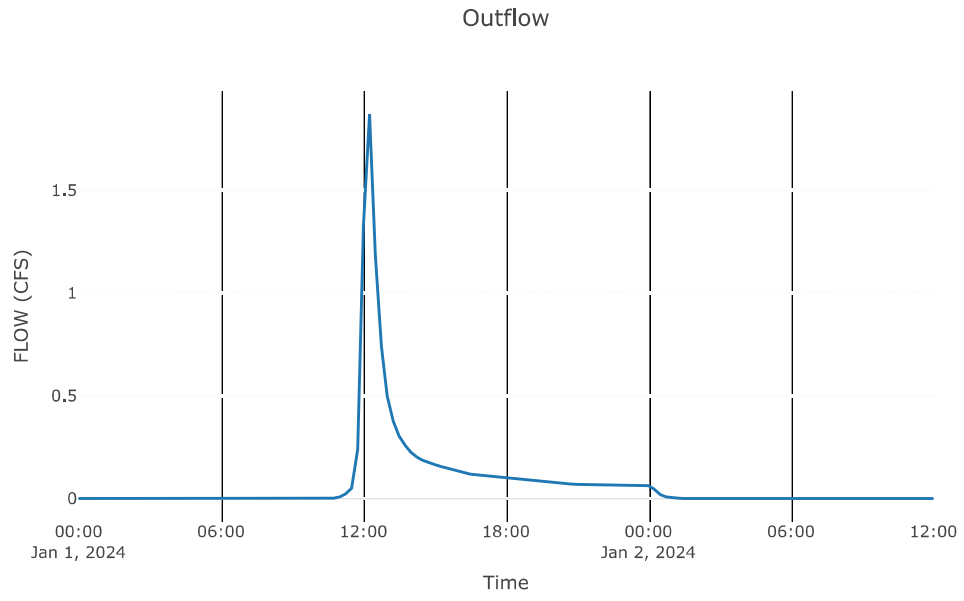


Reach: Reach-12b

Downstream : Junction - 15a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.25
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-12b	
Peak Discharge (CFS)	1.87
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	0.83
Peak Inflow (CFS)	1.88
Inflow Volume (AC - FT)	0.23

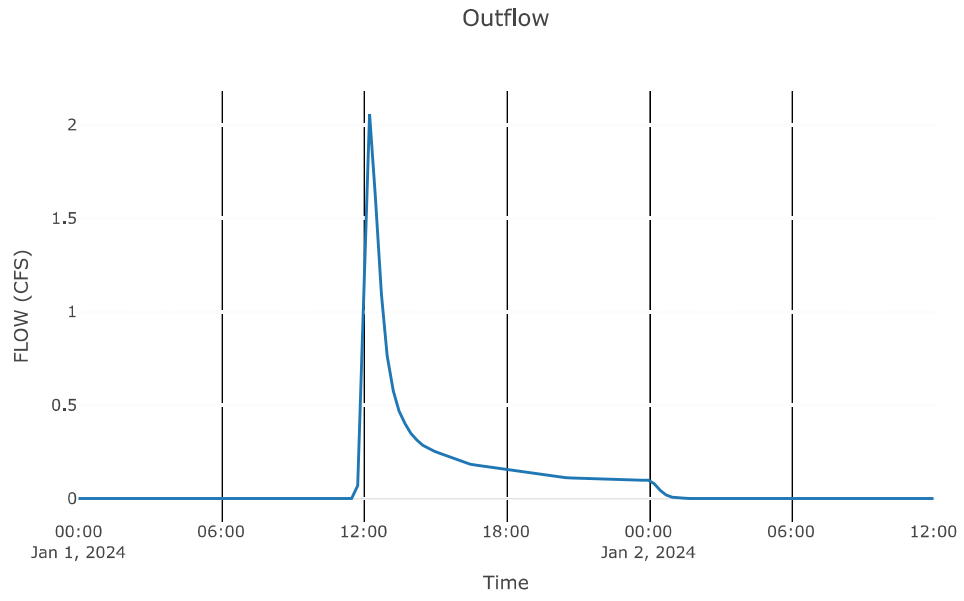


Reach: Reach-72b

Downstream : Junction - 73

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	500
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-72b	
Peak Discharge (CFS)	2.06
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	0.56
Peak Inflow (CFS)	2.18
Inflow Volume (AC - FT)	0.3

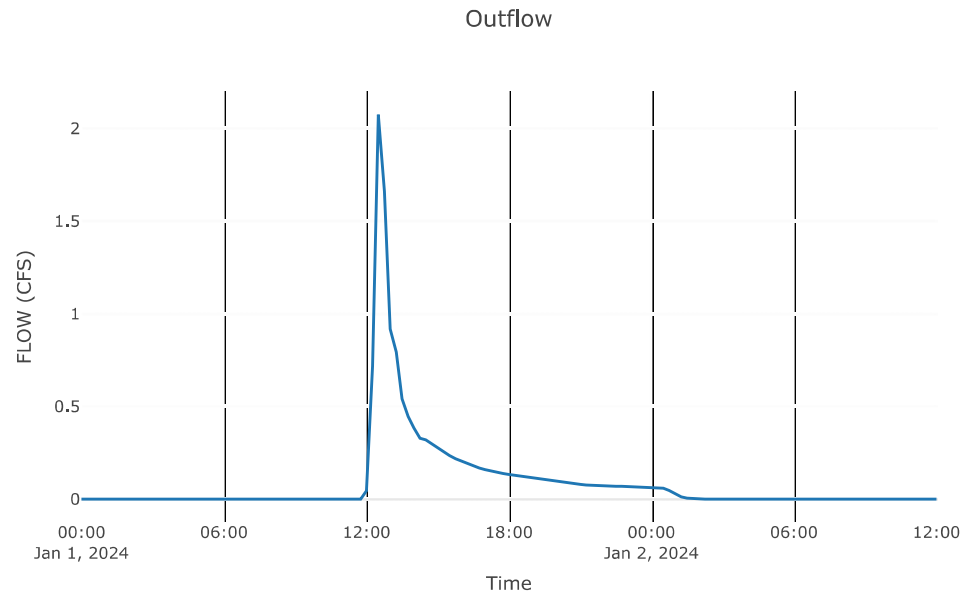


Reach: Reach-72c

Downstream : 84c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1170
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-72c	
Peak Discharge (CFS)	2.07
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.5
Peak Inflow (CFS)	2.06
Inflow Volume (AC - FT)	0.3

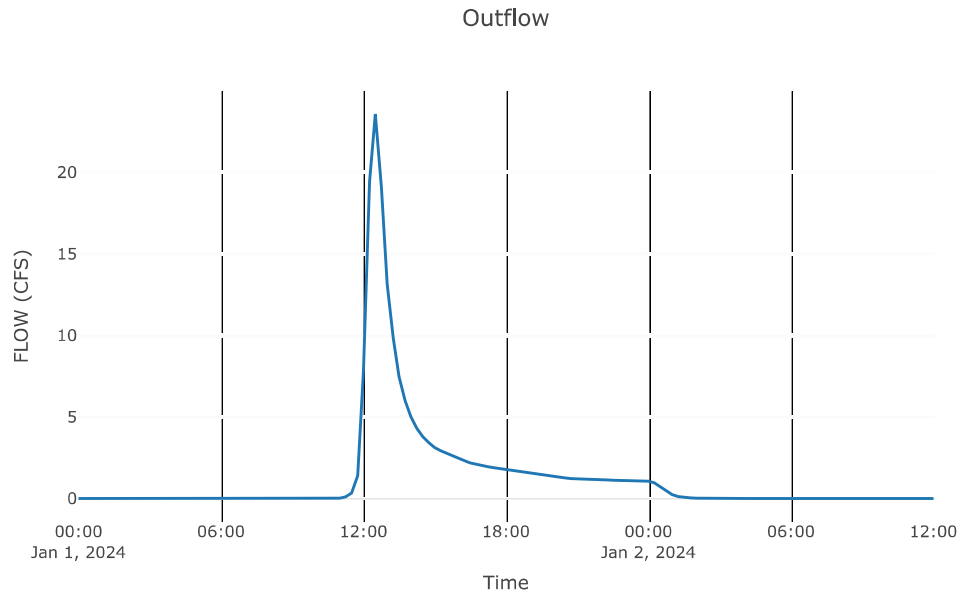


Reach: Reach-73b

Downstream : Junction - 28

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-73b	
Peak Discharge (CFS)	23.58
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.77
Peak Inflow (CFS)	23.63
Inflow Volume (AC - FT)	3.88

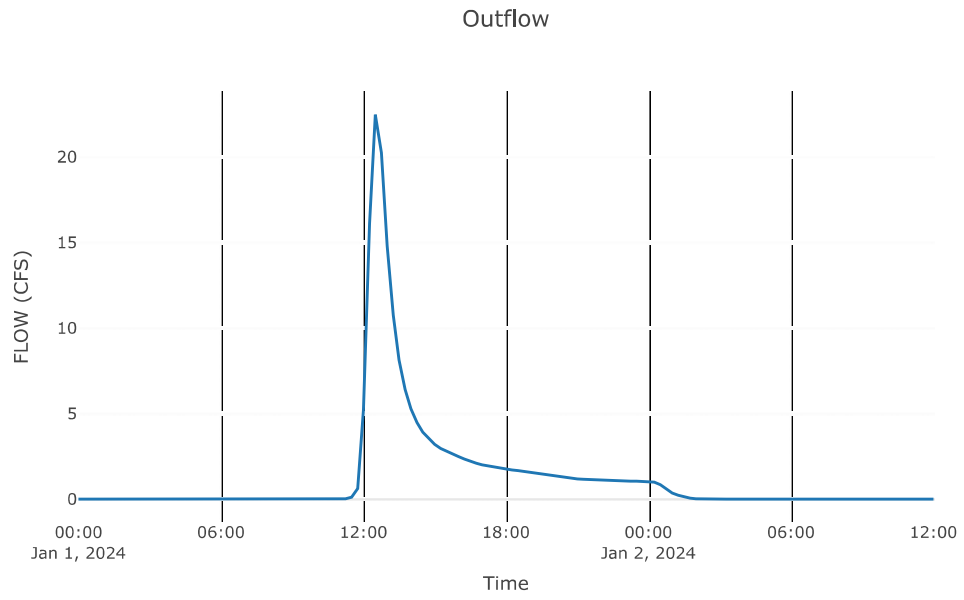


Reach: Reach-73c

Downstream : Junction - 28a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	650
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-73c	
Peak Discharge (CFS)	22.47
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.76
Peak Inflow (CFS)	23.58
Inflow Volume (AC - FT)	3.88

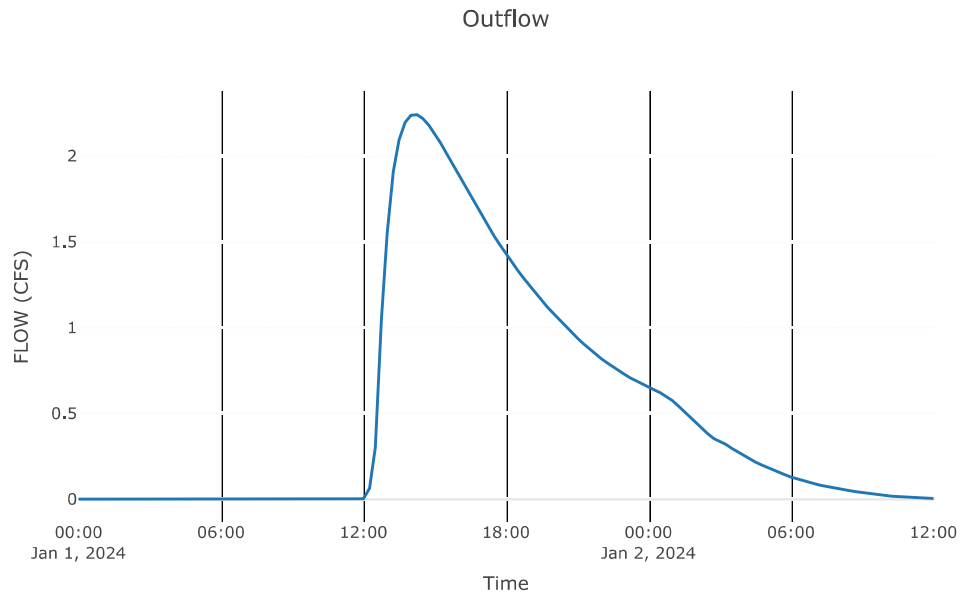


Reach: Reach-70b

Downstream : 81c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	940
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-70b	
Peak Discharge (CFS)	2.24
Time of Peak Discharge	01Jan2024, 14:15
Volume (IN)	0.7
Peak Inflow (CFS)	2.28
Inflow Volume (AC - FT)	1.58

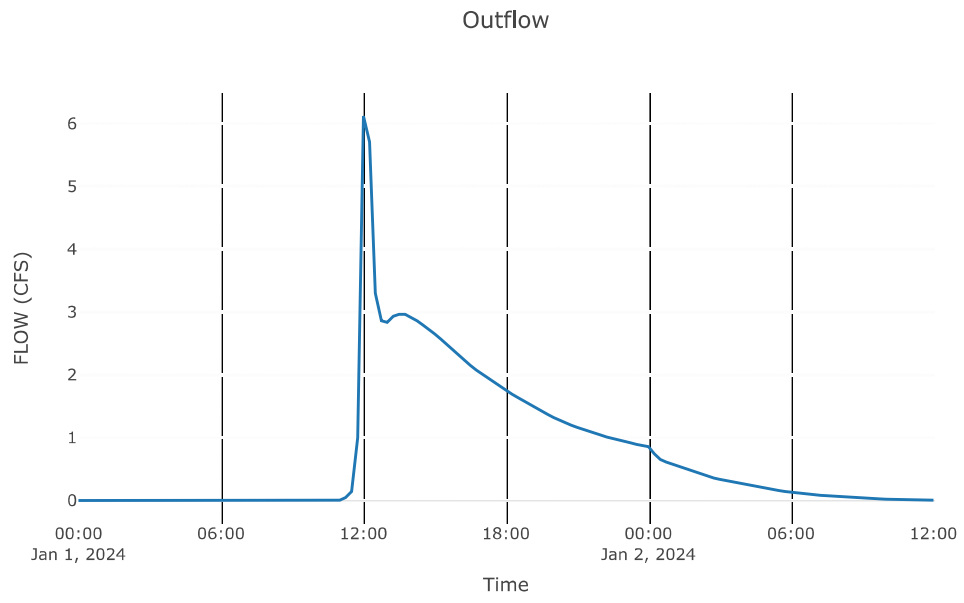


Reach: Reach-106b

Downstream : Junction - 28a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	80
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-106b	
Peak Discharge (CFS)	6.12
Time of Peak Discharge	01Jan2024, 12:00
Volume (IN)	0.72
Peak Inflow (CFS)	6.23
Inflow Volume (AC - FT)	2.25

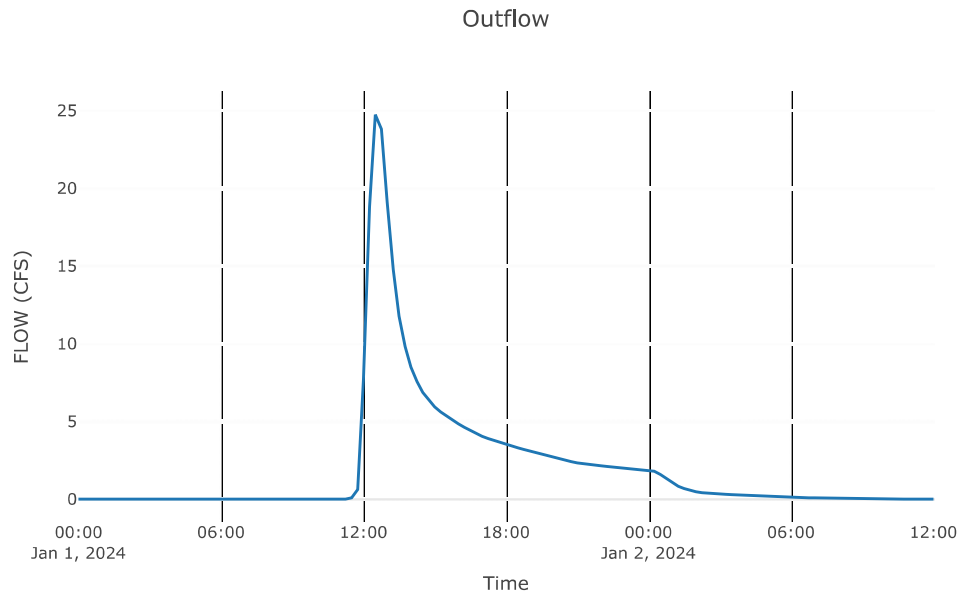


Reach: Reach-73d

Downstream : Junction - 26

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	670
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-73d	
Peak Discharge (CFS)	24.74
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.74
Peak Inflow (CFS)	25.77
Inflow Volume (AC - FT)	6.08

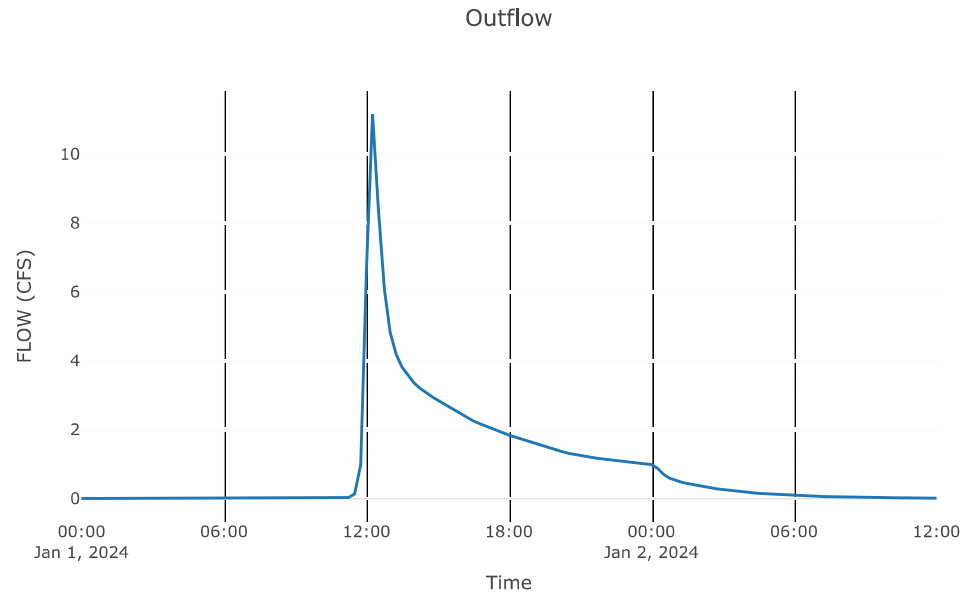


Reach: Reach-71b

Downstream : Junction - 26

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	100
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-71b	
Peak Discharge (CFS)	11.17
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	0.58
Peak Inflow (CFS)	11.28
Inflow Volume (AC - FT)	2.72

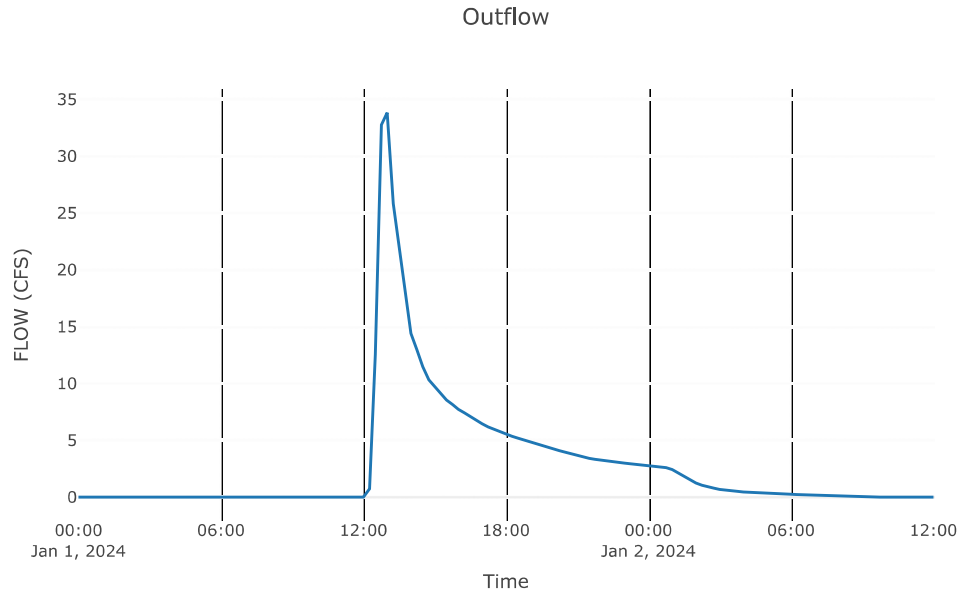


Reach: Reach-71c

Downstream : 39c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	4350
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-71c	
Peak Discharge (CFS)	33.83
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.65
Peak Inflow (CFS)	33.16
Inflow Volume (AC - FT)	8.74

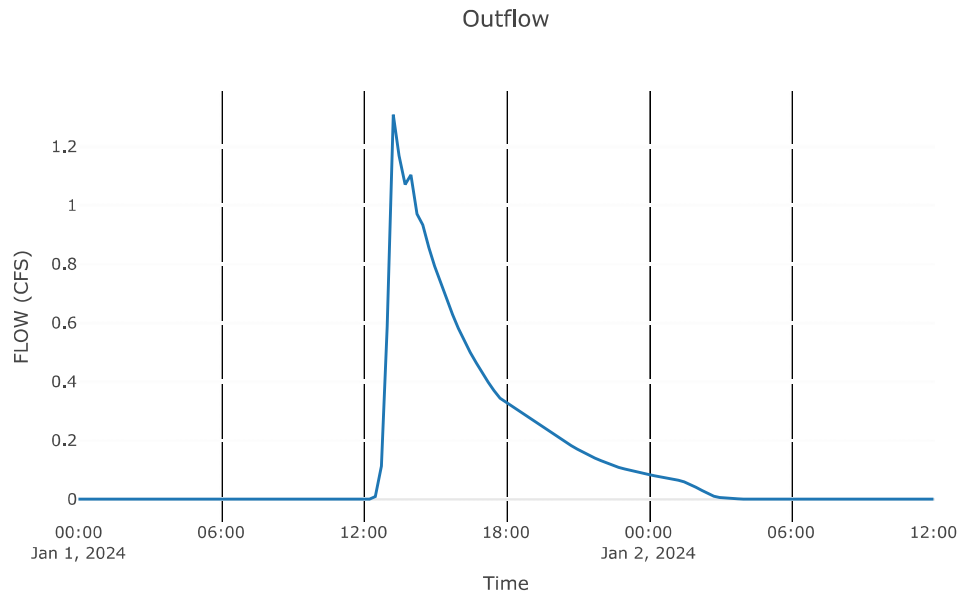


Reach: Reach-27b

Downstream : 39c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	3040
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-27b	
Peak Discharge (CFS)	1.31
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.63
Peak Inflow (CFS)	1.28
Inflow Volume (AC - FT)	0.52

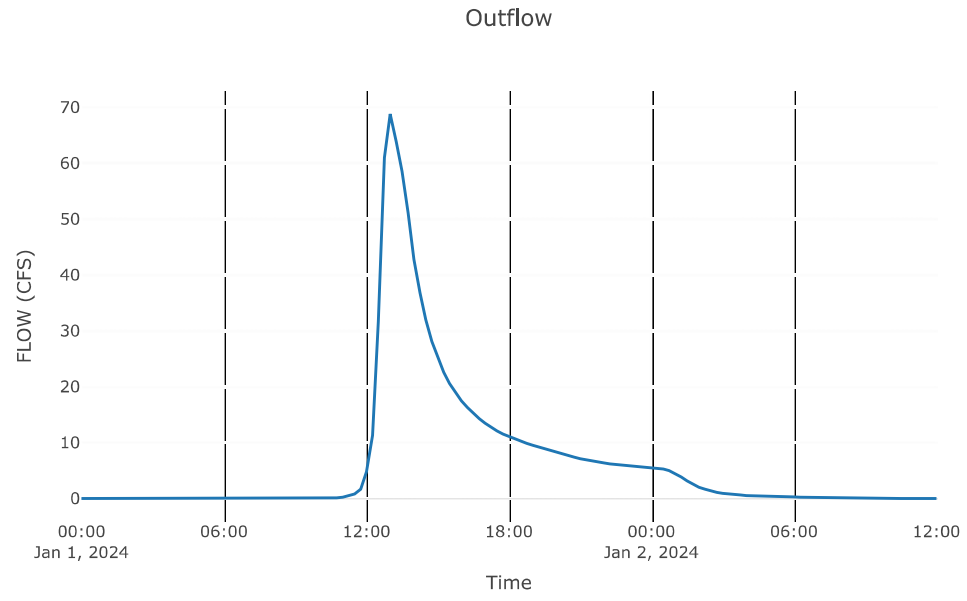


Reach: Reach-26b

Downstream : Junction - 23

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	110
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.25
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-26b	
Peak Discharge (CFS)	68.81
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.8
Peak Inflow (CFS)	69.01
Inflow Volume (AC - FT)	19.15

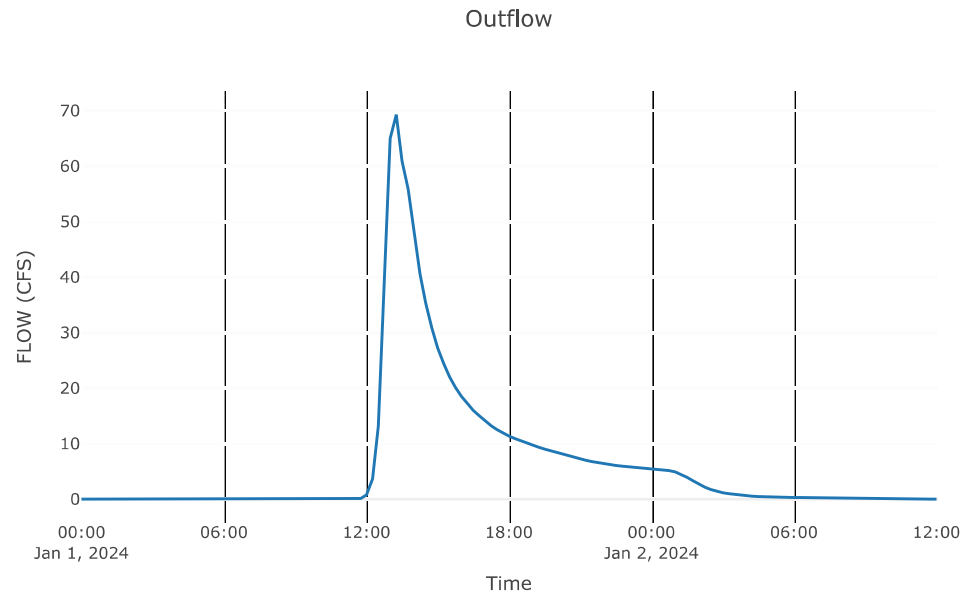


Reach: Reach-26c

Downstream : 38c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2230
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-26c	
Peak Discharge (CFS)	69.26
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.79
Peak Inflow (CFS)	68.81
Inflow Volume (AC - FT)	19.15

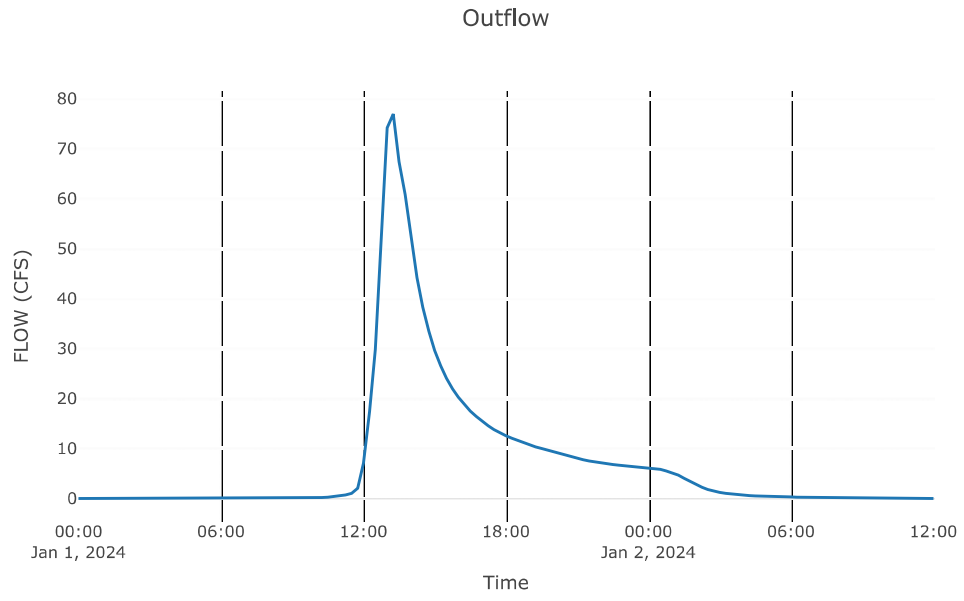


Reach: Reach-23b

Downstream : 33c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	460
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-23b	
Peak Discharge (CFS)	76.94
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.83
Peak Inflow (CFS)	77.02
Inflow Volume (AC - FT)	21.82

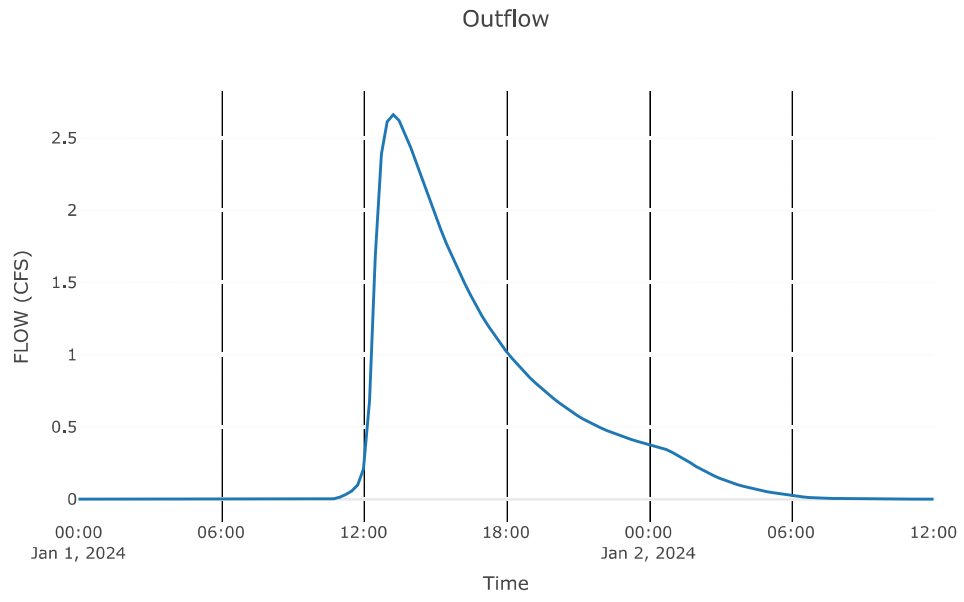


Reach: Reach-22b

Downstream : 33c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1030
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-22b	
Peak Discharge (CFS)	2.66
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	1.11
Peak Inflow (CFS)	2.7
Inflow Volume (AC - FT)	1.35

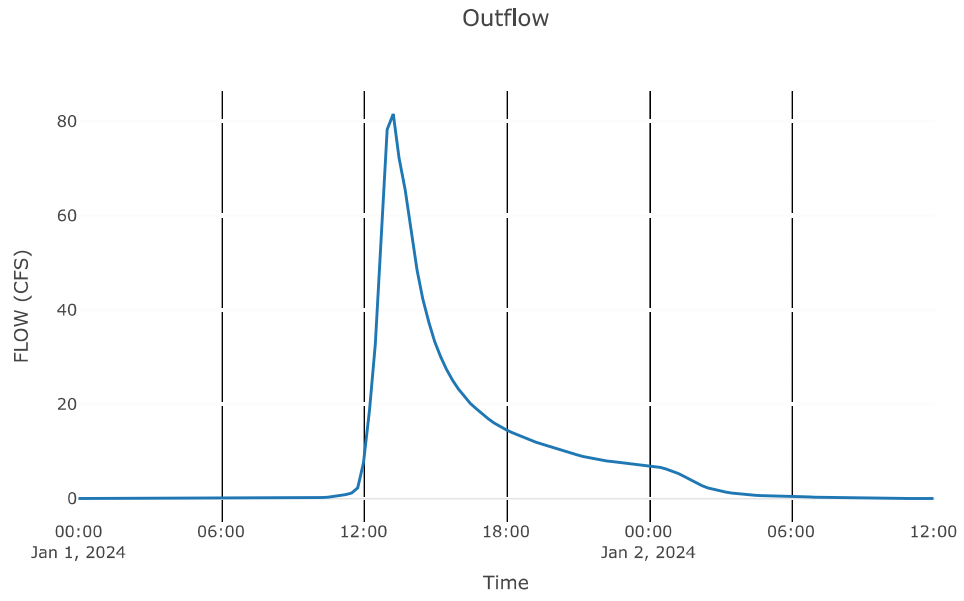


Reach: Reach-21b

Downstream : Junction - 20

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	150
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-21b	
Peak Discharge (CFS)	81.56
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.85
Peak Inflow (CFS)	81.62
Inflow Volume (AC - FT)	24.32

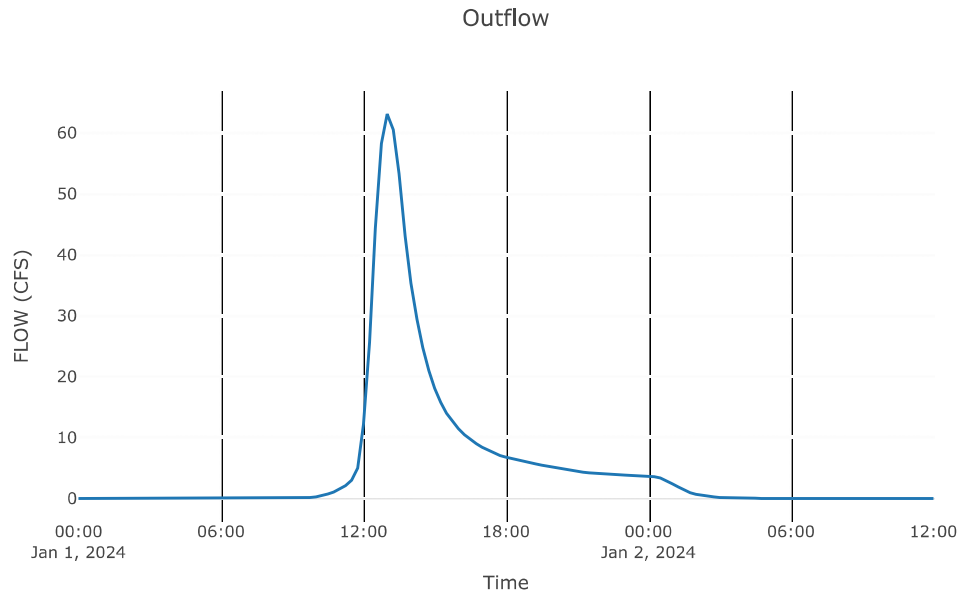


Reach: Reach-28b

Downstream : Junction - 83

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	80
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.25
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-28b	
Peak Discharge (CFS)	63.1
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	1.16
Peak Inflow (CFS)	63.19
Inflow Volume (AC - FT)	15.59

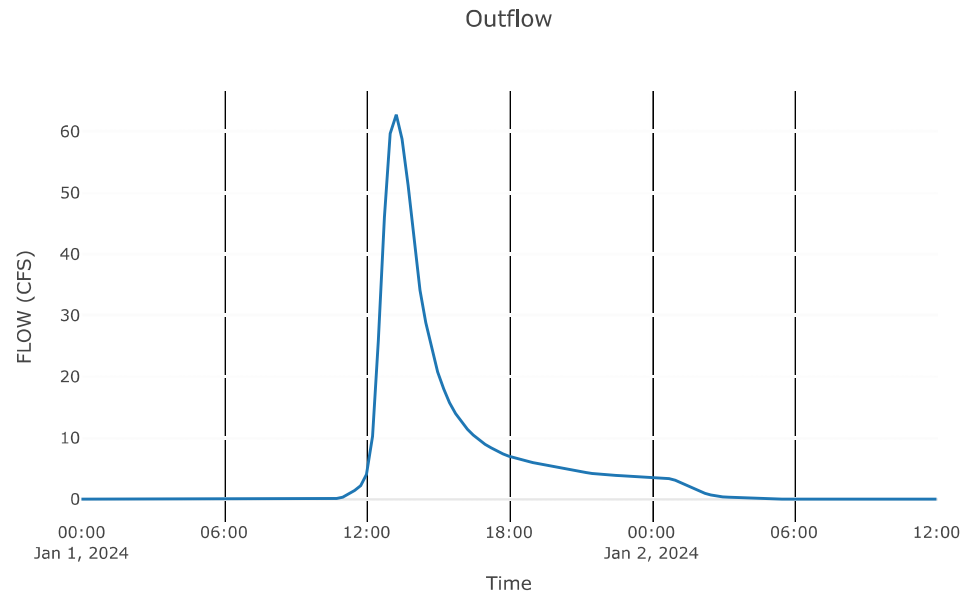


Reach: Reach-28c

Downstream : 35c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2650
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-28c	
Peak Discharge (CFS)	62.75
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	1.14
Peak Inflow (CFS)	63.1
Inflow Volume (AC - FT)	15.59

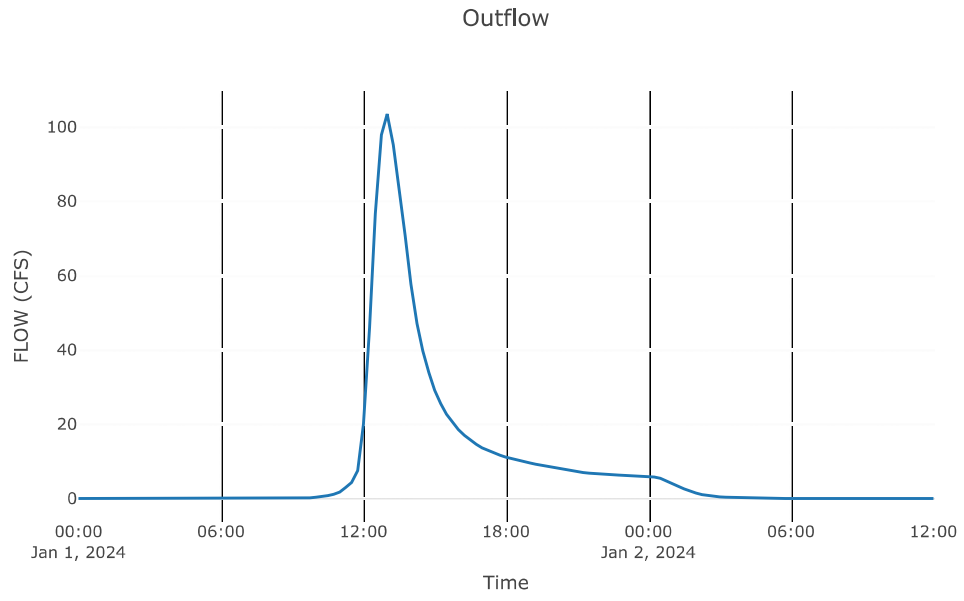


Reach: Reach-83b

Downstream : Junction - 24

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	60
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-83b	
Peak Discharge (CFS)	103.47
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	1.15
Peak Inflow (CFS)	103.52
Inflow Volume (AC - FT)	25.45

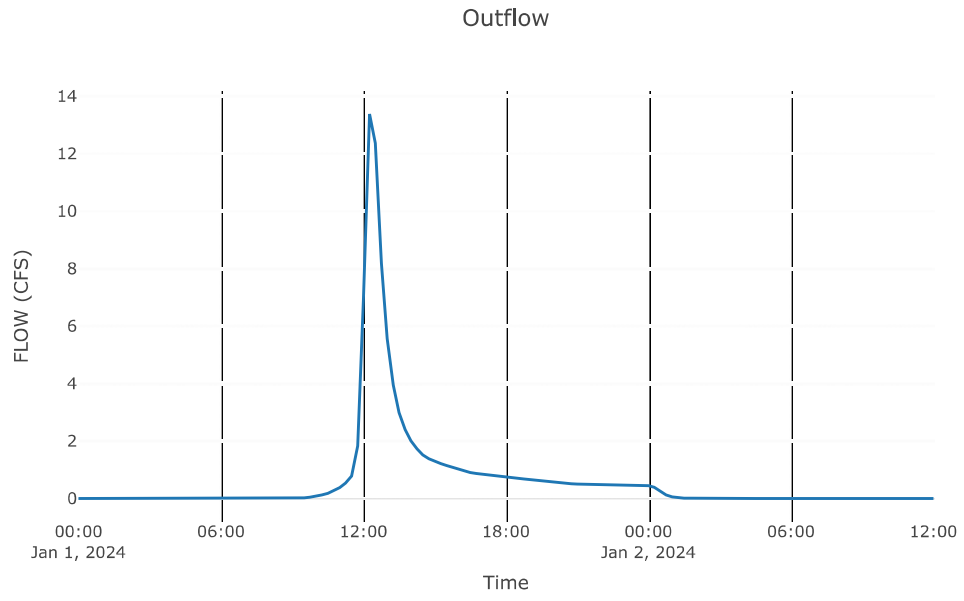


Reach: Reach-110b

Downstream : Junction - 102a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-110b	
Peak Discharge (CFS)	13.38
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	1.12
Peak Inflow (CFS)	13.43
Inflow Volume (AC - FT)	1.92

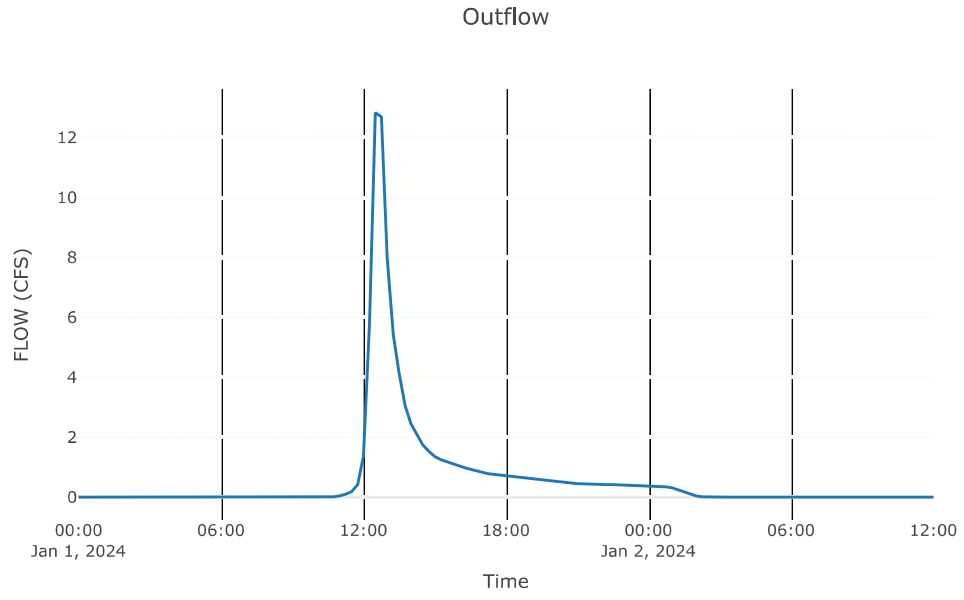


Reach: Reach-110c

Downstream : Junction - 24

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2030
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-110c	
Peak Discharge (CFS)	12.83
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	1.07
Peak Inflow (CFS)	13.38
Inflow Volume (AC - FT)	1.92

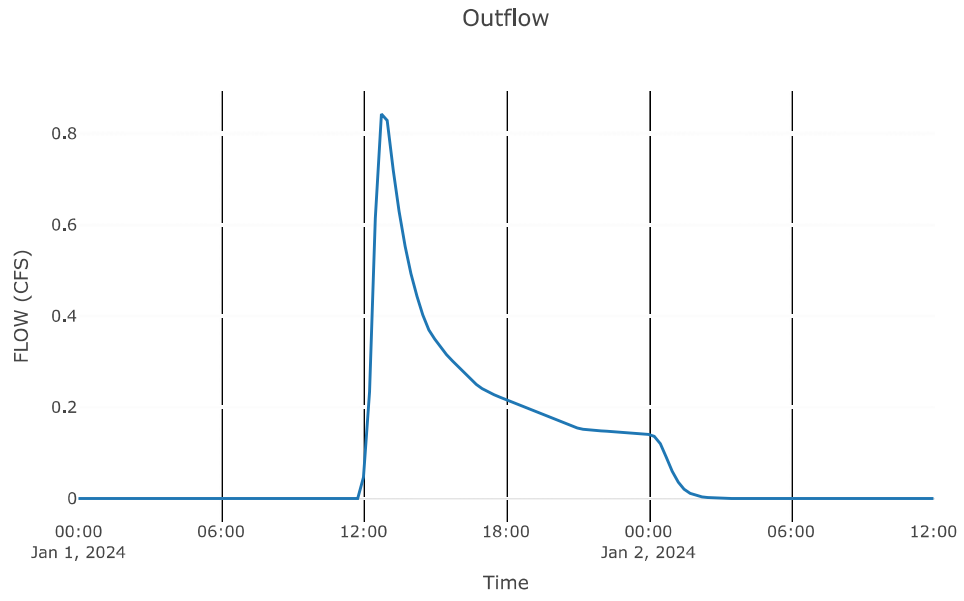


Reach: Reach-95b

Downstream : Junction - 68

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	2460
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-95b	
Peak Discharge (CFS)	0.84
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.22
Peak Inflow (CFS)	0.85
Inflow Volume (AC - FT)	0.29

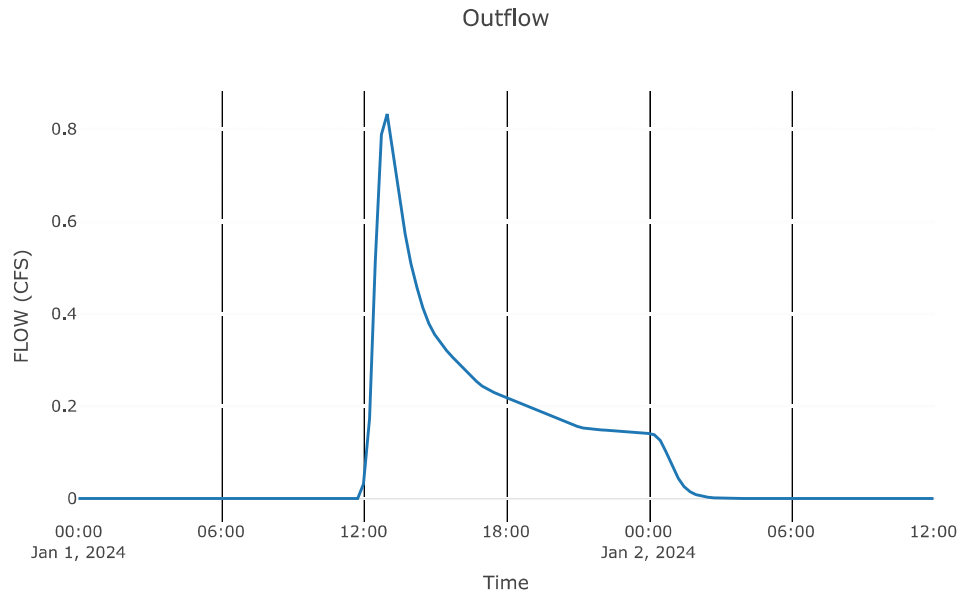


Reach: Reach-95c

Downstream : Junction - 73a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	910
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-95c	
Peak Discharge (CFS)	0.83
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.22
Peak Inflow (CFS)	0.84
Inflow Volume (AC - FT)	0.29

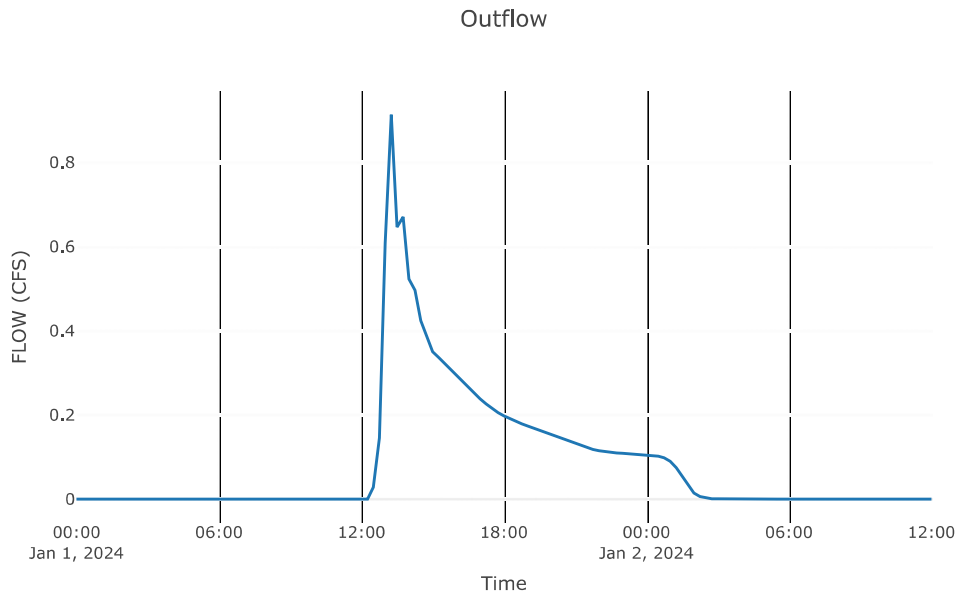


Reach: Reach-95d

Downstream : 85c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1260
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-95d	
Peak Discharge (CFS)	0.91
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.19
Peak Inflow (CFS)	0.83
Inflow Volume (AC - FT)	0.29

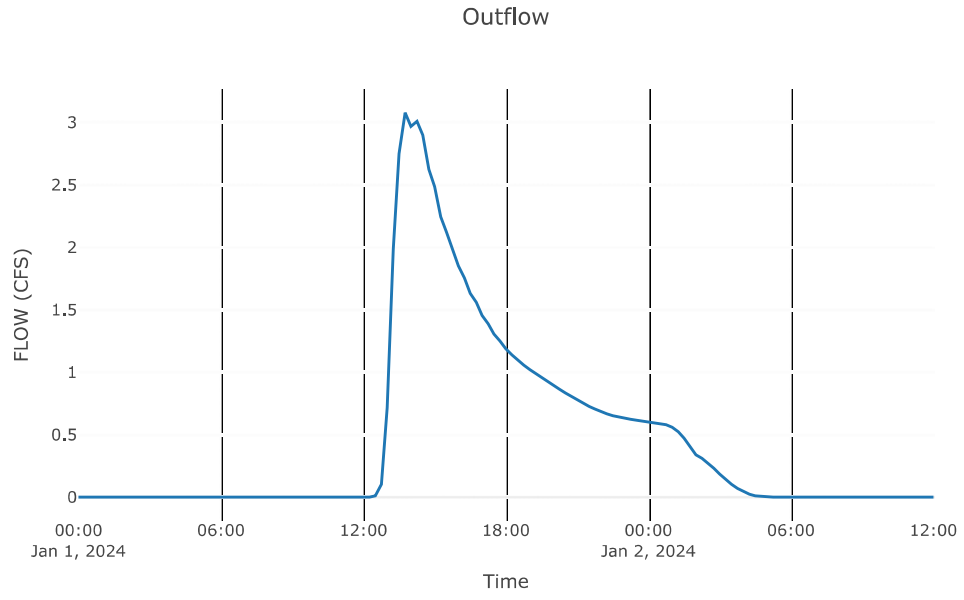


Reach: Reach-74b

Downstream : 45c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1700
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-74b	
Peak Discharge (CFS)	3.08
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.24
Peak Inflow (CFS)	3.16
Inflow Volume (AC - FT)	1.46

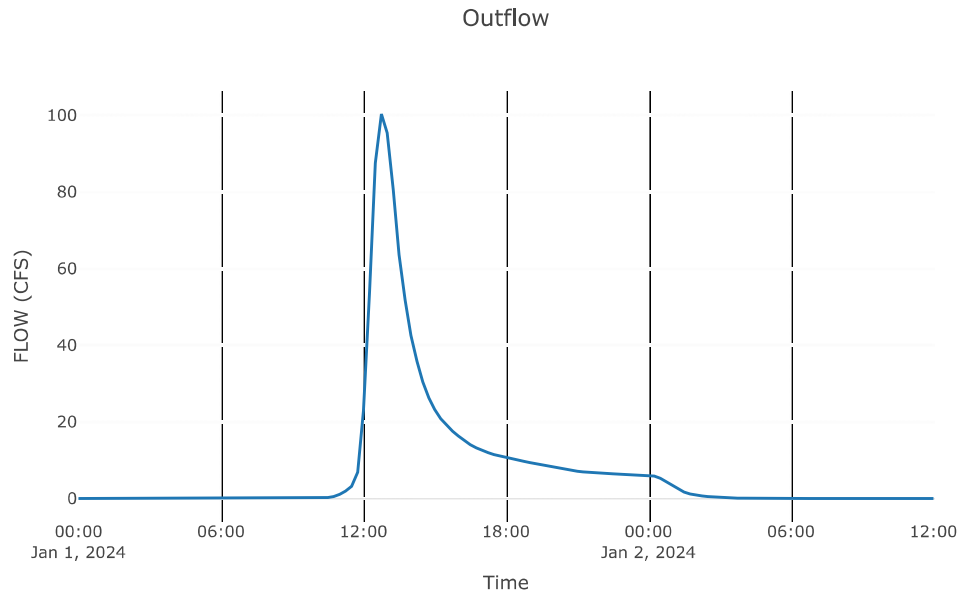


Reach: Reach-30b

Downstream : Junction - 29

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-30b	
Peak Discharge (CFS)	100.33
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.83
Peak Inflow (CFS)	100.4
Inflow Volume (AC - FT)	22.92

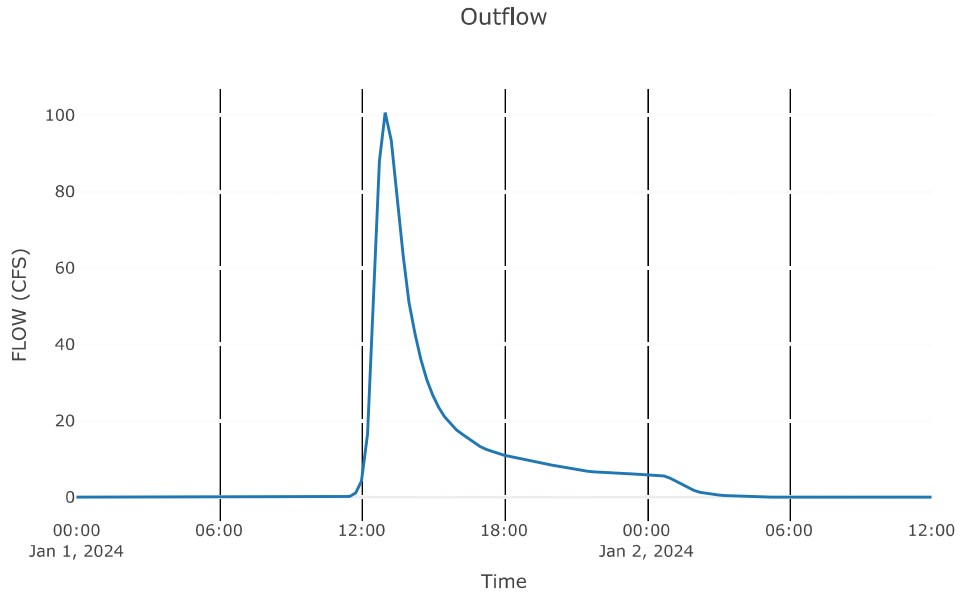


Reach: Reach-30c

Downstream : 44c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	3320
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-30c	
Peak Discharge (CFS)	100.62
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.82
Peak Inflow (CFS)	100.33
Inflow Volume (AC - FT)	22.92

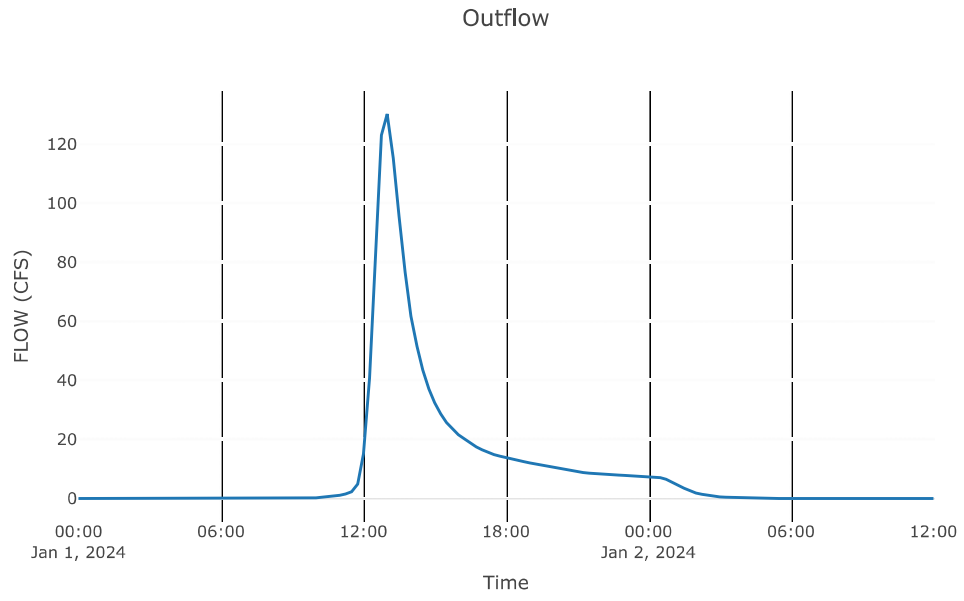


Reach: Reach-29b

Downstream : Junction - 102

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	60
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	4.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-29b	
Peak Discharge (CFS)	130.23
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.88
Peak Inflow (CFS)	130.27
Inflow Volume (AC - FT)	29.43

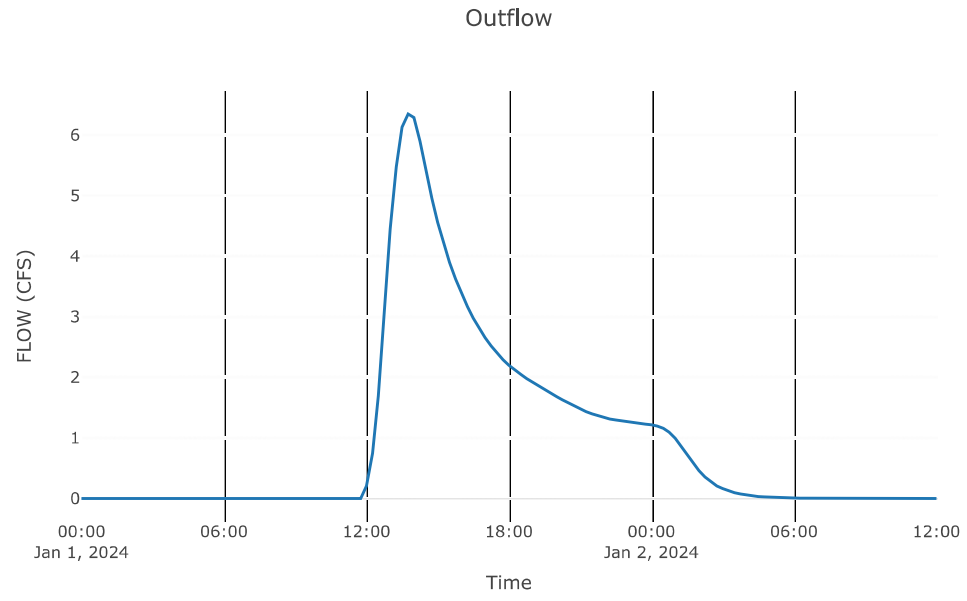


Reach: Reach-89b

Downstream : Junction - 63

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	250
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-89b	
Peak Discharge (CFS)	6.35
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.31
Peak Inflow (CFS)	6.36
Inflow Volume (AC - FT)	2.83

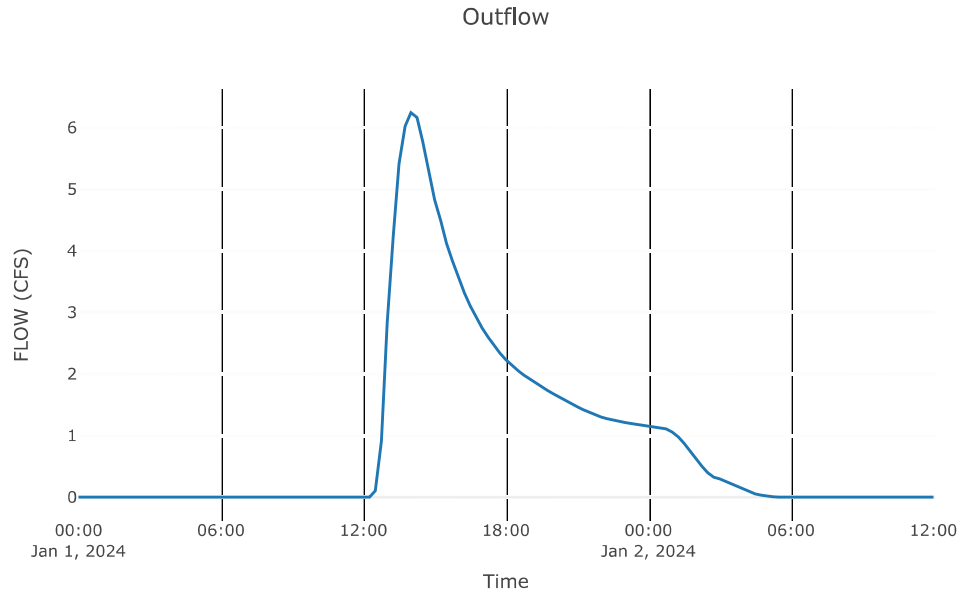


Reach: Reach-89c

Downstream : 86c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1830
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-89c	
Peak Discharge (CFS)	6.24
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.3
Peak Inflow (CFS)	6.35
Inflow Volume (AC - FT)	2.83

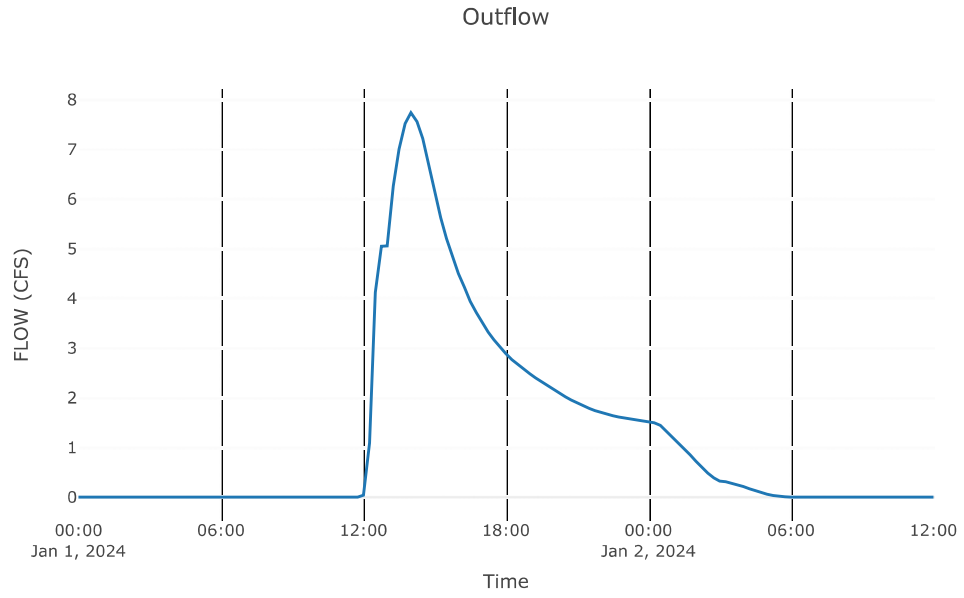


Reach: Reach-63b

Downstream : 87c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1140
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-63b	
Peak Discharge (CFS)	7.74
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.31
Peak Inflow (CFS)	7.75
Inflow Volume (AC - FT)	3.76

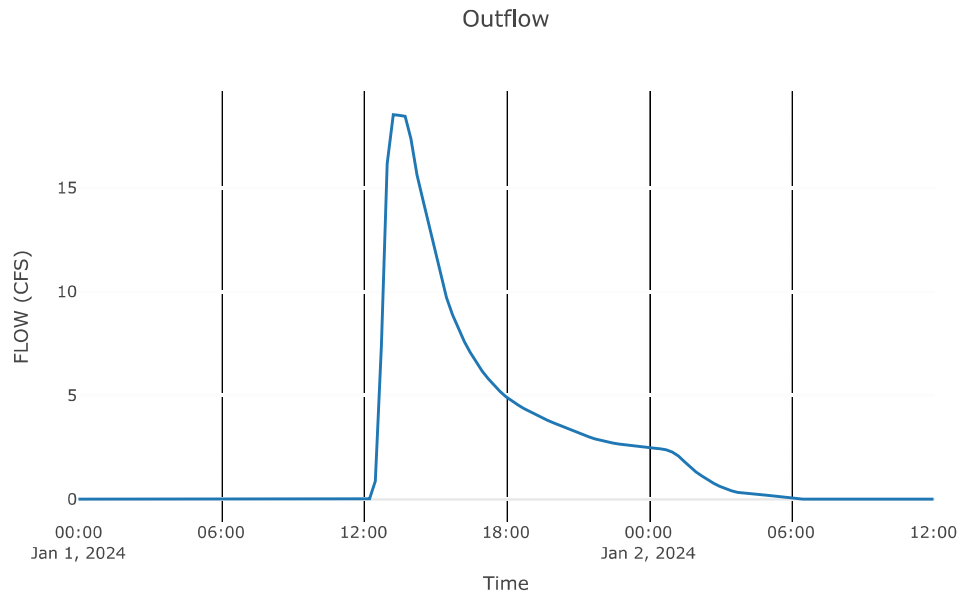


Reach: Reach-76b

Downstream : Junction - 76

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	3230
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-76b	
Peak Discharge (CFS)	18.52
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.42
Peak Inflow (CFS)	19.21
Inflow Volume (AC - FT)	7.26

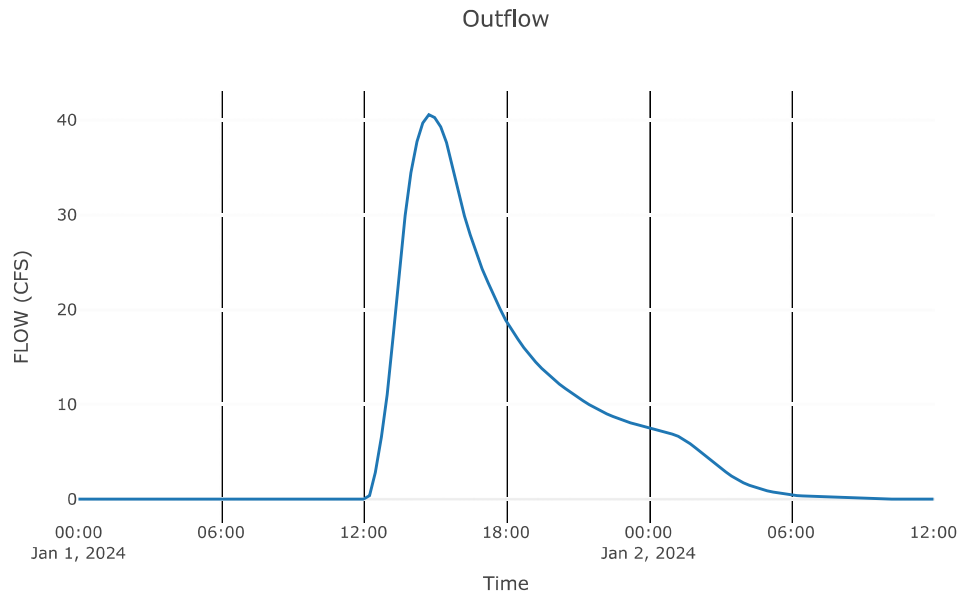


Reach: Reach-52b

Downstream : Junction - 52

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1460
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-52b	
Peak Discharge (CFS)	40.56
Time of Peak Discharge	01Jan2024, 14:45
Volume (IN)	0.55
Peak Inflow (CFS)	40.62
Inflow Volume (AC - FT)	20.37

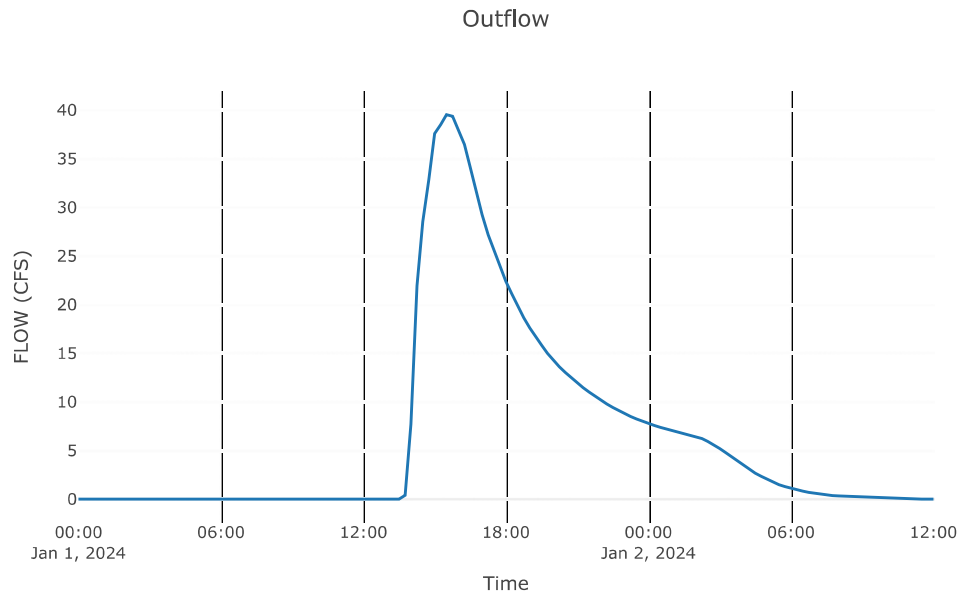


Reach: Reach-52c

Downstream : 115c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	8800
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-52c	
Peak Discharge (CFS)	39.53
Time of Peak Discharge	01Jan2024, 15:30
Volume (IN)	0.52
Peak Inflow (CFS)	40.56
Inflow Volume (AC - FT)	20.22

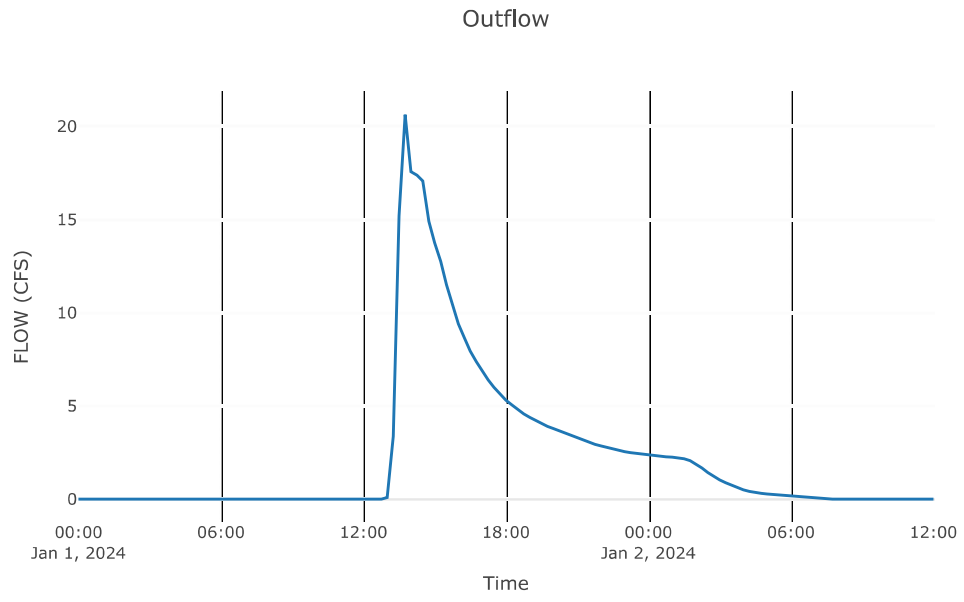


Reach: Reach-76c

Downstream : 115c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	4270
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-76c	
Peak Discharge (CFS)	20.62
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.4
Peak Inflow (CFS)	18.52
Inflow Volume (AC - FT)	7.04

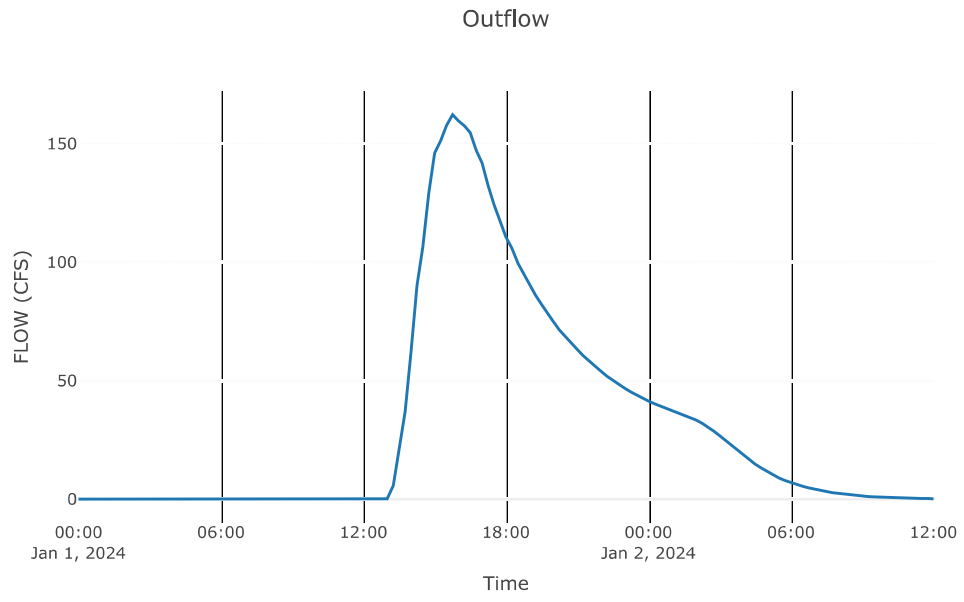


Reach: Reach-91b

Downstream : Junction - 102b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	7850
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	6
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-91b	
Peak Discharge (CFS)	162.25
Time of Peak Discharge	01Jan2024, 15:45
Volume (IN)	0.48
Peak Inflow (CFS)	162.33
Inflow Volume (AC - FT)	95.27

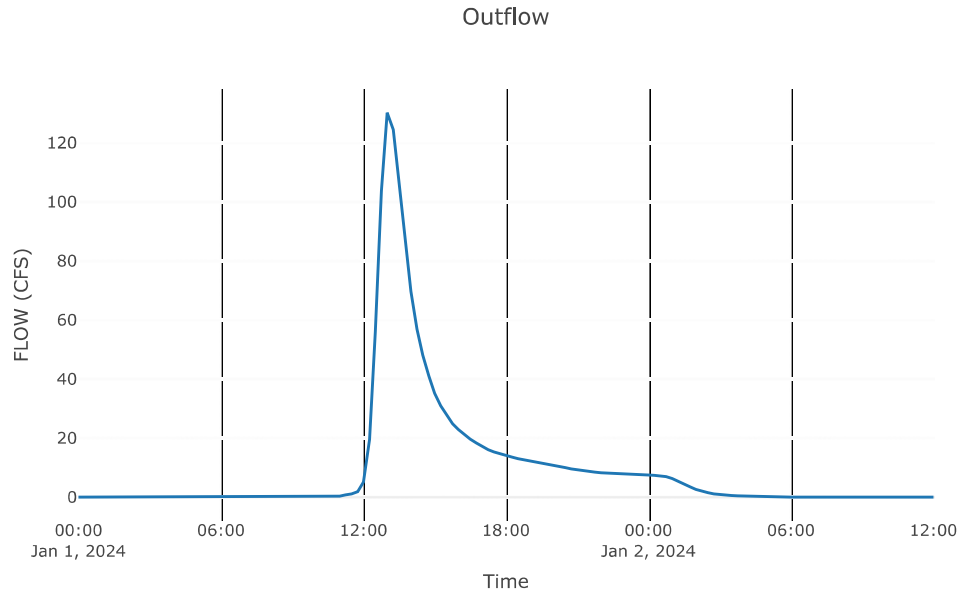


Reach: Reach-29c

Downstream : Junction - 102b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2030
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-29c	
Peak Discharge (CFS)	130.18
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.88
Peak Inflow (CFS)	130.23
Inflow Volume (AC - FT)	29.44

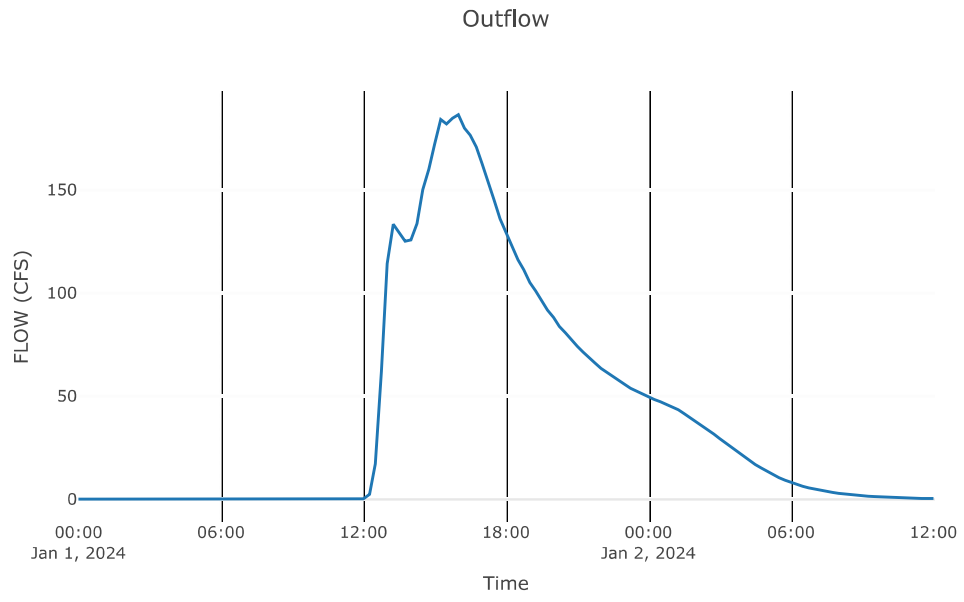


Reach: Reach-29d

Downstream : 36c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	3770
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	6
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-29d	
Peak Discharge (CFS)	186.37
Time of Peak Discharge	01Jan2024, 16:00
Volume (IN)	0.54
Peak Inflow (CFS)	187.15
Inflow Volume (AC - FT)	122.88

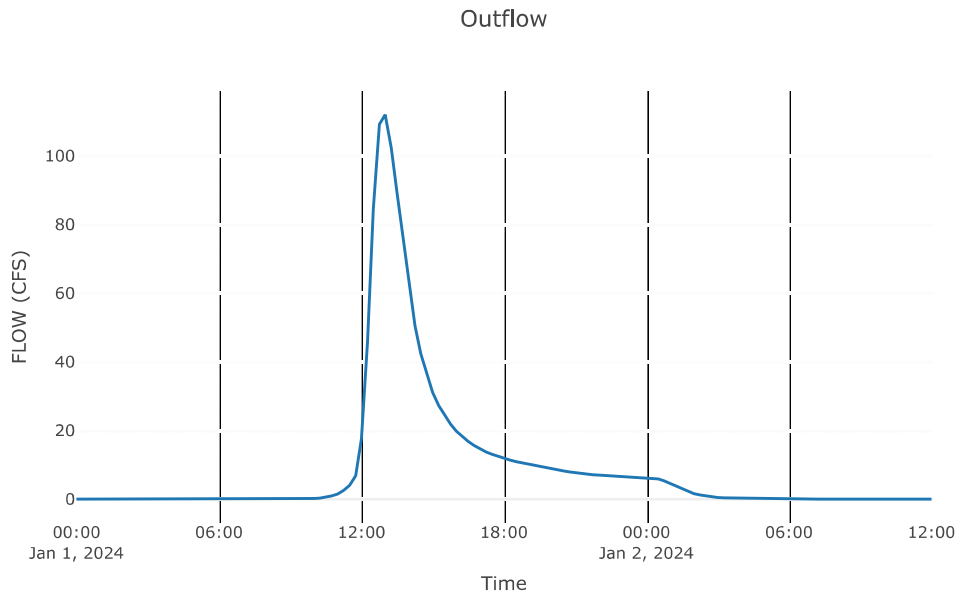


Reach: Reach-83c

Downstream : 36c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	480
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-83c	
Peak Discharge (CFS)	111.99
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	1.14
Peak Inflow (CFS)	111.47
Inflow Volume (AC - FT)	27.27

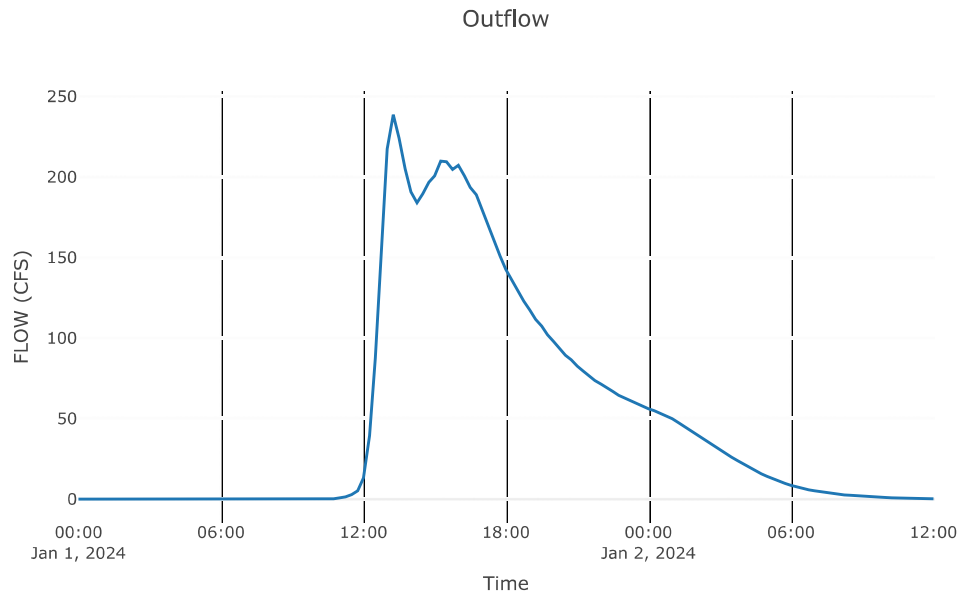


Reach: Reach-24b

Downstream : 32c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1500
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	6
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-24b	
Peak Discharge (CFS)	238.65
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.59
Peak Inflow (CFS)	236.56
Inflow Volume (AC - FT)	149.84

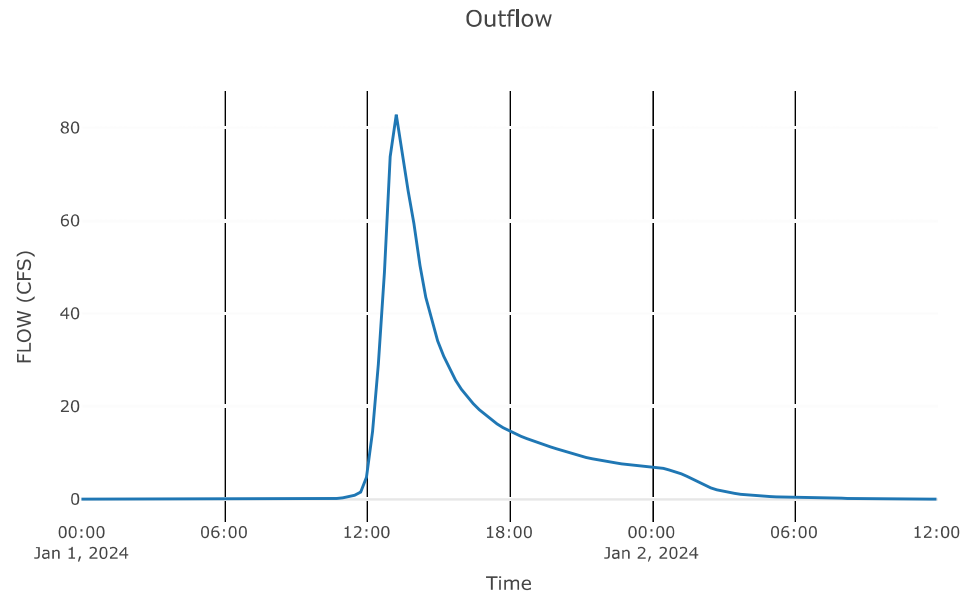


Reach: Reach-21c

Downstream : 32c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	750
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-21c	
Peak Discharge (CFS)	82.81
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.85
Peak Inflow (CFS)	81.56
Inflow Volume (AC - FT)	24.32

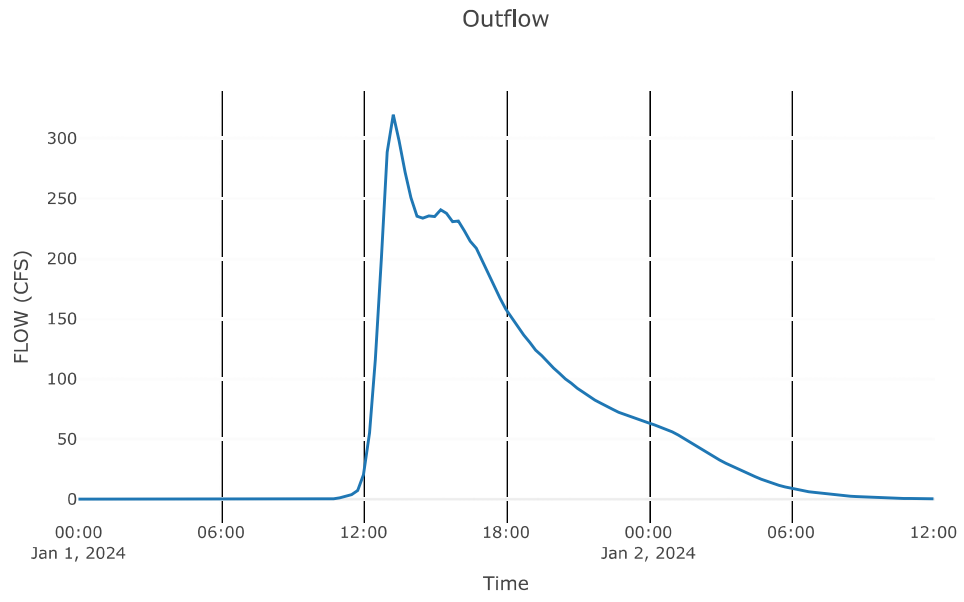


Reach: Reach-20b

Downstream : Junction - 18

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	300
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	6
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-20b	
Peak Discharge (CFS)	319.58
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.62
Peak Inflow (CFS)	321.85
Inflow Volume (AC - FT)	173.99

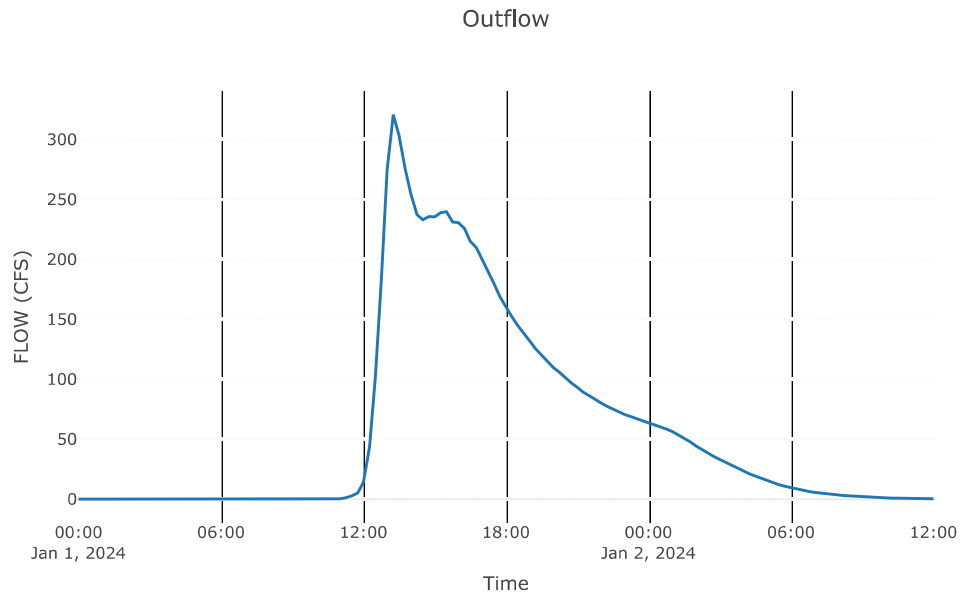


Reach: Reach-18b

Downstream : 16c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1100
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	6
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-18b	
Peak Discharge (CFS)	320.67
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.62
Peak Inflow (CFS)	320.02
Inflow Volume (AC - FT)	174.3

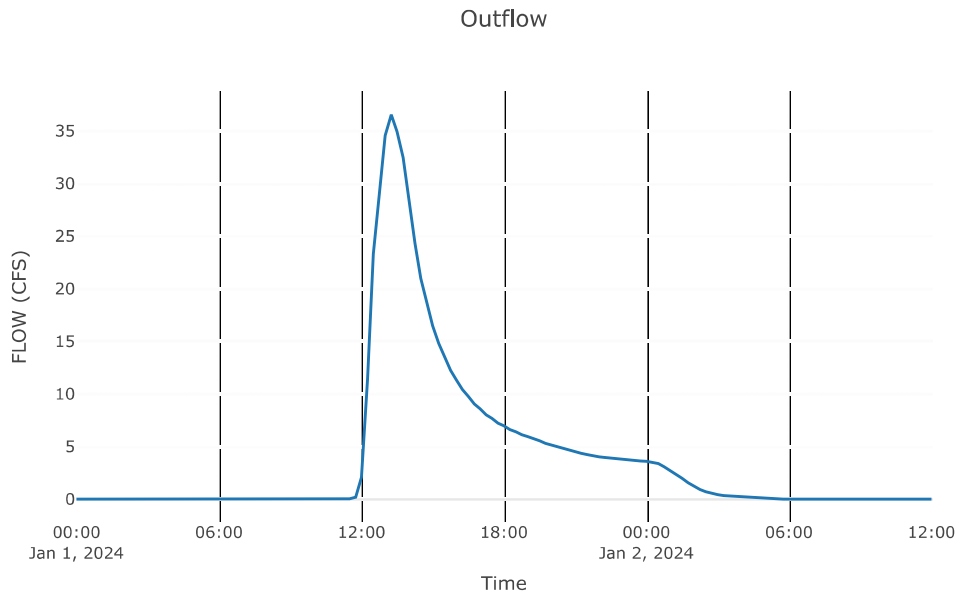


Reach: Reach-15c

Downstream : 16c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1300
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-15c	
Peak Discharge (CFS)	36.54
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.67
Peak Inflow (CFS)	36.75
Inflow Volume (AC - FT)	11.86

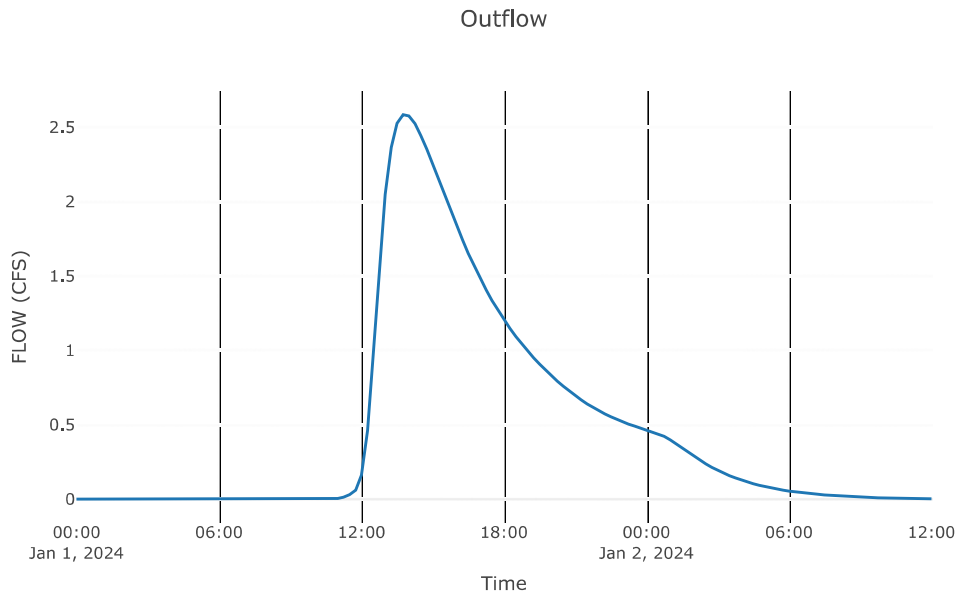


Reach: Reach-19b

Downstream : Junction - 17

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	140
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-19b	
Peak Discharge (CFS)	2.58
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.97
Peak Inflow (CFS)	2.6
Inflow Volume (AC - FT)	1.41

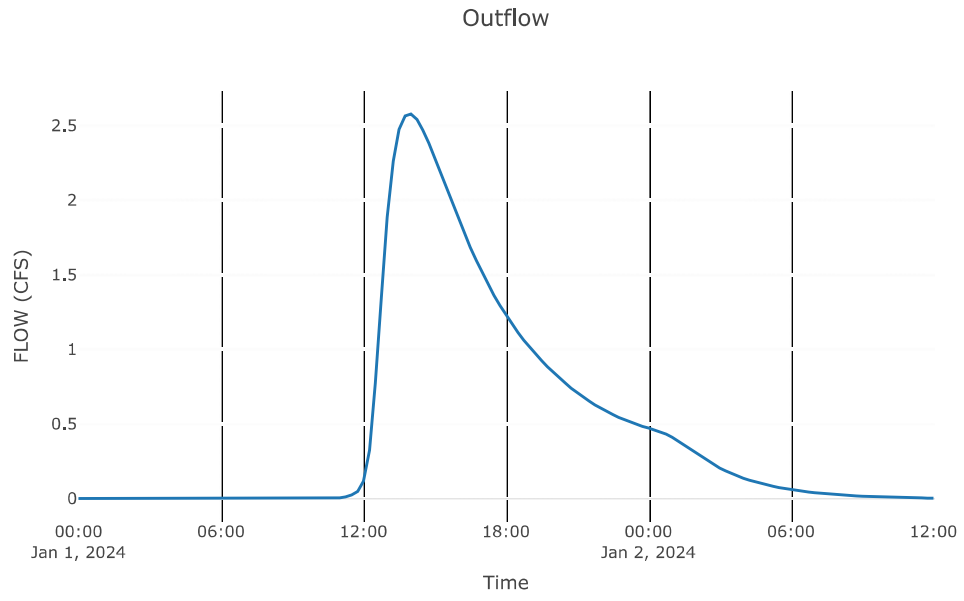


Reach: Reach-19c

Downstream : Reservoir - 8&59

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1300
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.25
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-19c	
Peak Discharge (CFS)	2.58
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.97
Peak Inflow (CFS)	2.58
Inflow Volume (AC - FT)	1.4

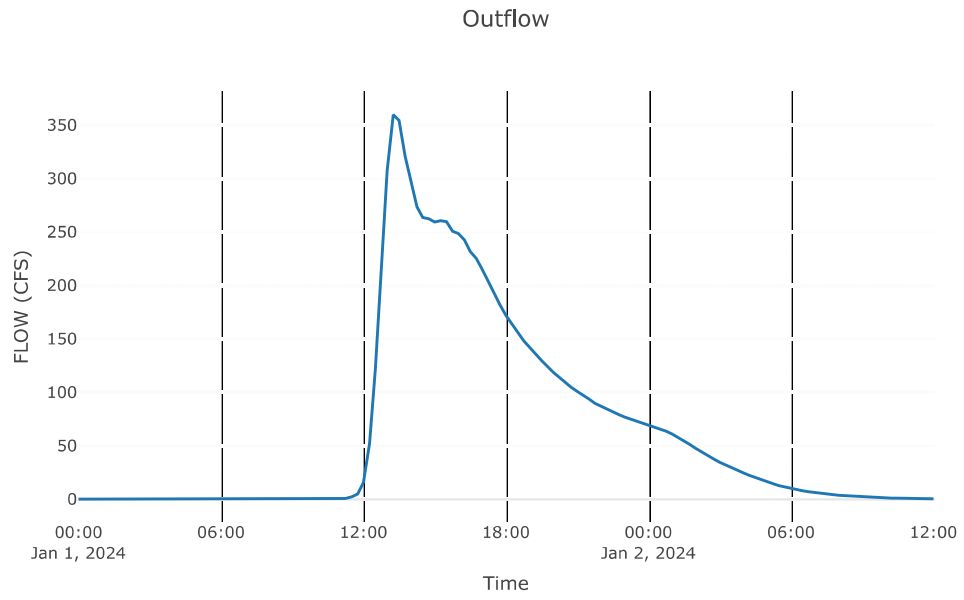


Reach: Reach-15d

Downstream : 106c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	770
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	6
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-15d	
Peak Discharge (CFS)	359.69
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.63
Peak Inflow (CFS)	367.4
Inflow Volume (AC - FT)	191.21

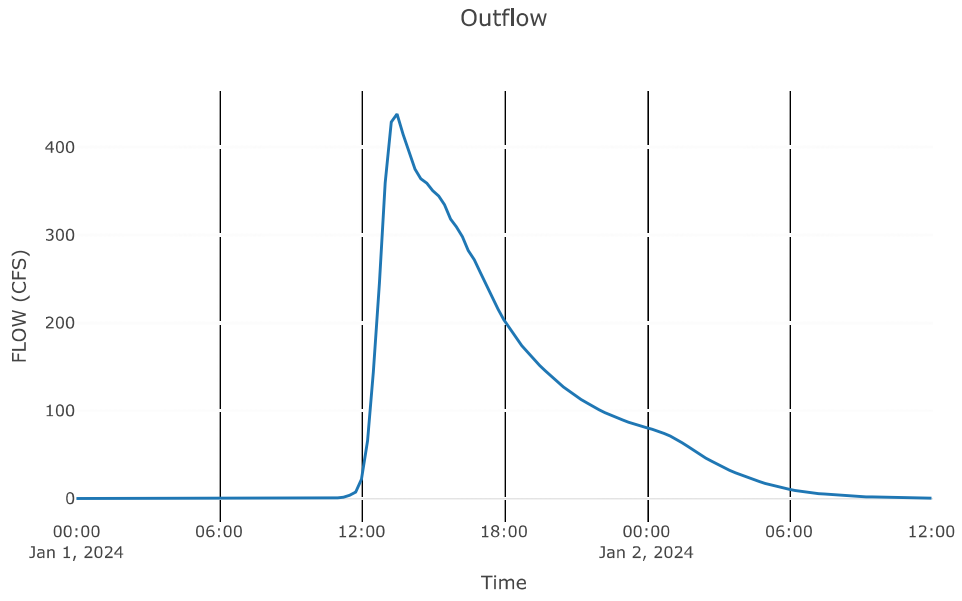


Reach: Reach-102b

Downstream : Junction - 9

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	100
Energy Slope (FT/FT)	0.01
Mannings n	0.01
Diameter	5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-102b	
Peak Discharge (CFS)	437.92
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.68
Peak Inflow (CFS)	437.97
Inflow Volume (AC - FT)	233.04

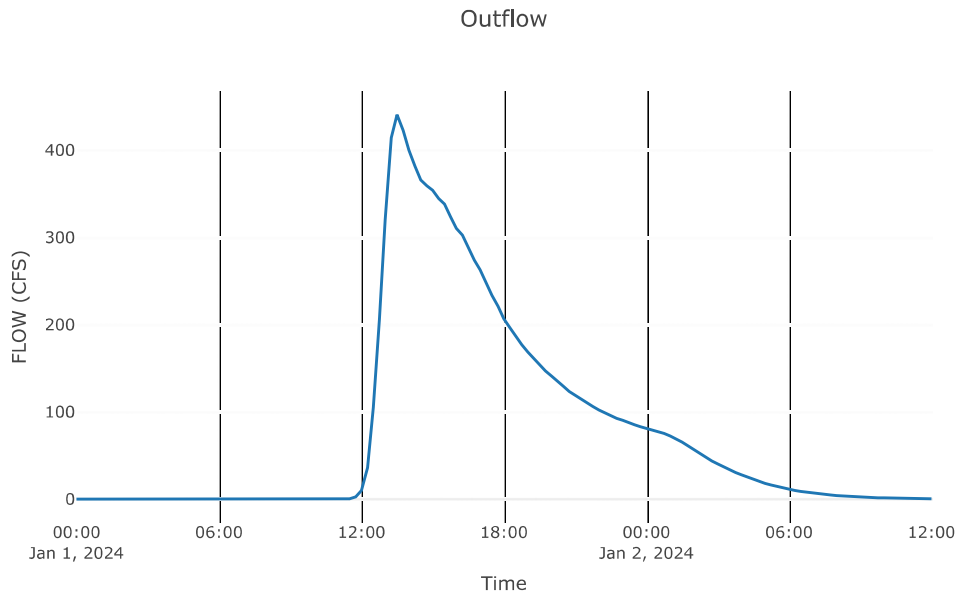


Reach: Reach-102c

Downstream : 26c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2300
Energy Slope (FT/FT)	0.01
Mannings n	0.04
Bottom Width (FT)	6
Side Slope (FT/FT)	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

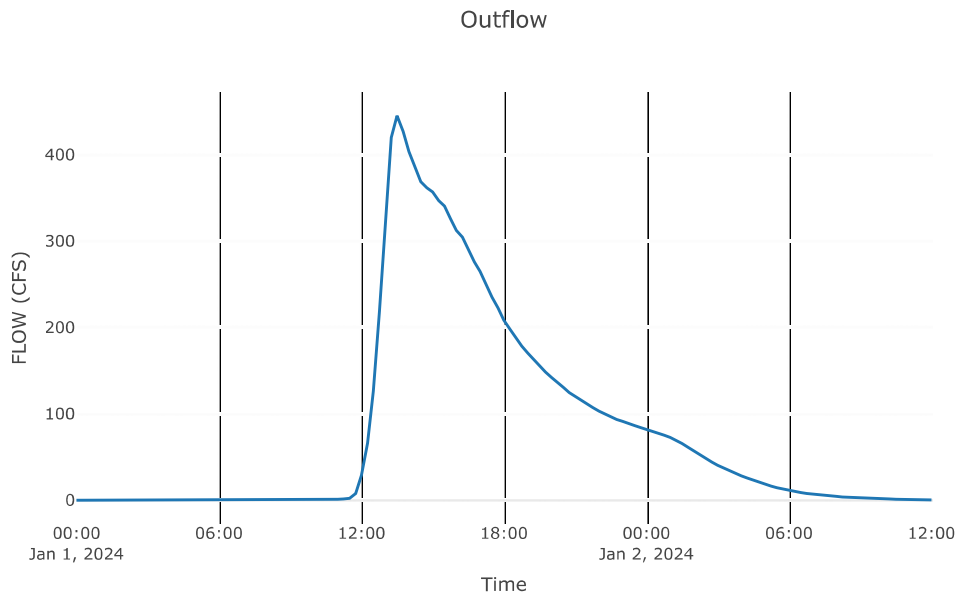
Results: Reach-102c	
Peak Discharge (CFS)	440.69
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.68
Peak Inflow (CFS)	437.92
Inflow Volume (AC - FT)	233.04



Reach: Reach-9b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Rectangular
Length (FT)	170
Energy Slope (FT/FT)	0.01
Mannings n	0.01
Width (FT)	8.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-9b	
Peak Discharge (CFS)	445.29
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.68
Peak Inflow (CFS)	445.49
Inflow Volume (AC - FT)	236.1

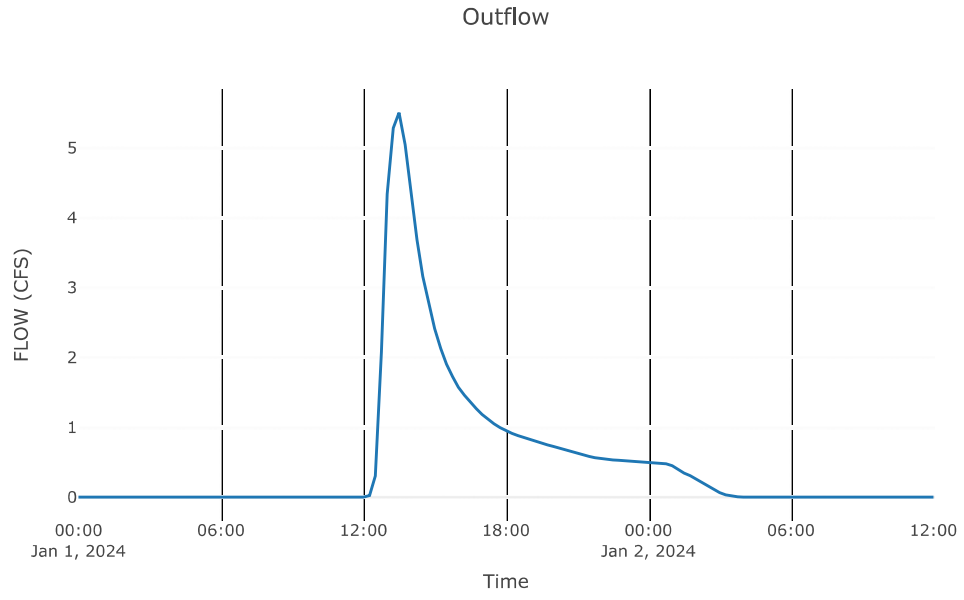


Reach: Reach-49b

Downstream : 59c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1900
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-49b	
Peak Discharge (CFS)	5.5
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.49
Peak Inflow (CFS)	5.58
Inflow Volume (AC - FT)	1.63

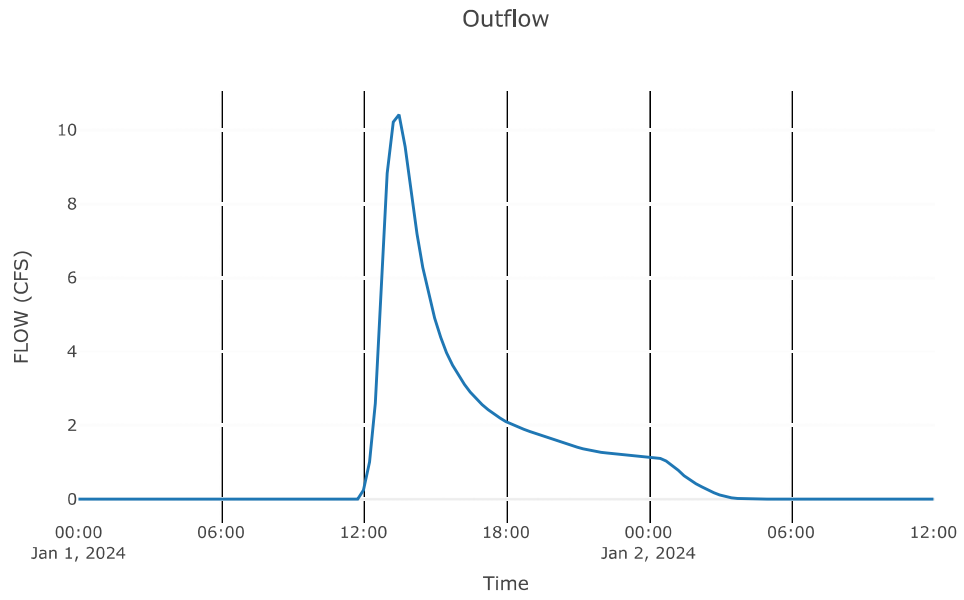


Reach: Reach-120b

Downstream : 63c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	290
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-120b	
Peak Discharge (CFS)	10.41
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.44
Peak Inflow (CFS)	10.43
Inflow Volume (AC - FT)	3.29

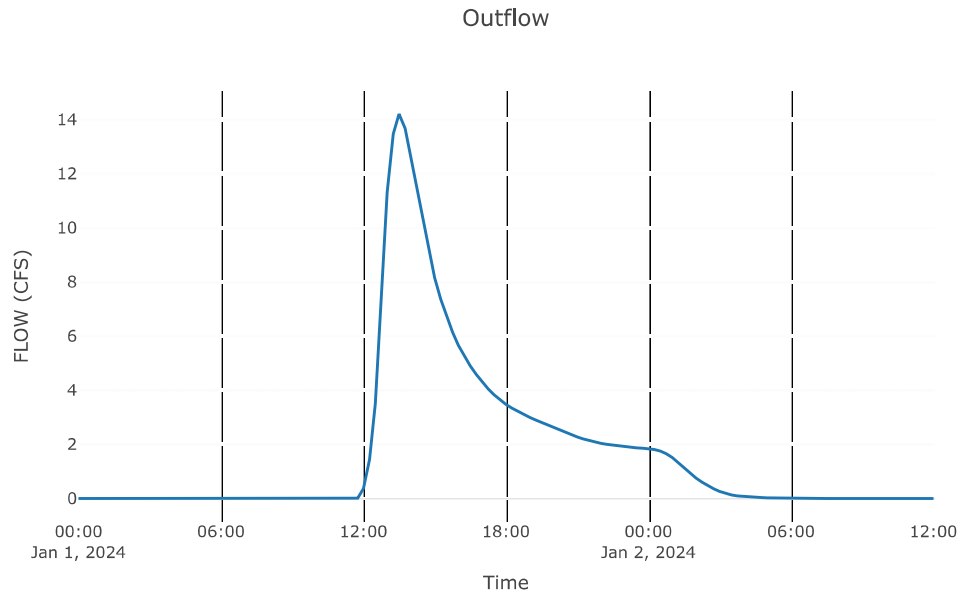


Reach: Reach-50b

Downstream : Junction - 103a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	60
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-50b	
Peak Discharge (CFS)	14.2
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.45
Peak Inflow (CFS)	14.21
Inflow Volume (AC - FT)	5.1

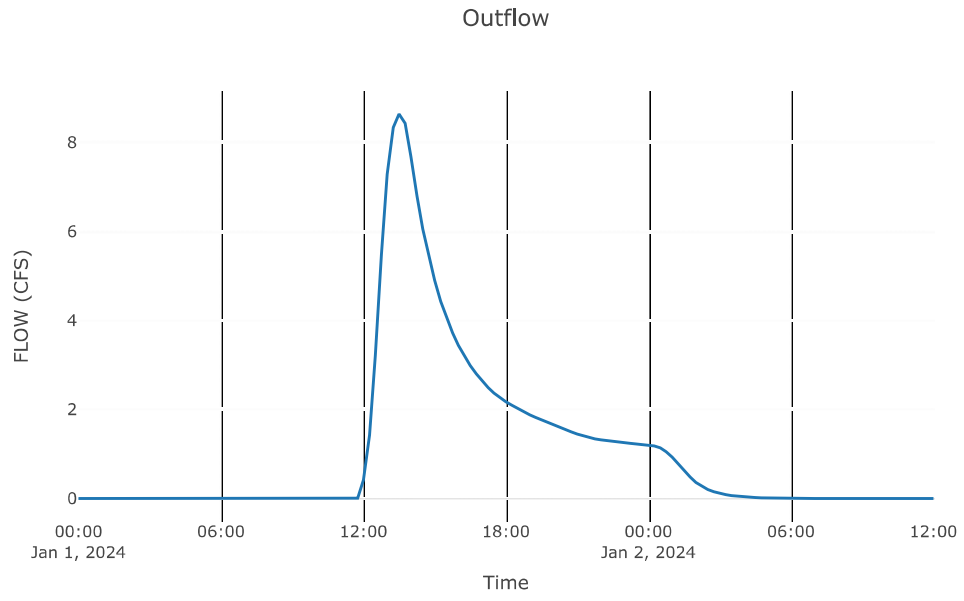


Reach: Reach-68b

Downstream : Junction - 67

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	225
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-68b	
Peak Discharge (CFS)	8.64
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.42
Peak Inflow (CFS)	8.65
Inflow Volume (AC - FT)	3.19

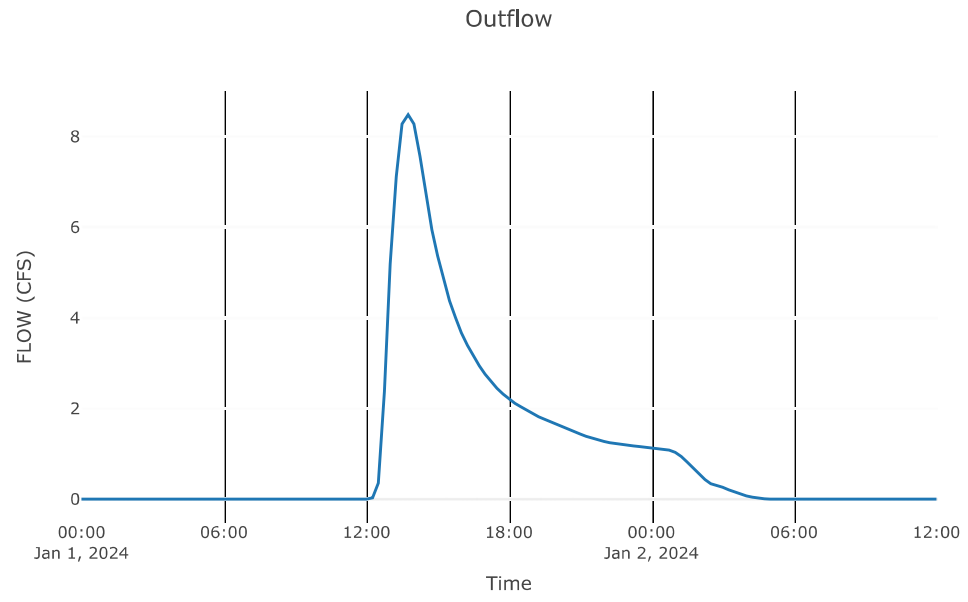


Reach: Reach-68c

Downstream : 68c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2000
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-68c	
Peak Discharge (CFS)	8.48
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.41
Peak Inflow (CFS)	8.64
Inflow Volume (AC - FT)	3.19

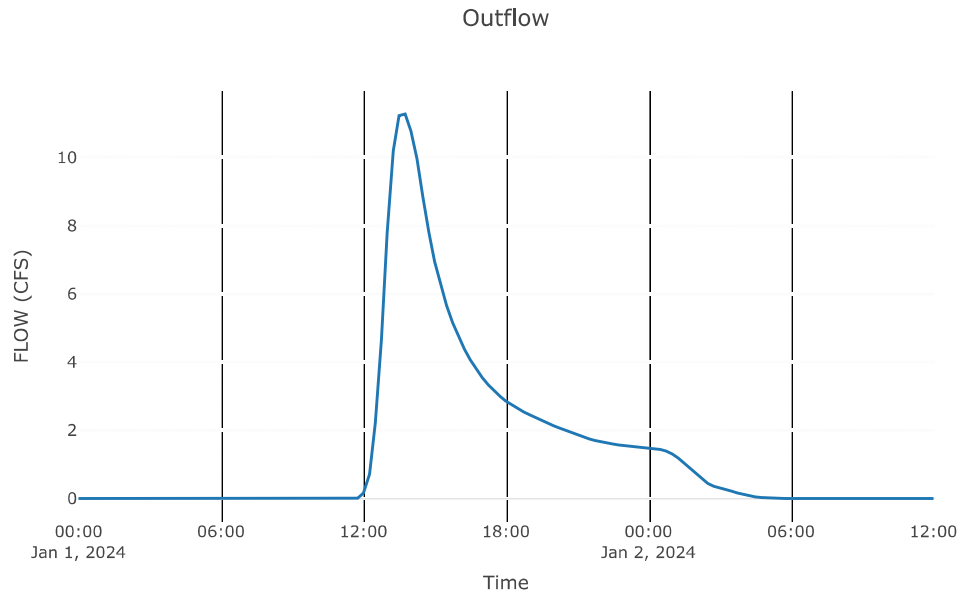


Reach: Reach-67b

Downstream : Junction - 57

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	2600
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-67b	
Peak Discharge (CFS)	11.28
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.45
Peak Inflow (CFS)	11.39
Inflow Volume (AC - FT)	4.16

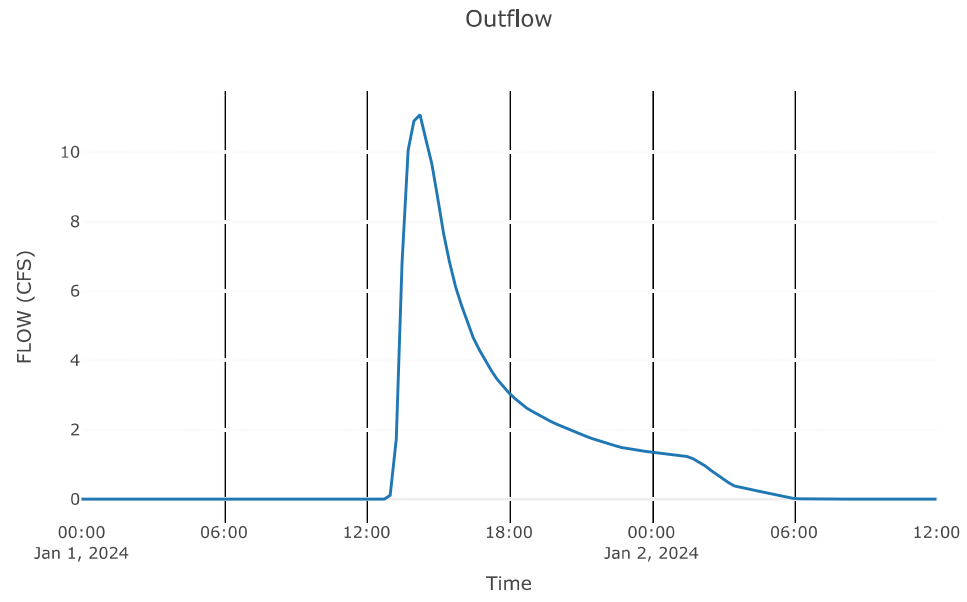


Reach: Reach-67c

Downstream : 58c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	4320
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-67c	
Peak Discharge (CFS)	11.08
Time of Peak Discharge	01Jan2024, 14:15
Volume (IN)	0.42
Peak Inflow (CFS)	11.28
Inflow Volume (AC - FT)	4.15

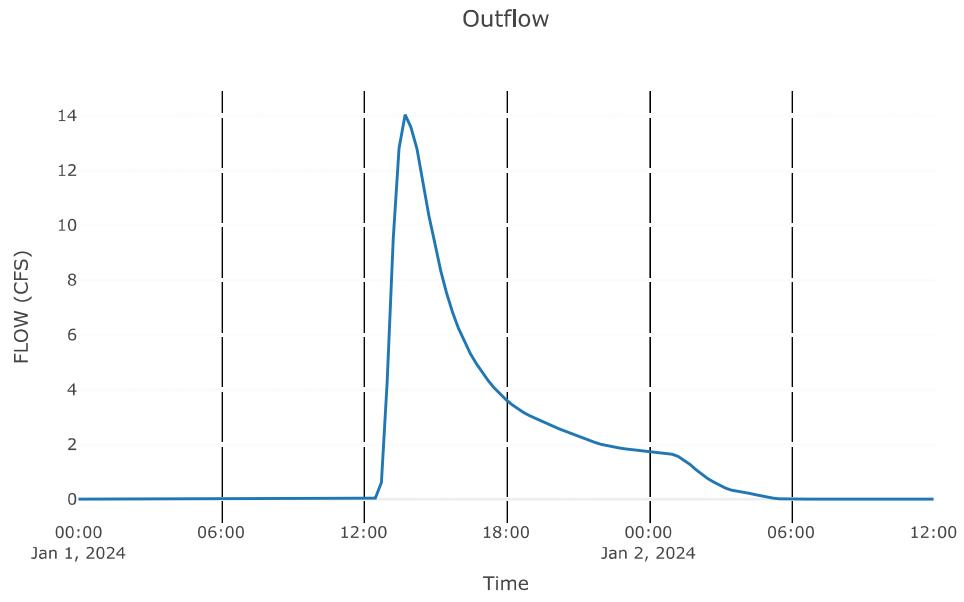


Reach: Reach-50c

Downstream : 58c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2980
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-50c	
Peak Discharge (CFS)	14.03
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.43
Peak Inflow (CFS)	14.2
Inflow Volume (AC - FT)	5.1

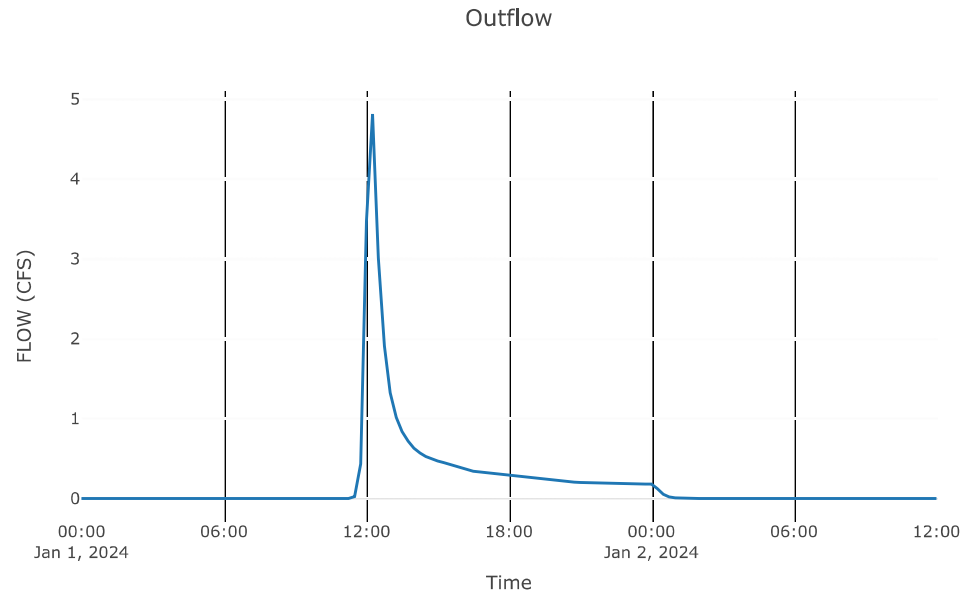


Reach: Reach-61b

Downstream : Junction - 42

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	70
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-61b	
Peak Discharge (CFS)	4.81
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	0.67
Peak Inflow (CFS)	4.83
Inflow Volume (AC - FT)	0.61

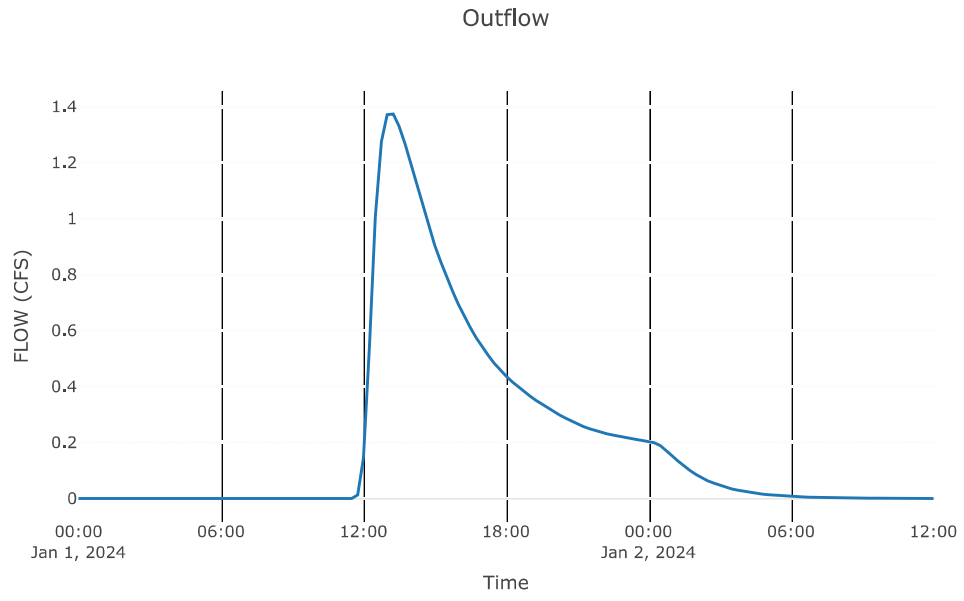


Reach: Reach-48b

Downstream : 60c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	740
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-48b	
Peak Discharge (CFS)	1.37
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.63
Peak Inflow (CFS)	1.38
Inflow Volume (AC - FT)	0.6

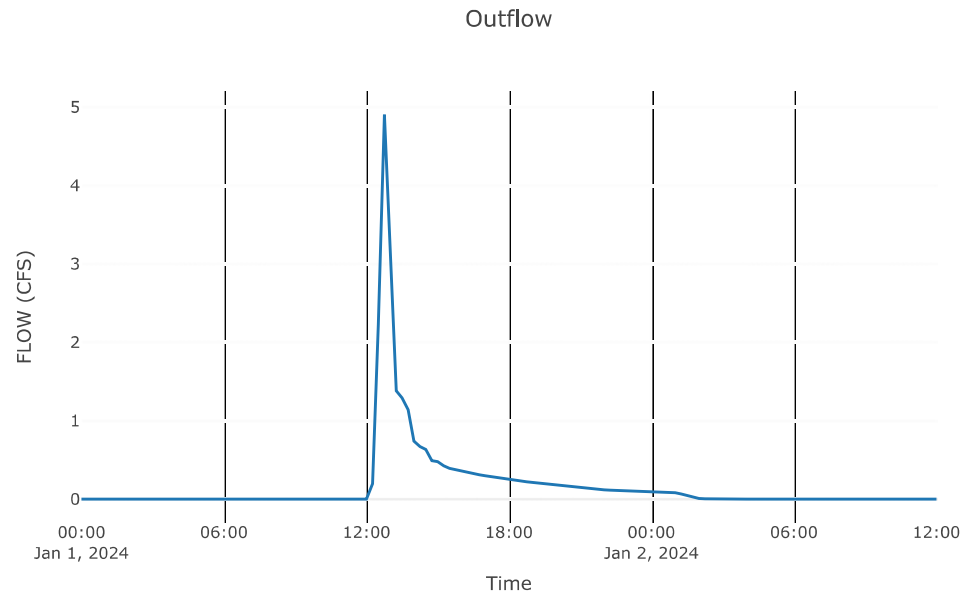


Reach: Reach-61c

Downstream : 60c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2900
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-61c	
Peak Discharge (CFS)	4.9
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.58
Peak Inflow (CFS)	4.81
Inflow Volume (AC - FT)	0.61

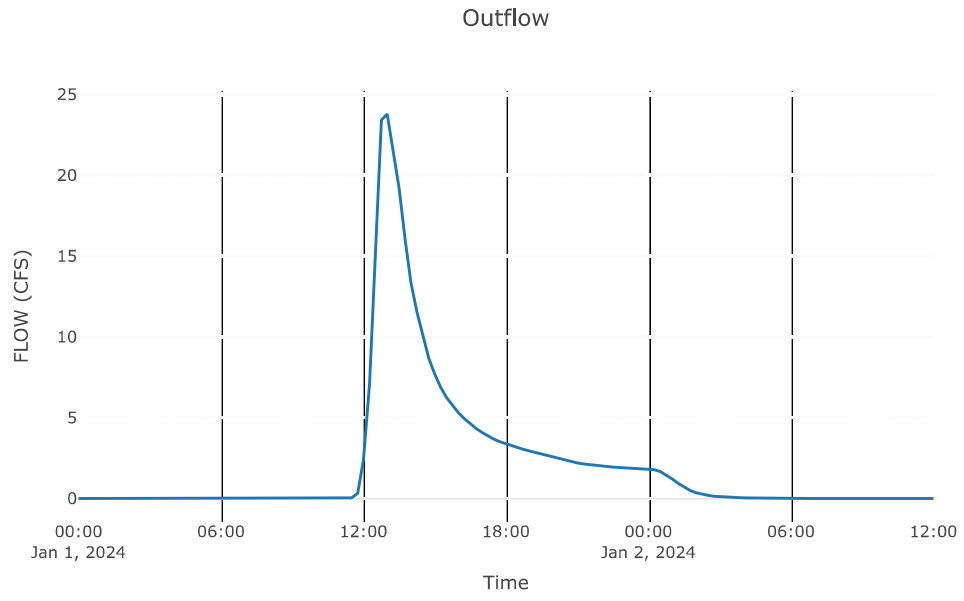


Reach: Reach-42b

Downstream : Junction - 103

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	70
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-42b	
Peak Discharge (CFS)	23.79
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.7
Peak Inflow (CFS)	23.8
Inflow Volume (AC - FT)	6.25

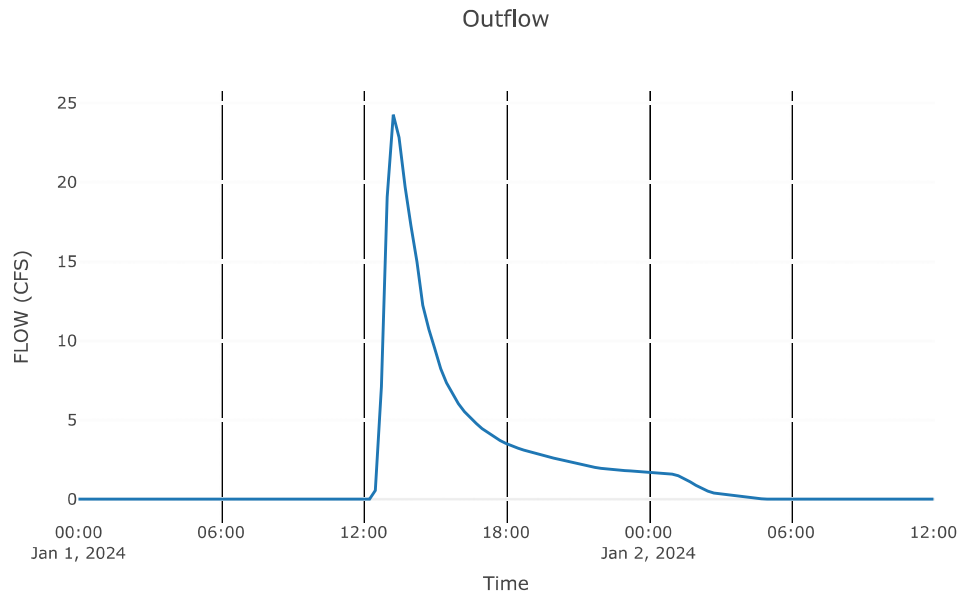


Reach: Reach-42c

Downstream : 58c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	3830
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-42c	
Peak Discharge (CFS)	24.26
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.67
Peak Inflow (CFS)	23.79
Inflow Volume (AC - FT)	6.25

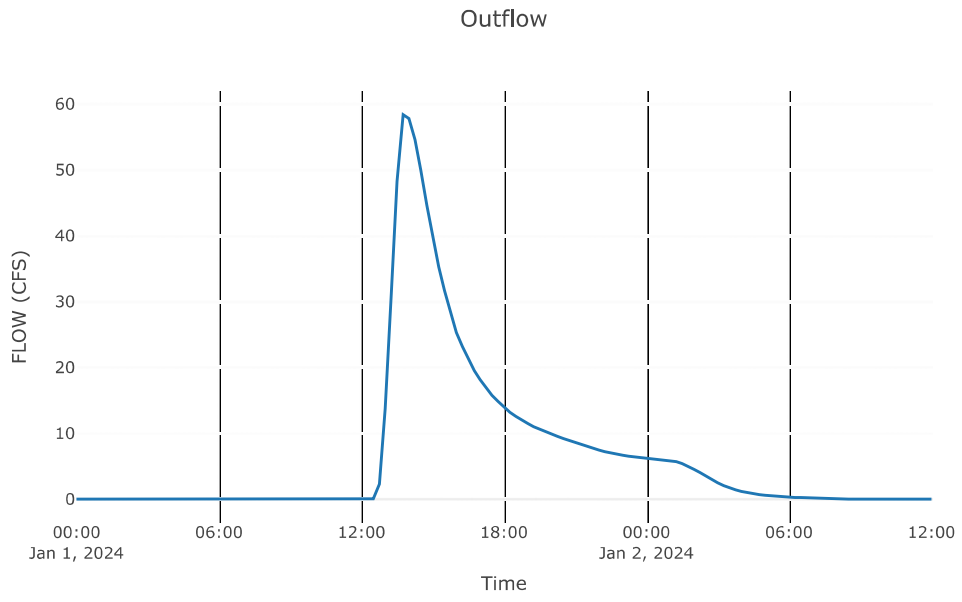


Reach: Reach-103b

Downstream : Junction - 57a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	4500
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-103b	
Peak Discharge (CFS)	58.37
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.53
Peak Inflow (CFS)	59.13
Inflow Volume (AC - FT)	19.97

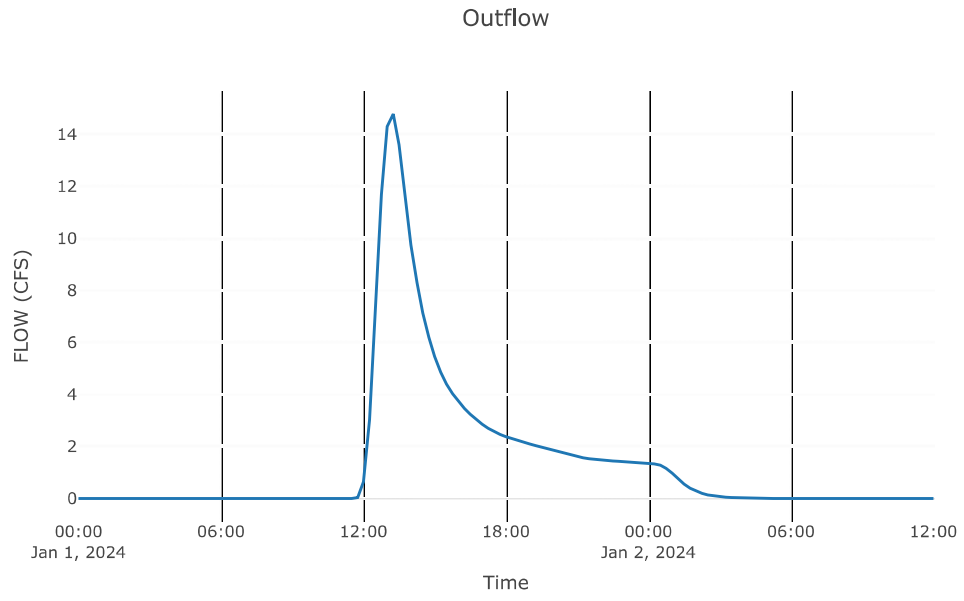


Reach: Reach-112b

Downstream : Junction - 57b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1400
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-112b	
Peak Discharge (CFS)	14.78
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.58
Peak Inflow (CFS)	14.85
Inflow Volume (AC - FT)	4.16

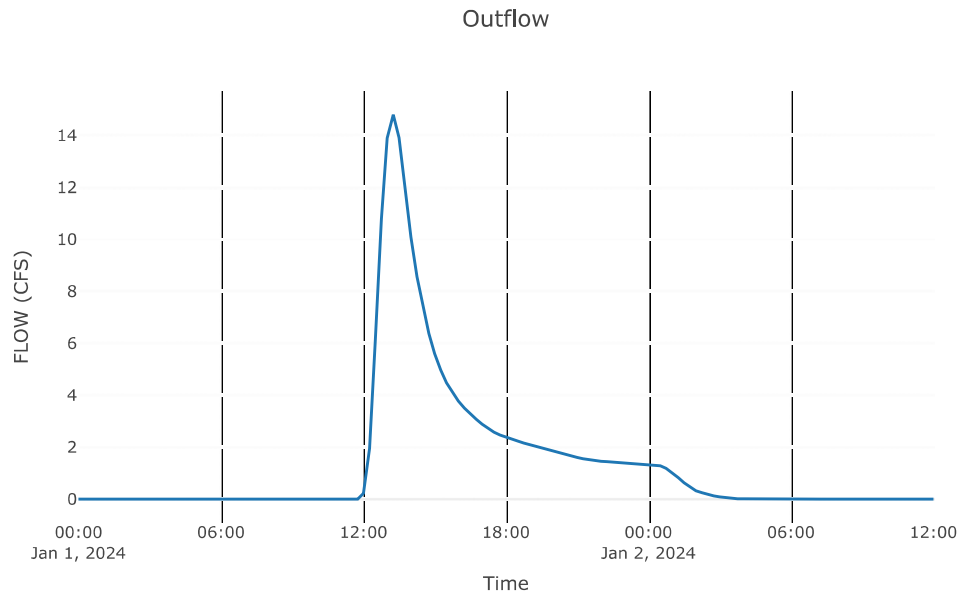


Reach: Reach-112c

Downstream : Junction - 33

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	480
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-112c	
Peak Discharge (CFS)	14.8
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.58
Peak Inflow (CFS)	14.78
Inflow Volume (AC - FT)	4.16

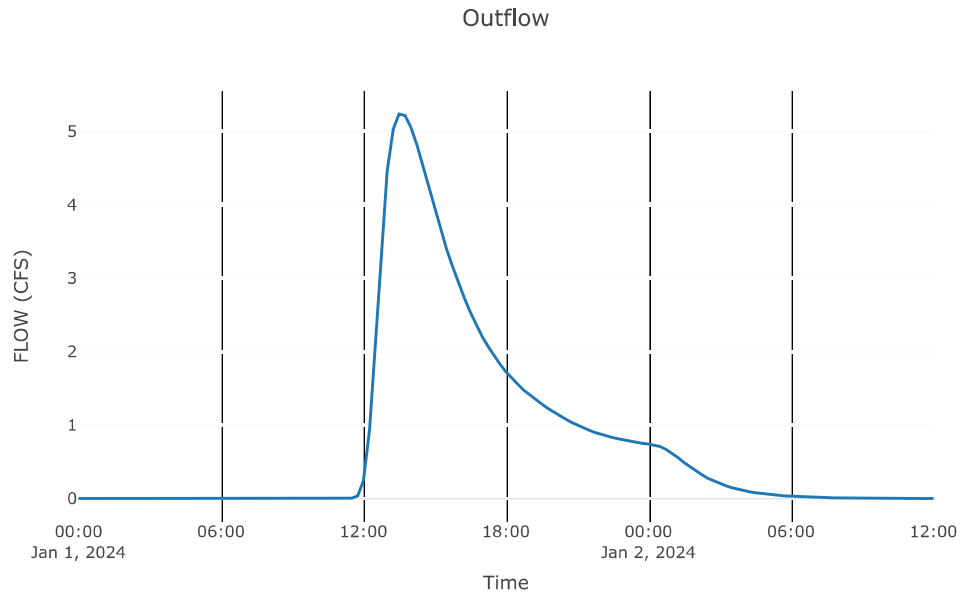


Reach: Reach-97b

Downstream : Junction - 33

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-97b	
Peak Discharge (CFS)	5.24
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.73
Peak Inflow (CFS)	5.24
Inflow Volume (AC - FT)	2.31

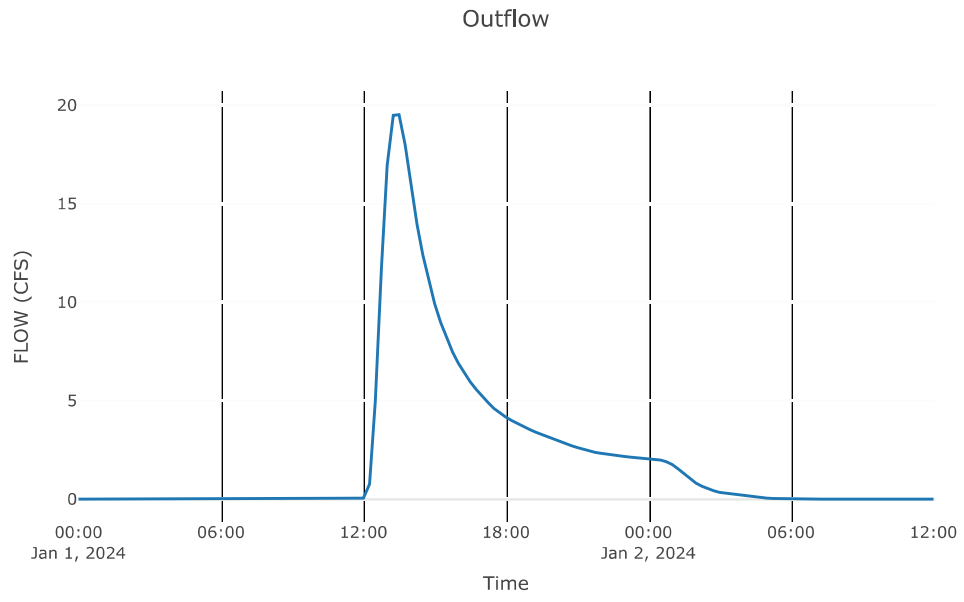


Reach: Reach-97c

Downstream : 50c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	960
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-97c	
Peak Discharge (CFS)	19.52
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.62
Peak Inflow (CFS)	19.83
Inflow Volume (AC - FT)	6.45

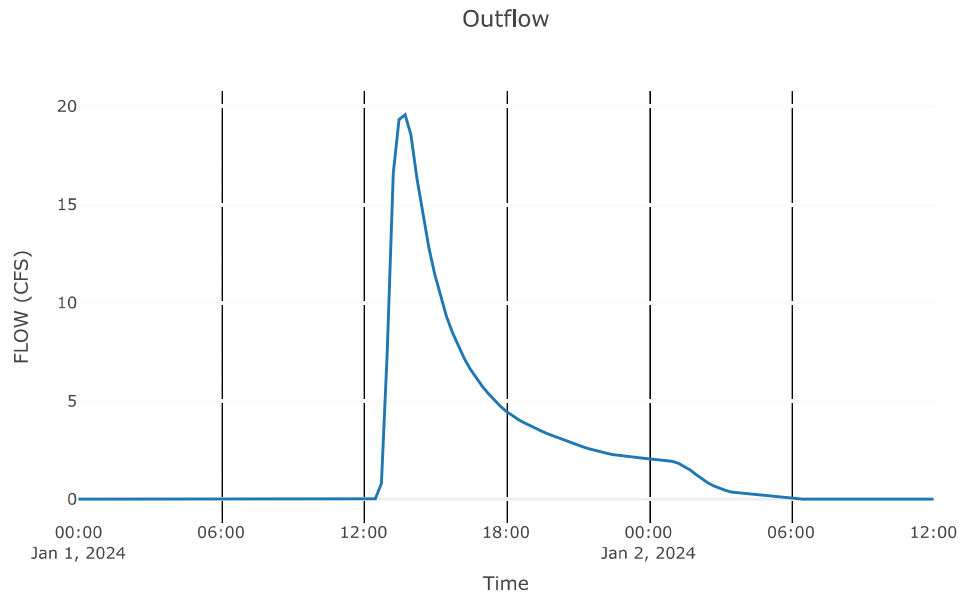


Reach: Reach-33b

Downstream : Junction - 57a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	3000
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-33b	
Peak Discharge (CFS)	19.57
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.56
Peak Inflow (CFS)	19.82
Inflow Volume (AC - FT)	6.54

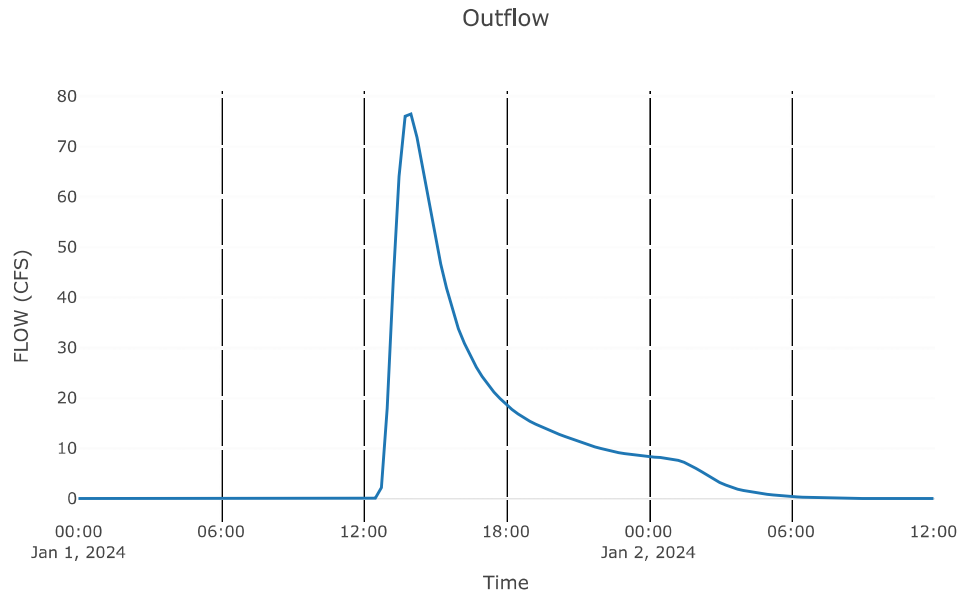


Reach: Reach-103c

Downstream : 112c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1430
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-103c	
Peak Discharge (CFS)	76.46
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.54
Peak Inflow (CFS)	77.94
Inflow Volume (AC - FT)	25.9



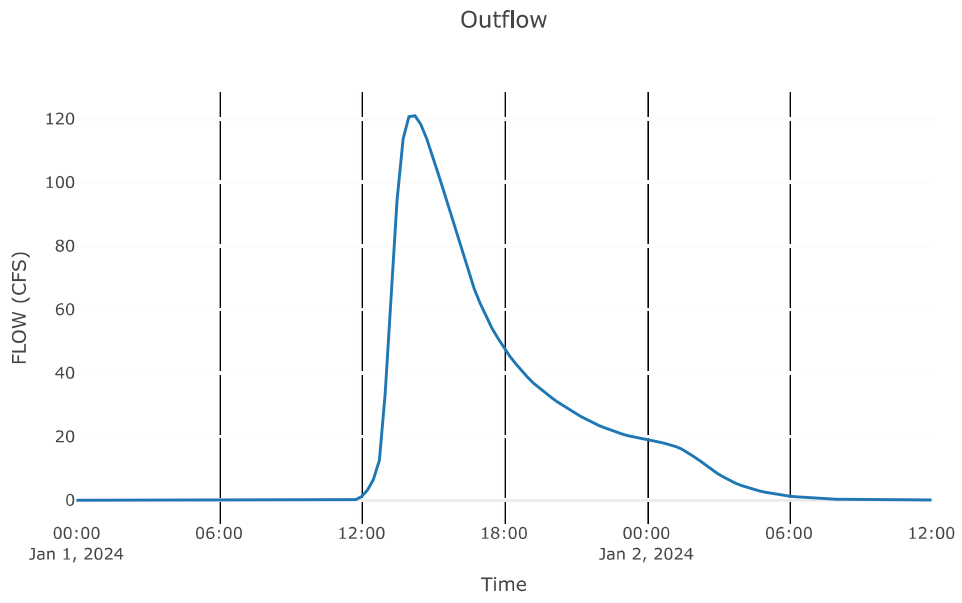
Reach: Reach-57b

Route: Muskingum Cunge

Method	Muskingum Cunge
Channel	Circular
Length (FT)	150
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-57b

Peak Discharge (CFS)	121
Time of Peak Discharge	01Jan2024, 14:15
Volume (IN)	0.61
Peak Inflow (CFS)	121
Inflow Volume (AC - FT)	55.49

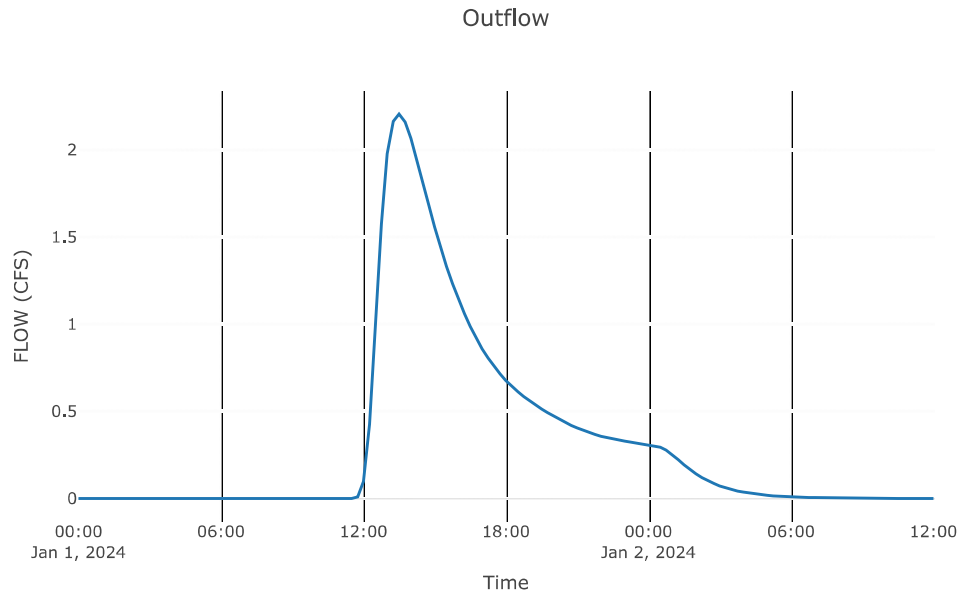


Reach: Reach-60b

Downstream : Reservoir - 52&53

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	400
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-60b	
Peak Discharge (CFS)	2.21
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.65
Peak Inflow (CFS)	2.21
Inflow Volume (AC - FT)	0.94

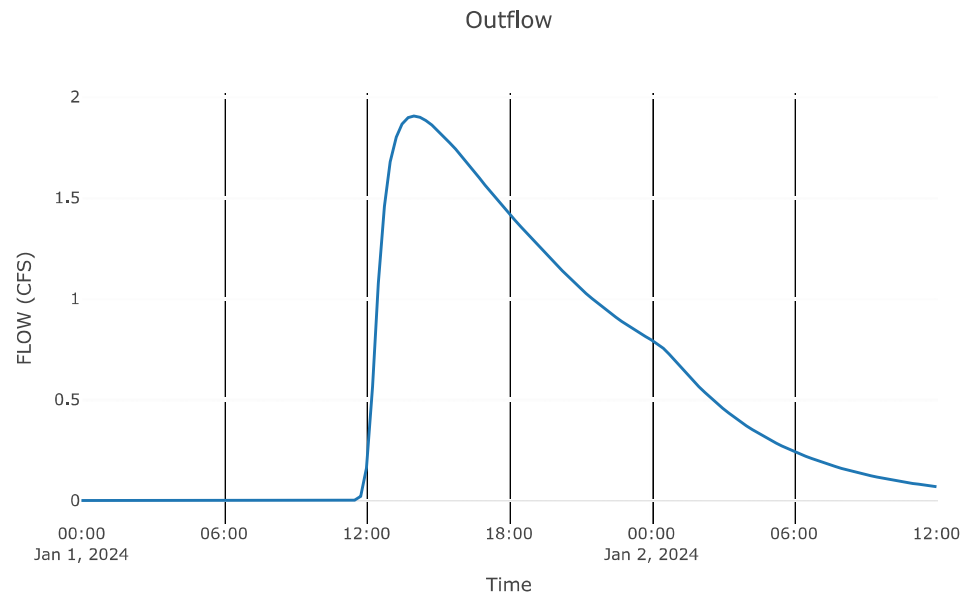


Reach: Reach-69b

Downstream : Junction - 61

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	300
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-69b	
Peak Discharge (CFS)	1.91
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.7
Peak Inflow (CFS)	1.91
Inflow Volume (AC - FT)	1.64

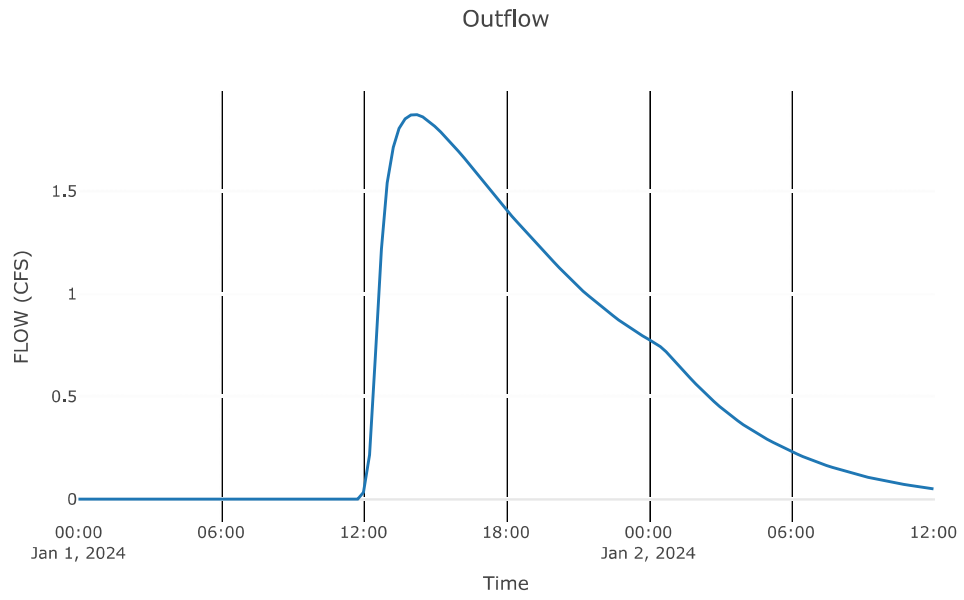


Reach: Reach-69c

Downstream : Junction - 81a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	730
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-69c	
Peak Discharge (CFS)	1.87
Time of Peak Discharge	01Jan2024, 14:15
Volume (IN)	0.67
Peak Inflow (CFS)	1.91
Inflow Volume (AC - FT)	1.64

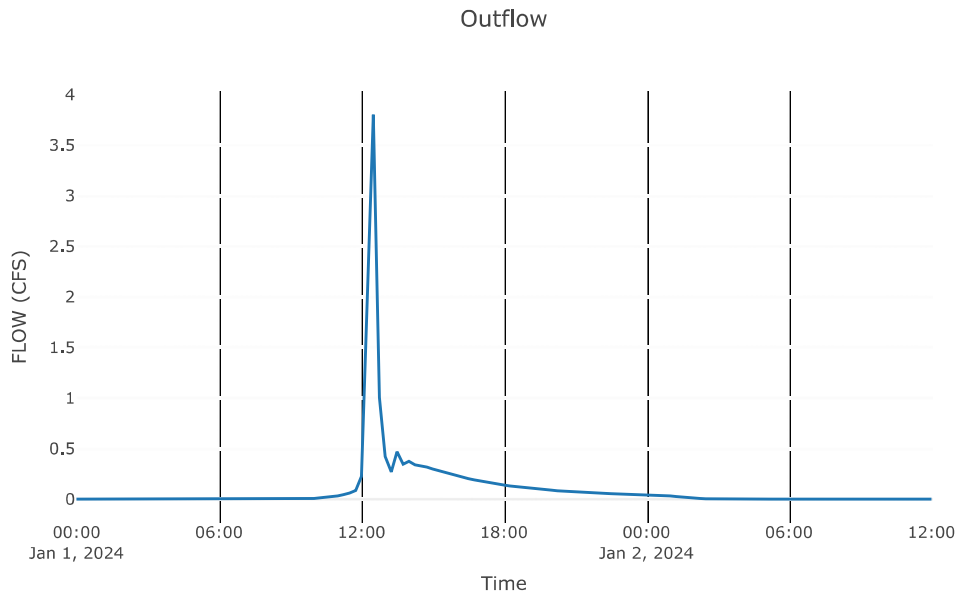


Reach: Reach-88b

Downstream : 94c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	900
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-88b	
Peak Discharge (CFS)	3.8
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	1.5
Peak Inflow (CFS)	4.92
Inflow Volume (AC - FT)	0.33

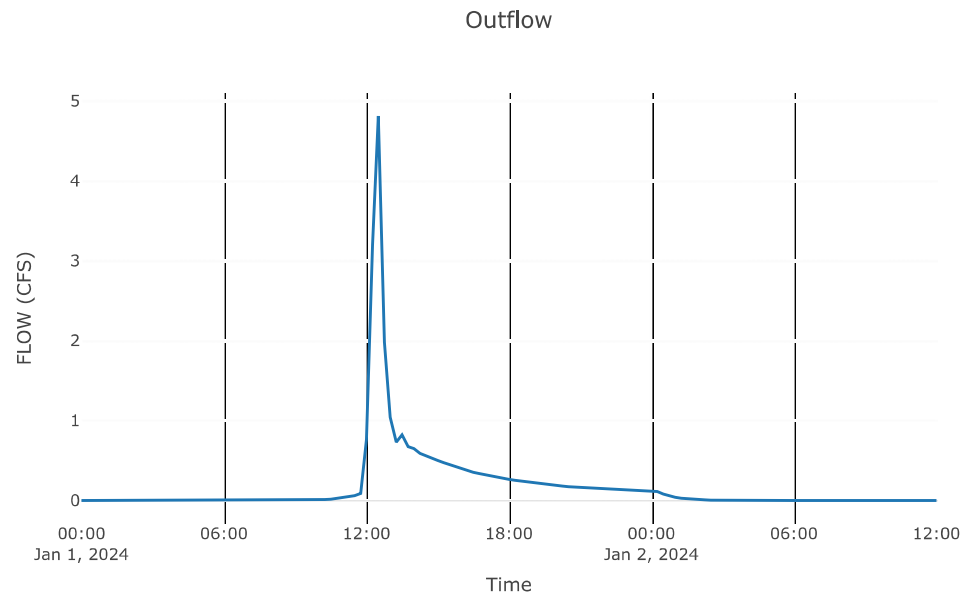


Reach: Reach-105b

Downstream : Junction - 81

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	300
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	3
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-105b	
Peak Discharge (CFS)	4.81
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.73
Peak Inflow (CFS)	4.9
Inflow Volume (AC - FT)	0.53

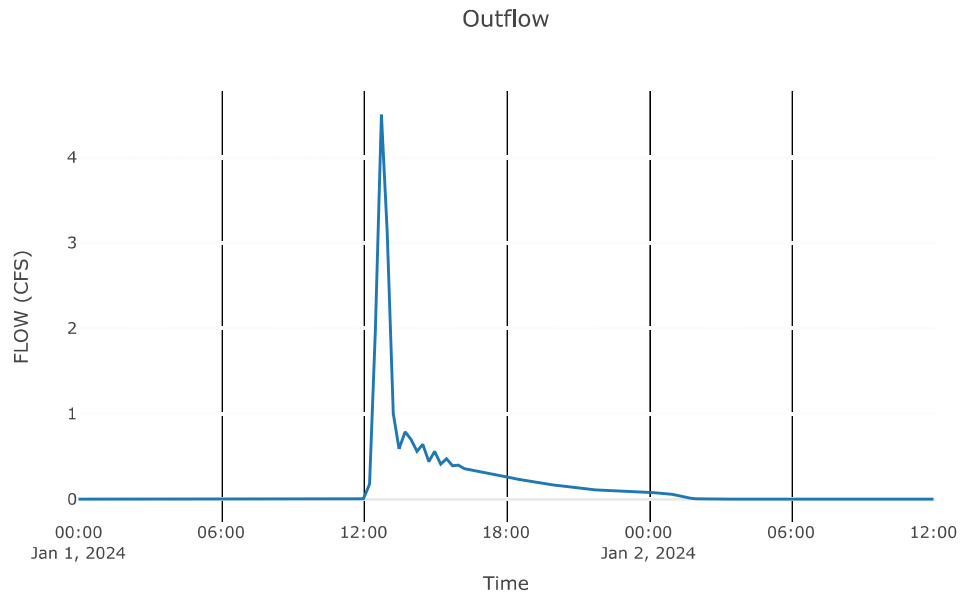


Reach: Reach-105c

Downstream : Junction - 81a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1800
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-105c	
Peak Discharge (CFS)	4.5
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.65
Peak Inflow (CFS)	4.81
Inflow Volume (AC - FT)	0.53

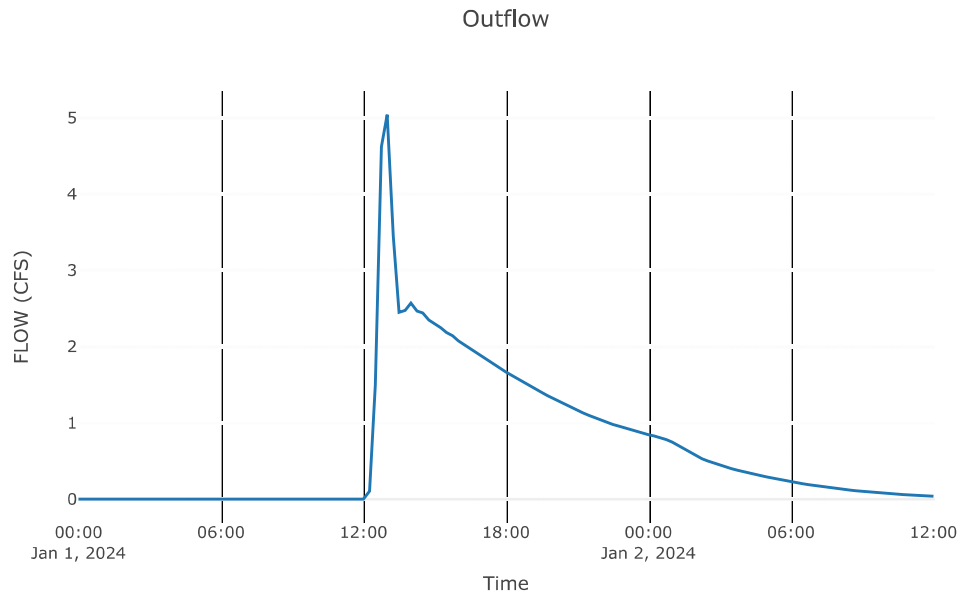


Reach: Reach-105d

Downstream : 66c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	580
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-105d	
Peak Discharge (CFS)	5.04
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.65
Peak Inflow (CFS)	5.71
Inflow Volume (AC - FT)	2.06

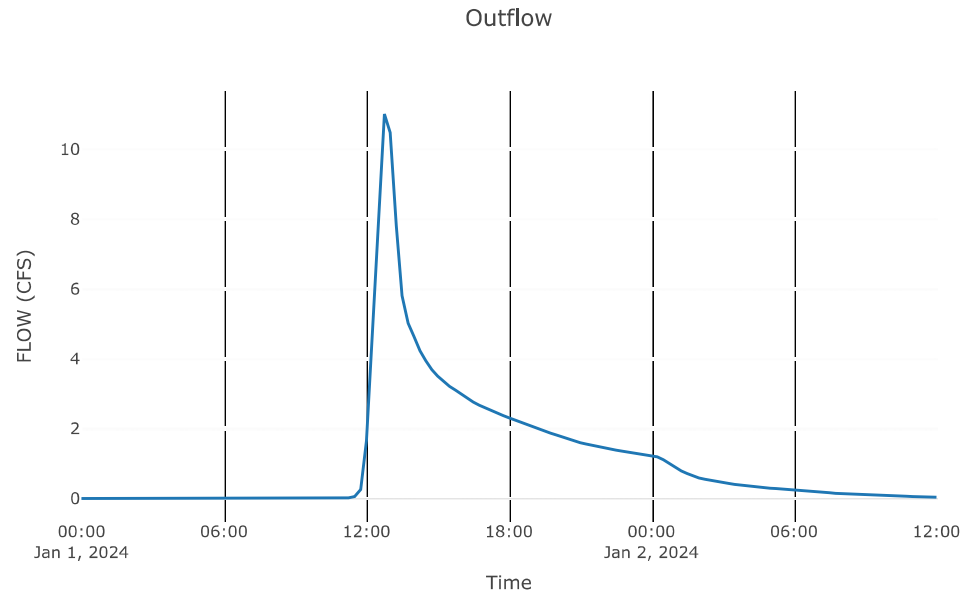


Reach: Reach-81b

Downstream : Junction - 65

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	770
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-81b	
Peak Discharge (CFS)	11.01
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.7
Peak Inflow (CFS)	11.37
Inflow Volume (AC - FT)	3.36

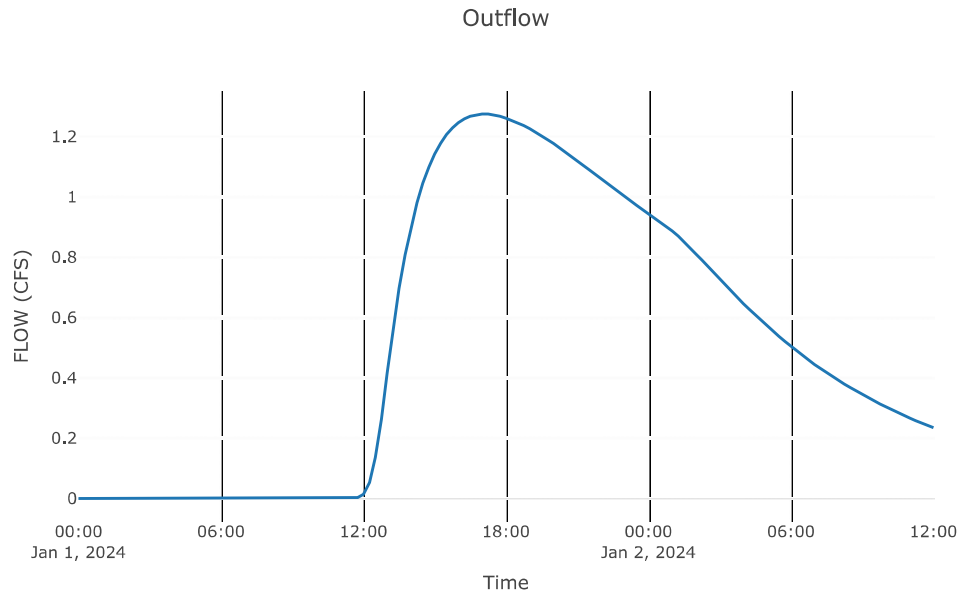


Reach: Reach-37b

Downstream : Junction - 65

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	380
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-37b	
Peak Discharge (CFS)	1.27
Time of Peak Discharge	01Jan2024, 17:00
Volume (IN)	0.65
Peak Inflow (CFS)	1.28
Inflow Volume (AC - FT)	1.55

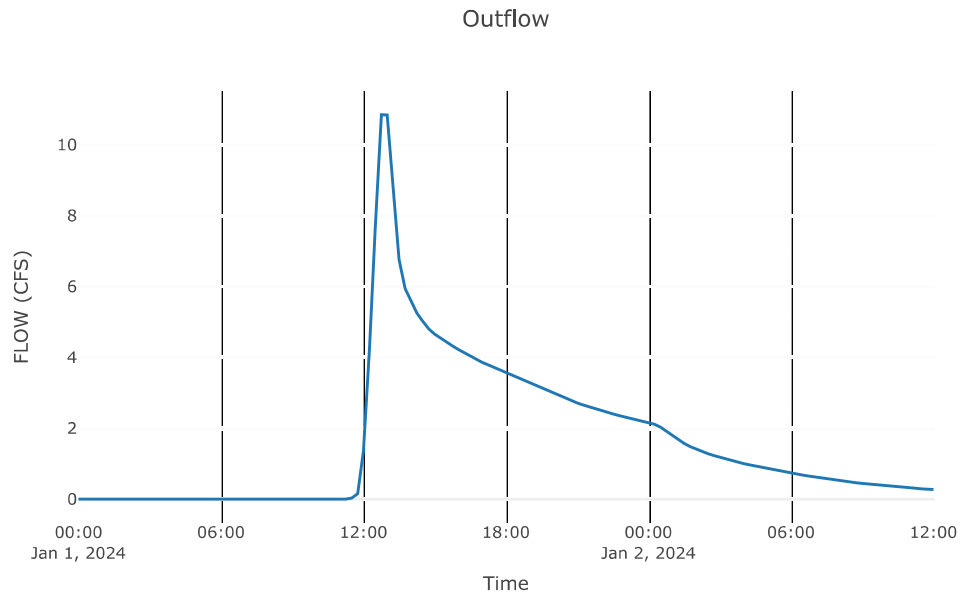


Reach: Reach-81c

Downstream : 64c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	290
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-81c	
Peak Discharge (CFS)	10.85
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.68
Peak Inflow (CFS)	11.27
Inflow Volume (AC - FT)	4.92

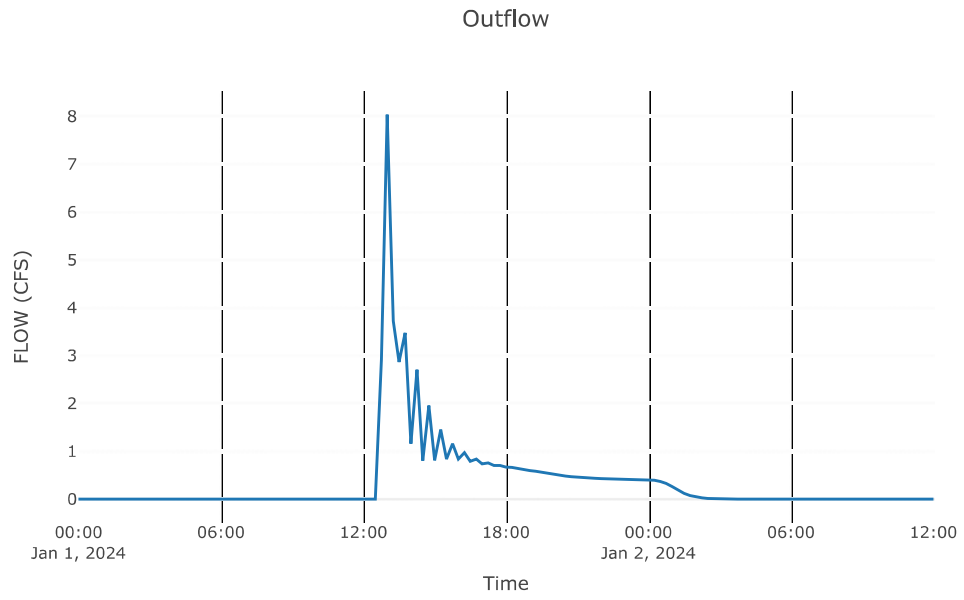


Reach: Reach-45b

Downstream : Reservoir - 25

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1800
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-45b	
Peak Discharge (CFS)	8.03
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.58
Peak Inflow (CFS)	7.76
Inflow Volume (AC - FT)	1.07

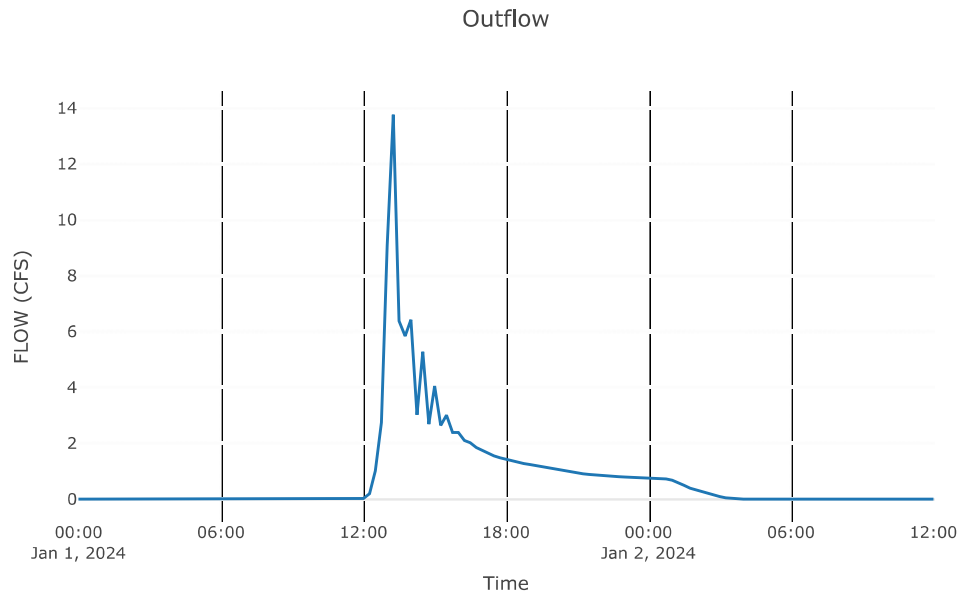


Reach: Reach-43b

Downstream : 64c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1020
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-43b	
Peak Discharge (CFS)	13.76
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.65
Peak Inflow (CFS)	16.4
Inflow Volume (AC - FT)	2.4

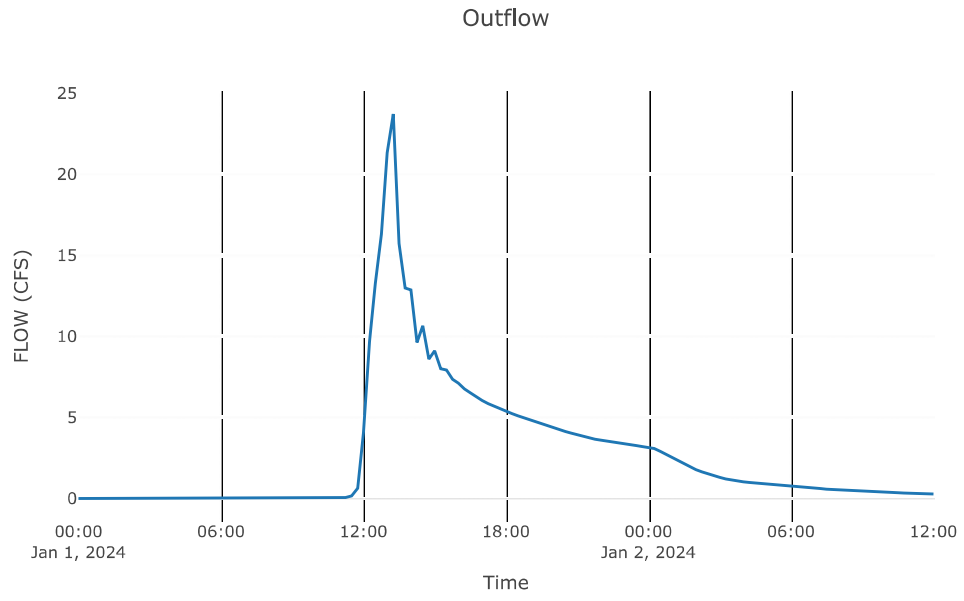


Reach: Reach-65b

Downstream : Junction - 51

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	910
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-65b	
Peak Discharge (CFS)	23.72
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.68
Peak Inflow (CFS)	23.95
Inflow Volume (AC - FT)	8.07

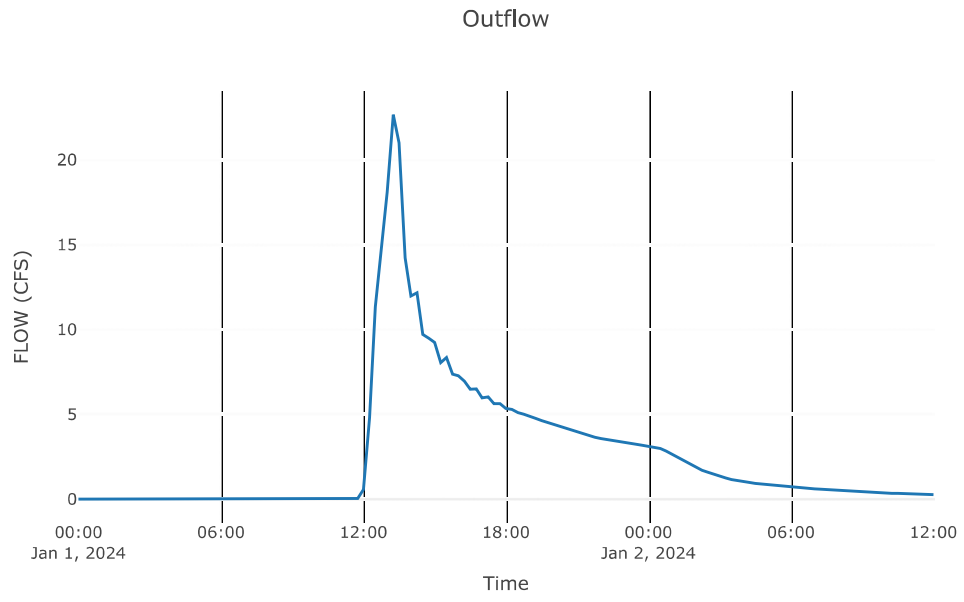


Reach: Reach-65c

Downstream : 55c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1400
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-65c	
Peak Discharge (CFS)	22.66
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.67
Peak Inflow (CFS)	23.72
Inflow Volume (AC - FT)	8.07

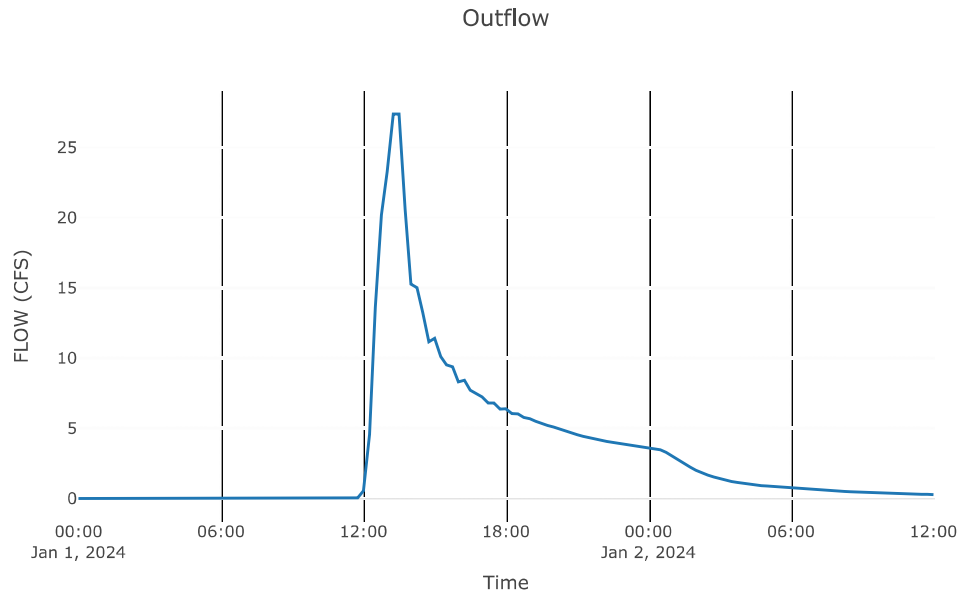


Reach: Reach-51b

Downstream : Junction - 86

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1840
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-51b	
Peak Discharge (CFS)	27.38
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.67
Peak Inflow (CFS)	28.49
Inflow Volume (AC - FT)	9.53

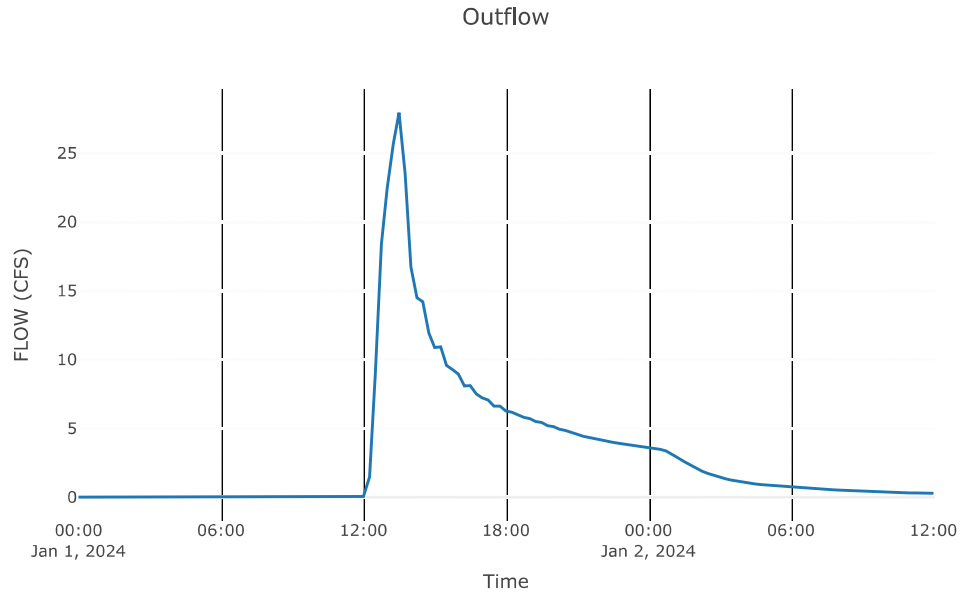


Reach: Reach-51c

Downstream : 13c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	920
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-51c	
Peak Discharge (CFS)	27.93
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.67
Peak Inflow (CFS)	27.38
Inflow Volume (AC - FT)	9.53

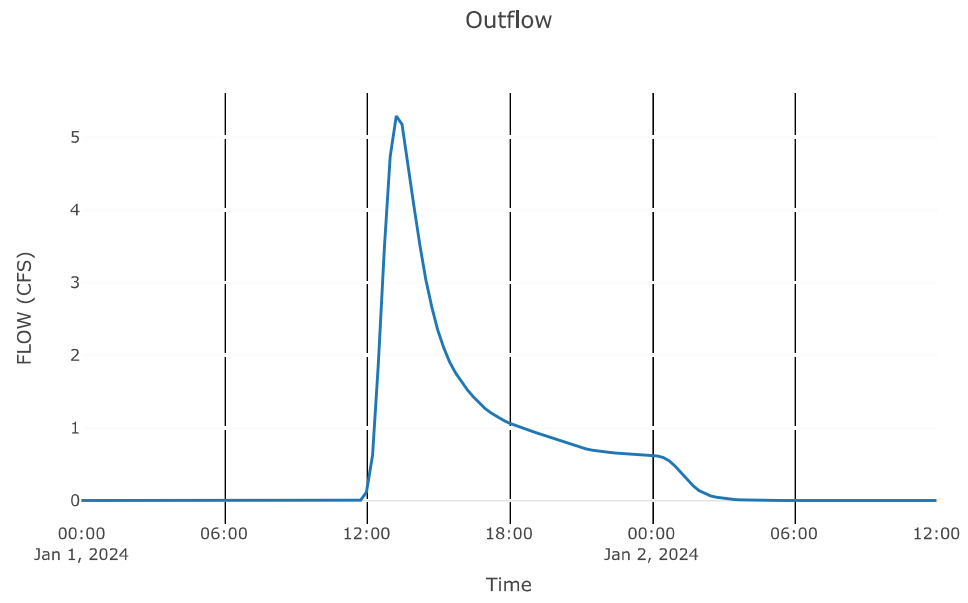


Reach: Reach-75b

Downstream : 78c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1450
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-75b	
Peak Discharge (CFS)	5.29
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.43
Peak Inflow (CFS)	5.4
Inflow Volume (AC - FT)	1.67

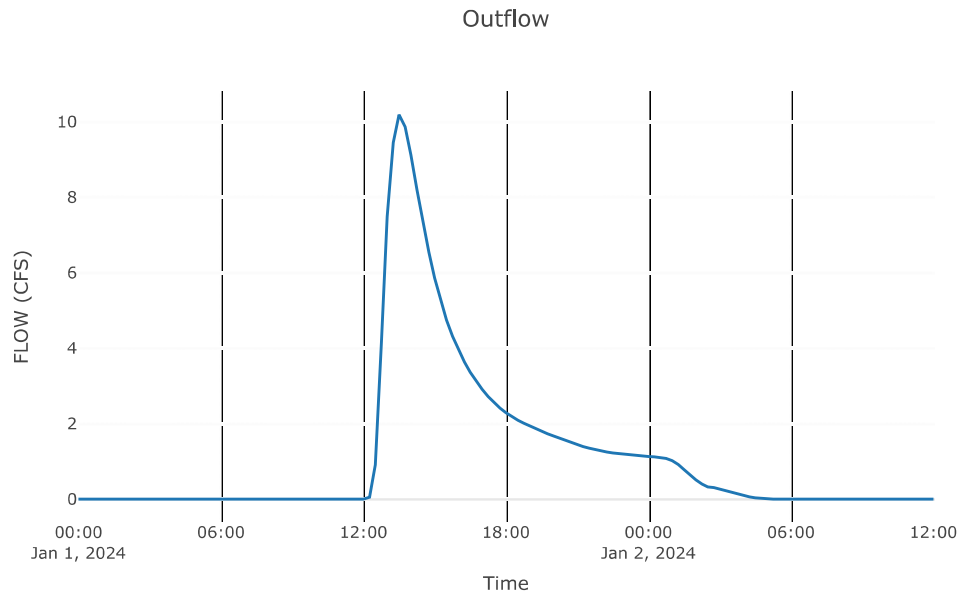


Reach: Reach-115b

Downstream : 73c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1710
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-115b	
Peak Discharge (CFS)	10.19
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.53
Peak Inflow (CFS)	10.23
Inflow Volume (AC - FT)	3.52

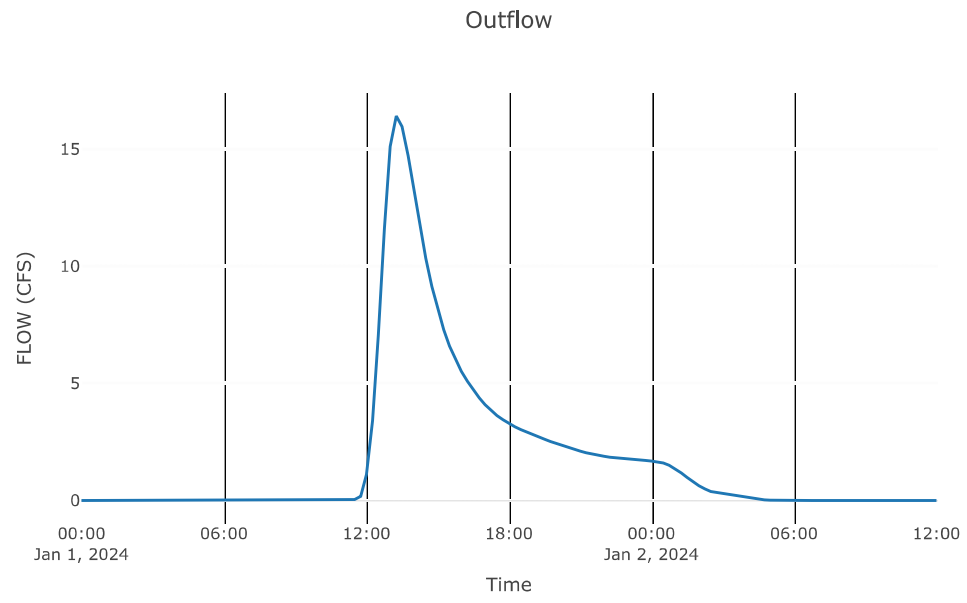


Reach: Reach-64b

Downstream : 72c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1260
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-64b	
Peak Discharge (CFS)	16.42
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.61
Peak Inflow (CFS)	16.65
Inflow Volume (AC - FT)	5.39

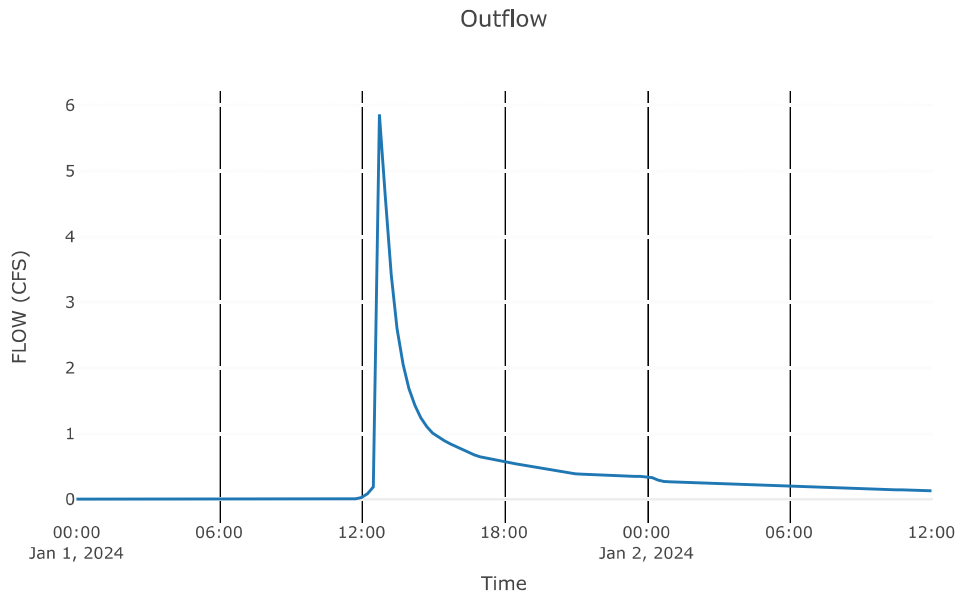


Reach: Reach-117b

Downstream : 72c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	630
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-117b	
Peak Discharge (CFS)	5.86
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.72
Peak Inflow (CFS)	6.28
Inflow Volume (AC - FT)	1.09

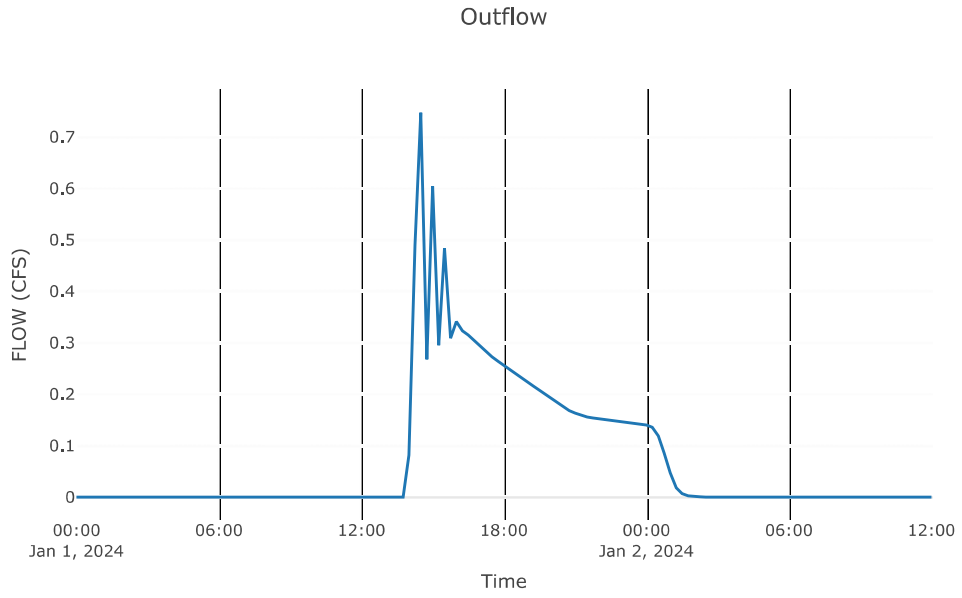


Reach: Reach-84b

Downstream : 72c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	970
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-84b	
Peak Discharge (CFS)	0.75
Time of Peak Discharge	01Jan2024, 14:30
Volume (IN)	0.27
Peak Inflow (CFS)	0.86
Inflow Volume (AC - FT)	0.24

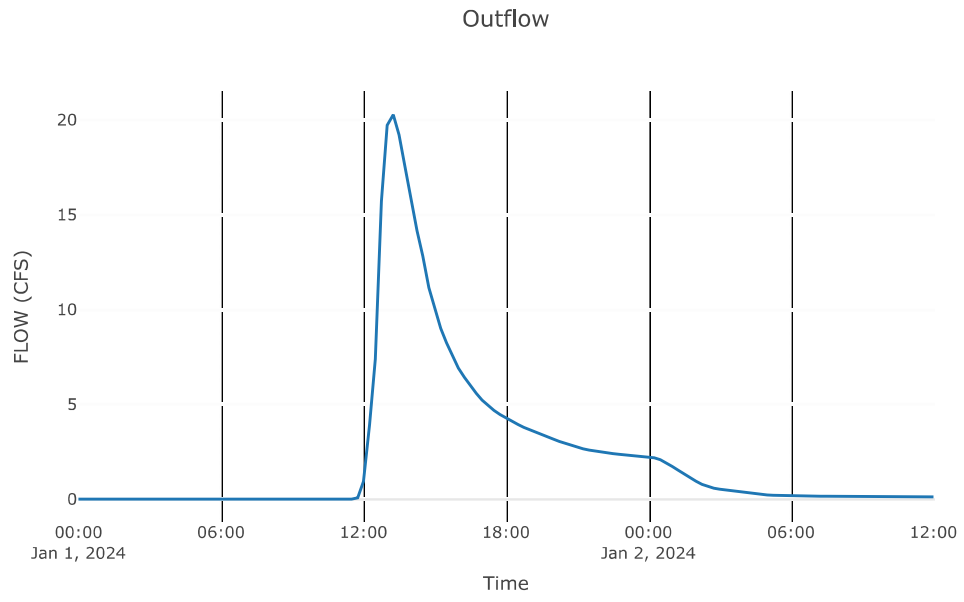


Reach: Reach-59b

Downstream : 57c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	600
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-59b	
Peak Discharge (CFS)	20.27
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.59
Peak Inflow (CFS)	20.3
Inflow Volume (AC - FT)	6.94

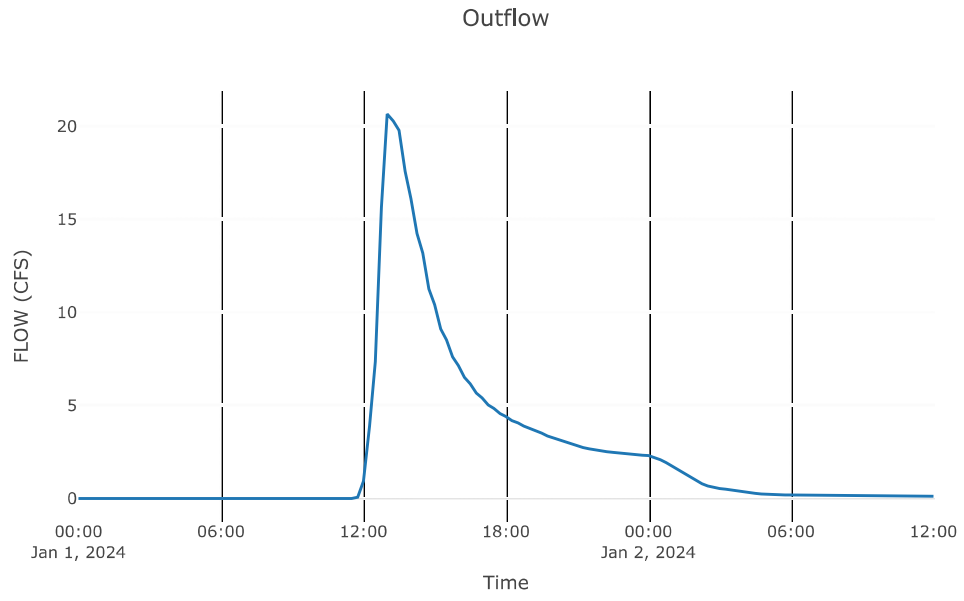


Reach: Reach-34b

Downstream : Junction - 53

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	60
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-34b	
Peak Discharge (CFS)	20.66
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.59
Peak Inflow (CFS)	20.71
Inflow Volume (AC - FT)	7.02

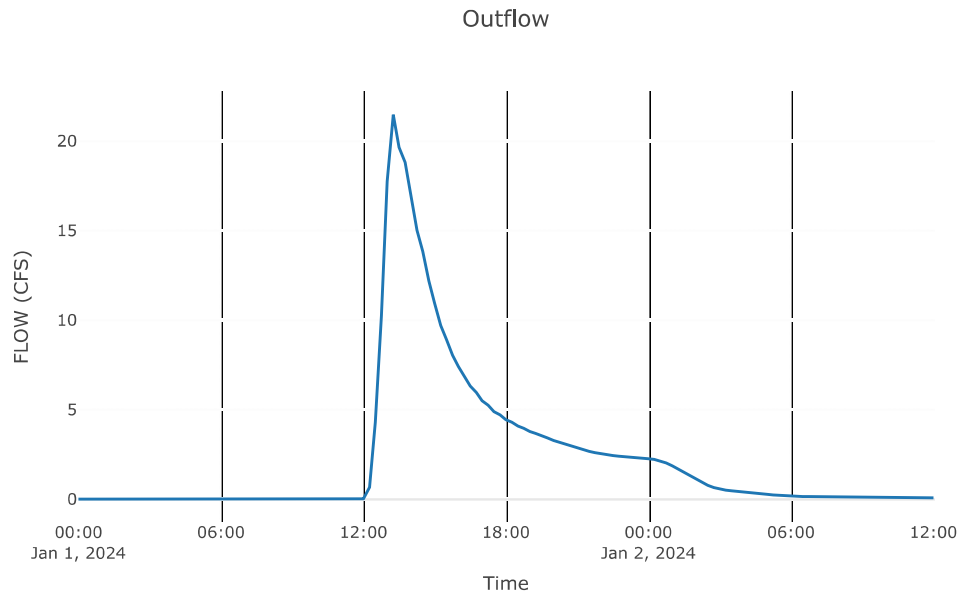


Reach: Reach-34c

Downstream : 56c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1380
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-34c	
Peak Discharge (CFS)	21.47
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.58
Peak Inflow (CFS)	20.66
Inflow Volume (AC - FT)	7.02

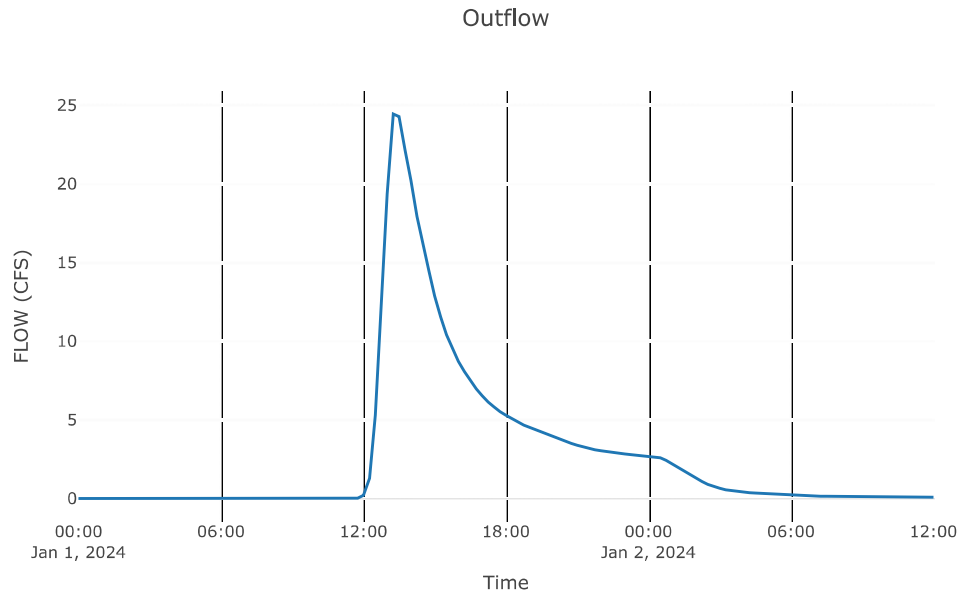


Reach: Reach-53b

Downstream : 52c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	2650
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-53b	
Peak Discharge (CFS)	24.44
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.57
Peak Inflow (CFS)	25.49
Inflow Volume (AC - FT)	8.15

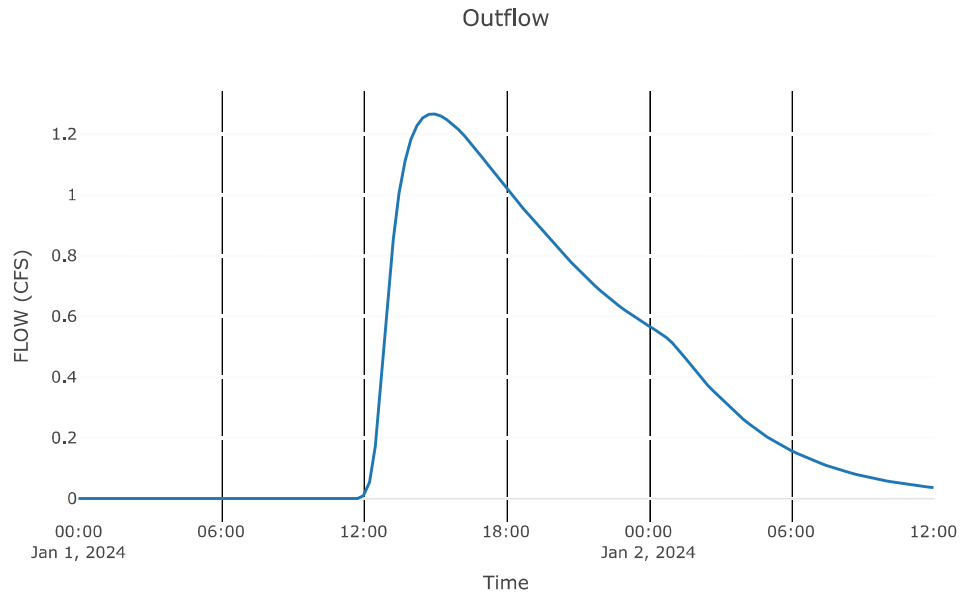


Reach: Reach-41b

Downstream : Reservoir - 18&19

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1420
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-41b	
Peak Discharge (CFS)	1.27
Time of Peak Discharge	01Jan2024, 15:00
Volume (IN)	0.48
Peak Inflow (CFS)	1.27
Inflow Volume (AC - FT)	1.09

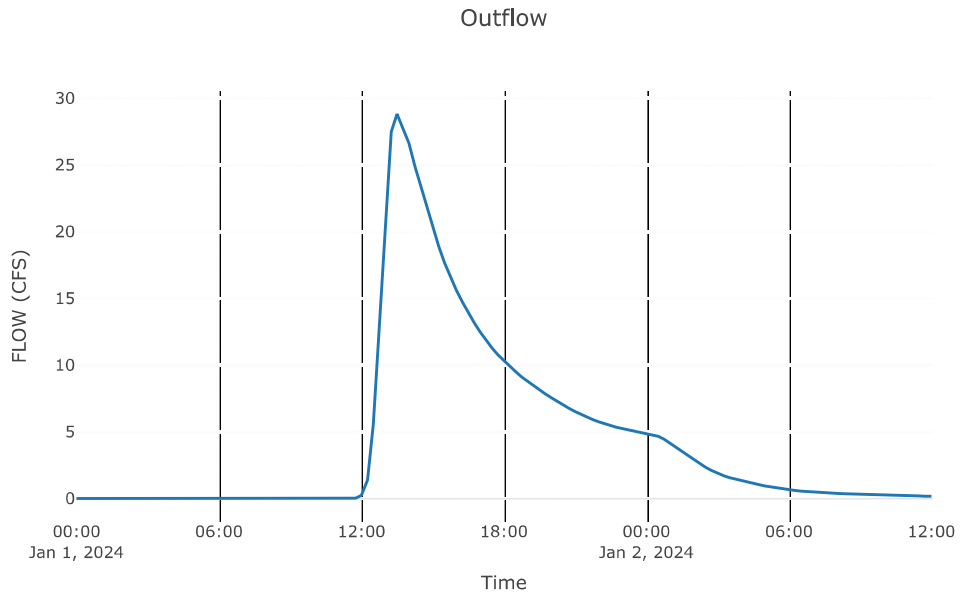


Reach: Reach-119b

Downstream : Junction - 7

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	490
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-119b	
Peak Discharge (CFS)	28.82
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.6
Peak Inflow (CFS)	28.89
Inflow Volume (AC - FT)	13.08

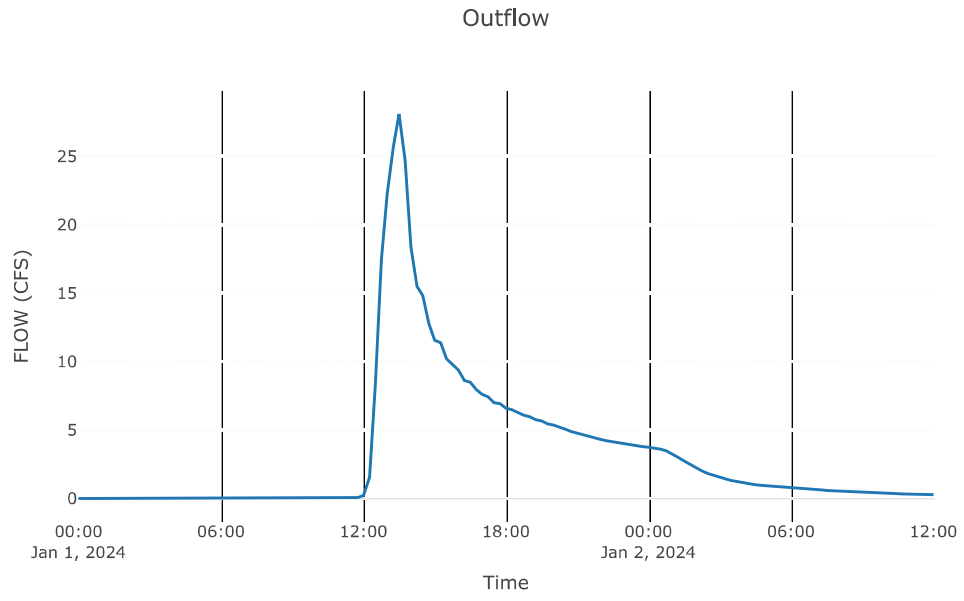


Reach: Reach-51d

Downstream : Junction - 7

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1090
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-51d	
Peak Discharge (CFS)	28.1
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.68
Peak Inflow (CFS)	28.51
Inflow Volume (AC - FT)	9.79

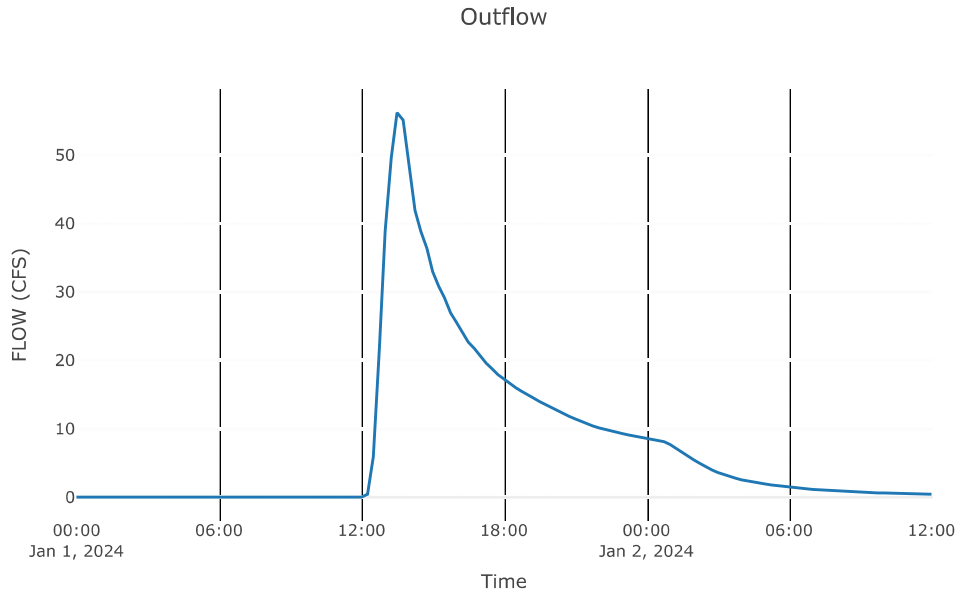


Reach: Reach-51e

Downstream : Junction - 51a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1270
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-51e	
Peak Discharge (CFS)	56.18
Time of Peak Discharge	01Jan2024, 13:30
Volume (IN)	0.63
Peak Inflow (CFS)	57.1
Inflow Volume (AC - FT)	22.97

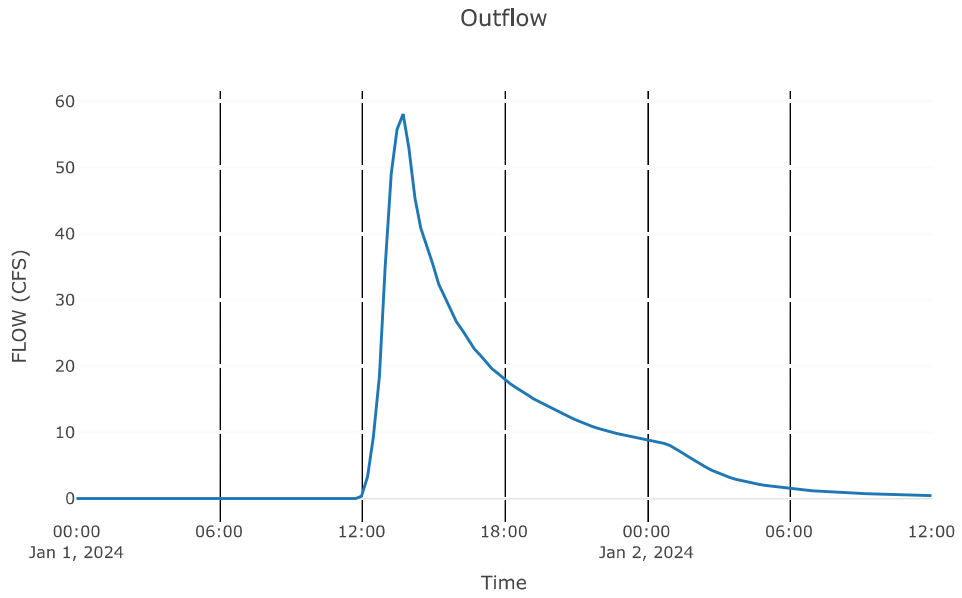


Reach: Reach-51f

Downstream : I2C

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1360
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-51f	
Peak Discharge (CFS)	58.1
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.63
Peak Inflow (CFS)	58.24
Inflow Volume (AC - FT)	23.95

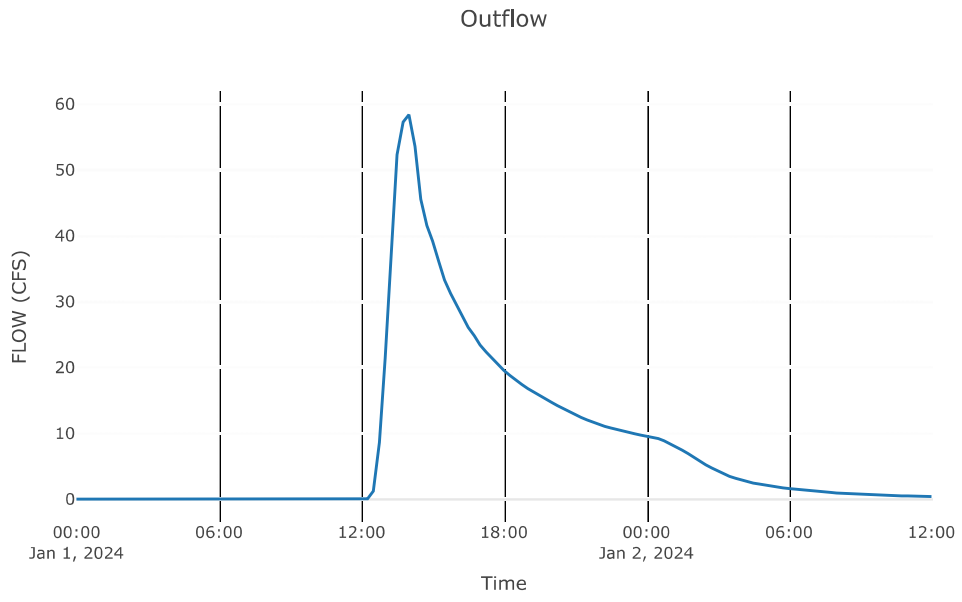


Reach: Reach-62b

Downstream : IIC

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	2200
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-62b	
Peak Discharge (CFS)	58.39
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.6
Peak Inflow (CFS)	59.99
Inflow Volume (AC - FT)	24.72

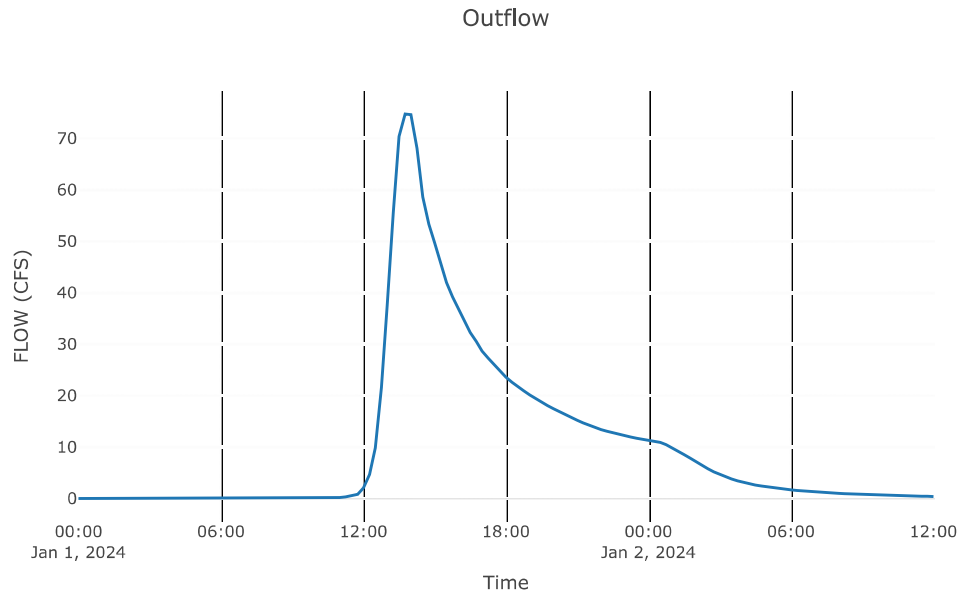


Reach: Reach-10b

Downstream : Junction - 98

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Rectangular
Length (FT)	150
Energy Slope (FT/FT)	0
Mannings n	0.01
Width (FT)	6
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-10b	
Peak Discharge (CFS)	74.75
Time of Peak Discharge	01Jan2024, 13:45
Volume (IN)	0.66
Peak Inflow (CFS)	74.82
Inflow Volume (AC - FT)	30.94

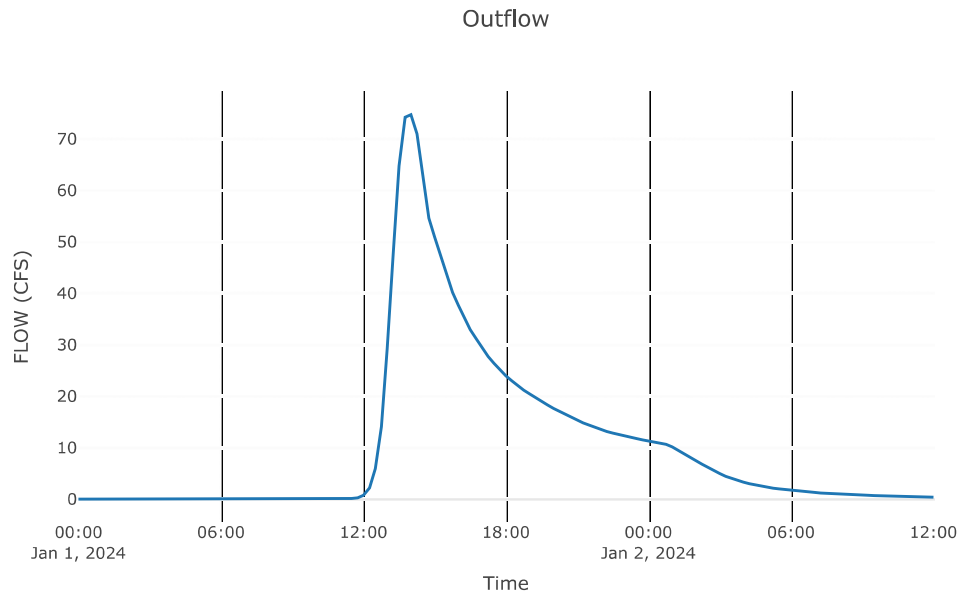


Reach: Reach-10c

Downstream : 108c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1350
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-10c	
Peak Discharge (CFS)	74.71
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.66
Peak Inflow (CFS)	74.75
Inflow Volume (AC - FT)	30.94

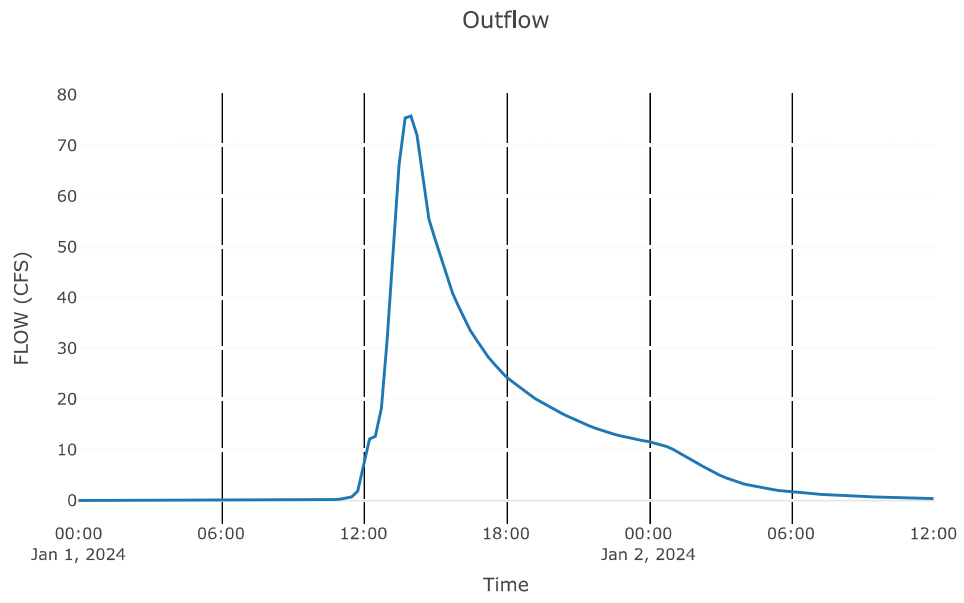


Reach: Reach-98b

Downstream : Junction - 99

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	60
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-98b	
Peak Discharge (CFS)	75.81
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.67
Peak Inflow (CFS)	75.82
Inflow Volume (AC - FT)	31.94

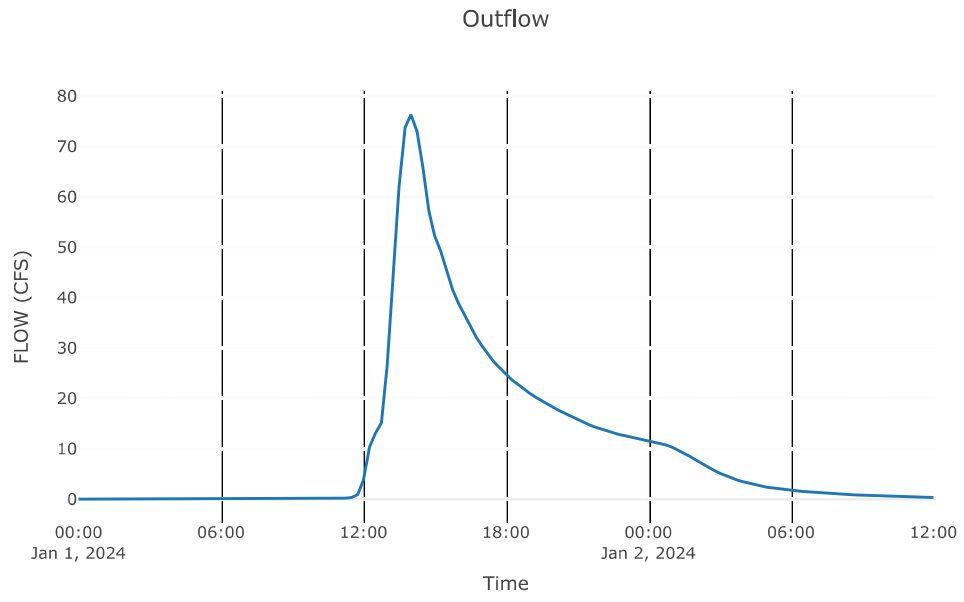


Reach: Reach-98c

Downstream : 109c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	890
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-98c	
Peak Discharge (CFS)	76.29
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.66
Peak Inflow (CFS)	75.81
Inflow Volume (AC - FT)	31.94

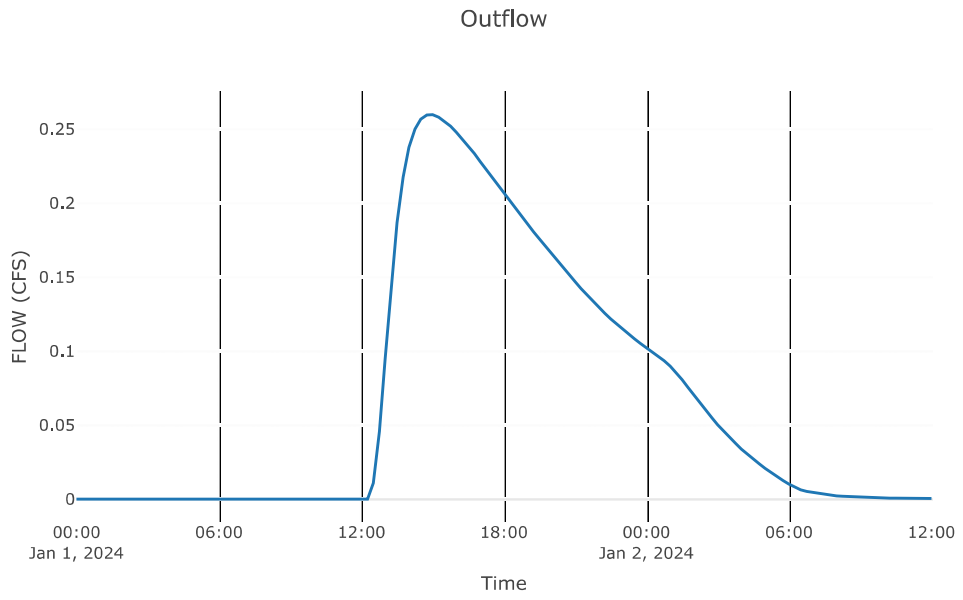


Reach: Reach-39b

Downstream : Reservoir - 55

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1200
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-39b	
Peak Discharge (CFS)	0.26
Time of Peak Discharge	01Jan2024, 15:00
Volume (IN)	0.44
Peak Inflow (CFS)	0.3
Inflow Volume (AC - FT)	0.26

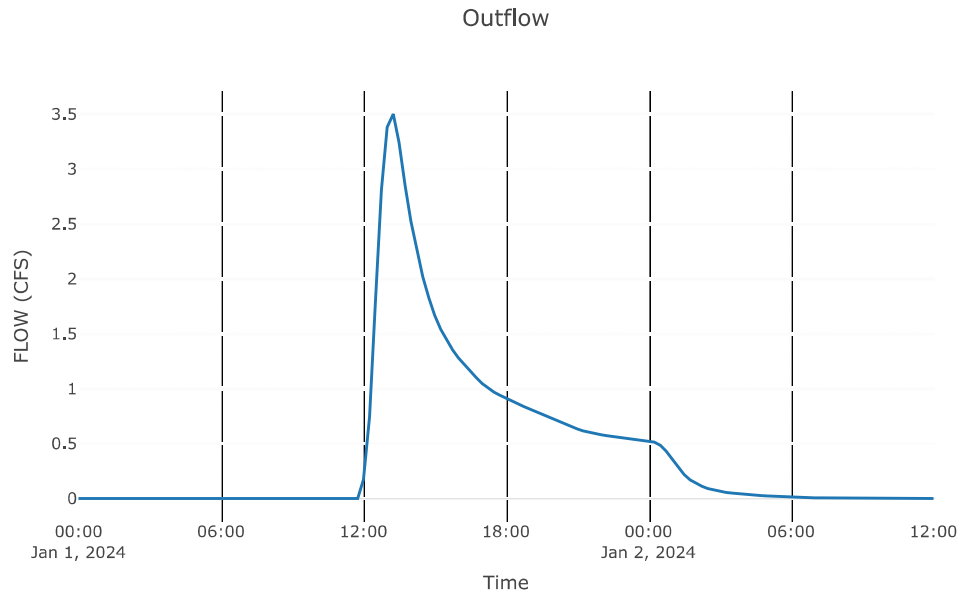


Reach: Reach-32b

Downstream : Junction - 57c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	0.67
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-32b	
Peak Discharge (CFS)	3.5
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.39
Peak Inflow (CFS)	3.5
Inflow Volume (AC - FT)	1.28

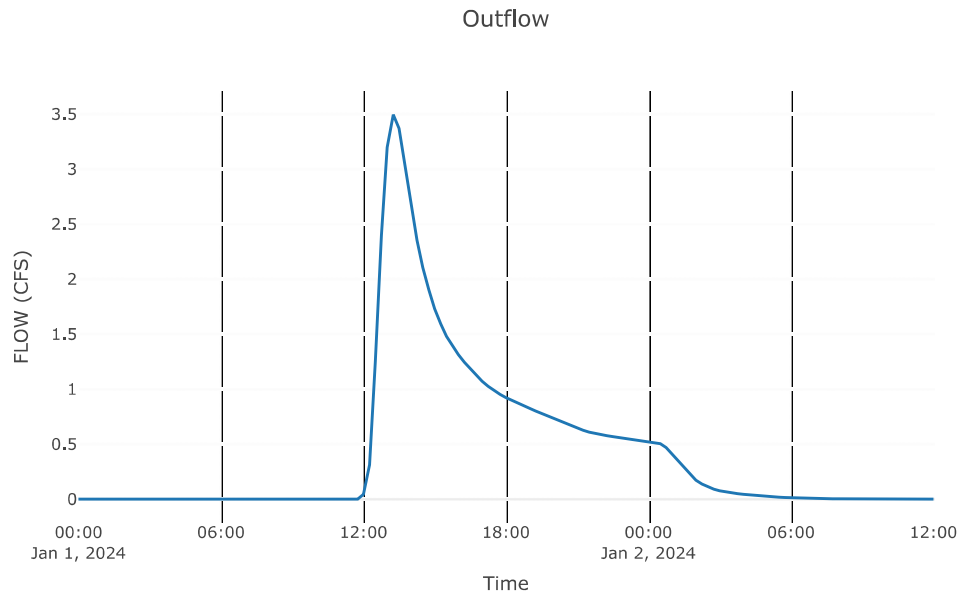


Reach: Reach-32c

Downstream : Junction - 44

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1400
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-32c	
Peak Discharge (CFS)	3.5
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.39
Peak Inflow (CFS)	3.5
Inflow Volume (AC - FT)	1.28

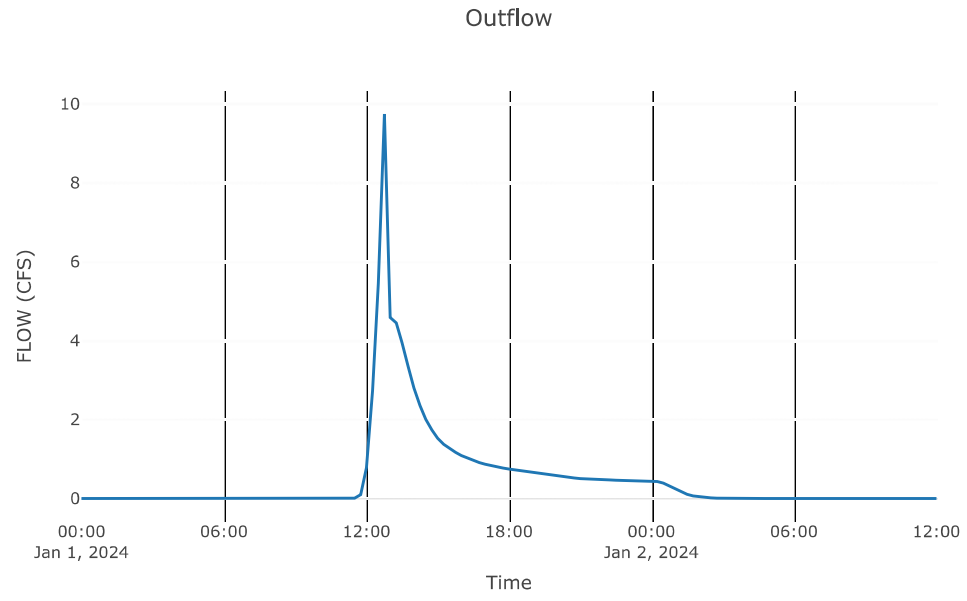


Reach: Reach-31b

Downstream : Junction - 44

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	75
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.25
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-31b	
Peak Discharge (CFS)	9.75
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.71
Peak Inflow (CFS)	9.82
Inflow Volume (AC - FT)	1.49

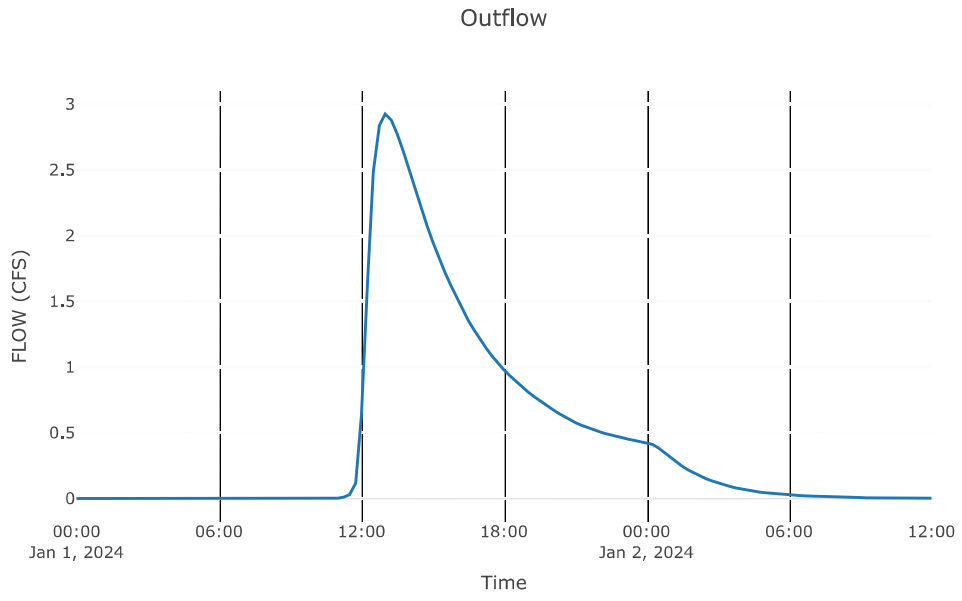


Reach: Reach-121b

Downstream : 49c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.17
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-121b	
Peak Discharge (CFS)	2.93
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.8
Peak Inflow (CFS)	2.93
Inflow Volume (AC - FT)	1.34

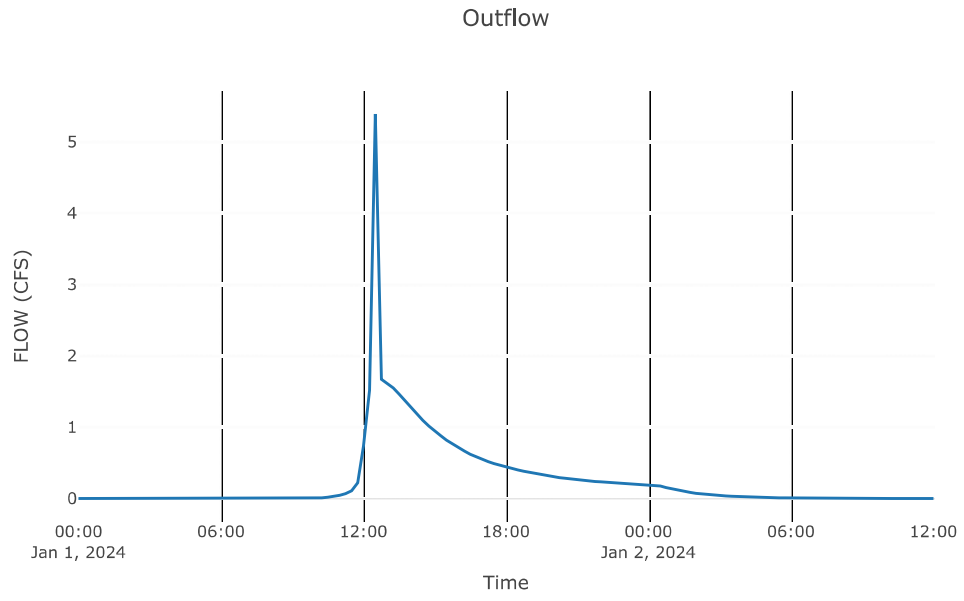


Reach: Reach-47b

Downstream : 49c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	70
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.25
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-47b	
Peak Discharge (CFS)	5.39
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	1.07
Peak Inflow (CFS)	5.45
Inflow Volume (AC - FT)	0.76

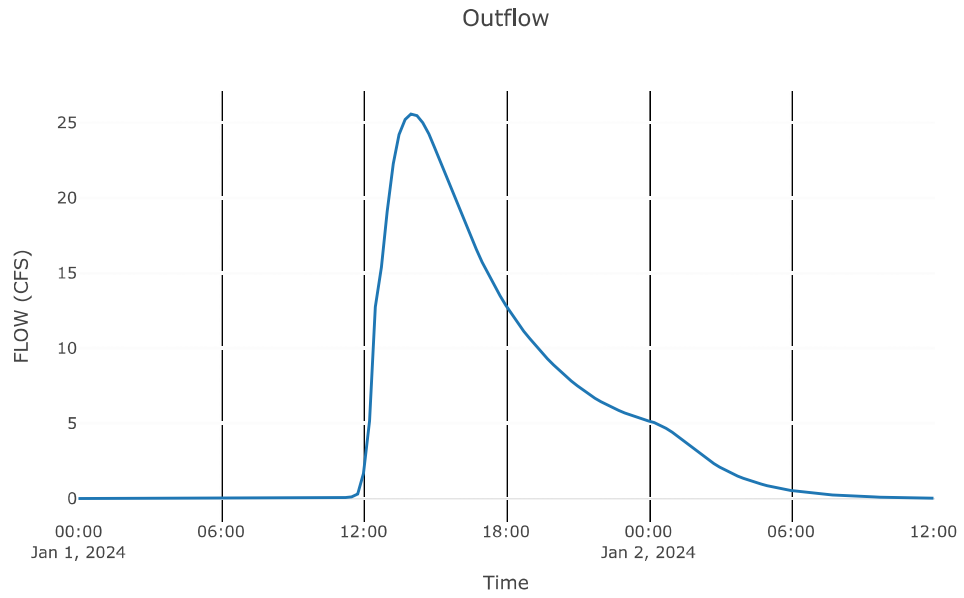


Reach: Reach-86b

Downstream : Reservoir - 92&93

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1100
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-86b	
Peak Discharge (CFS)	25.57
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.75
Peak Inflow (CFS)	25.66
Inflow Volume (AC - FT)	14.62

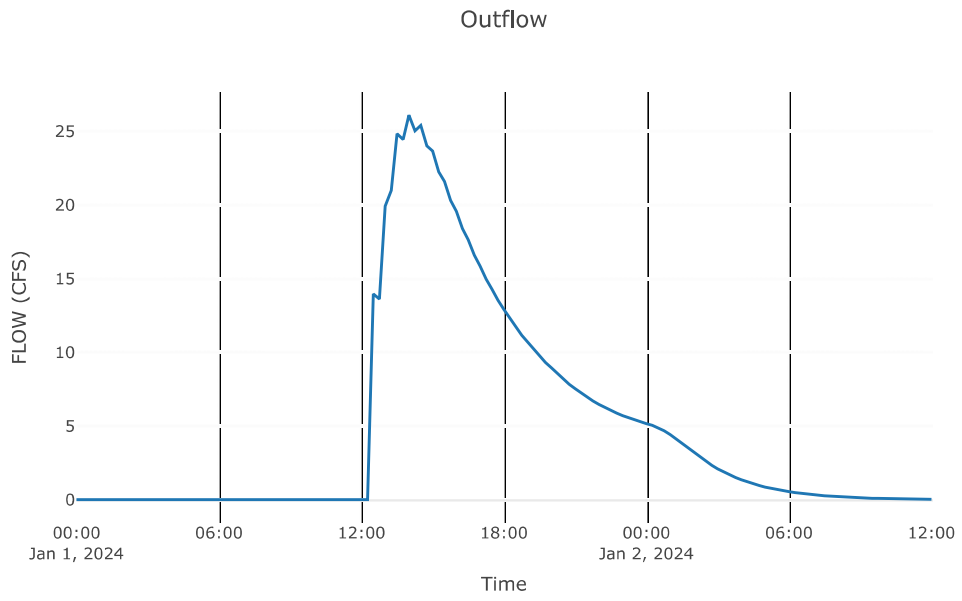


Reach: Reach-86c

Downstream : 47c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	250
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-86c	
Peak Discharge (CFS)	26.09
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	0.74
Peak Inflow (CFS)	26.18
Inflow Volume (AC - FT)	14.46

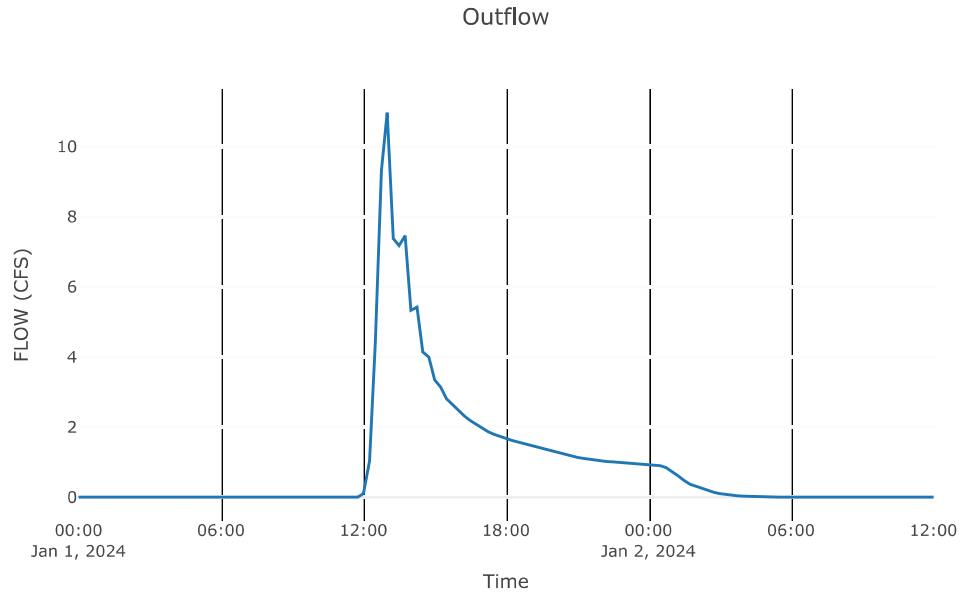


Reach: Reach-31c

Downstream : 47c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1020
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

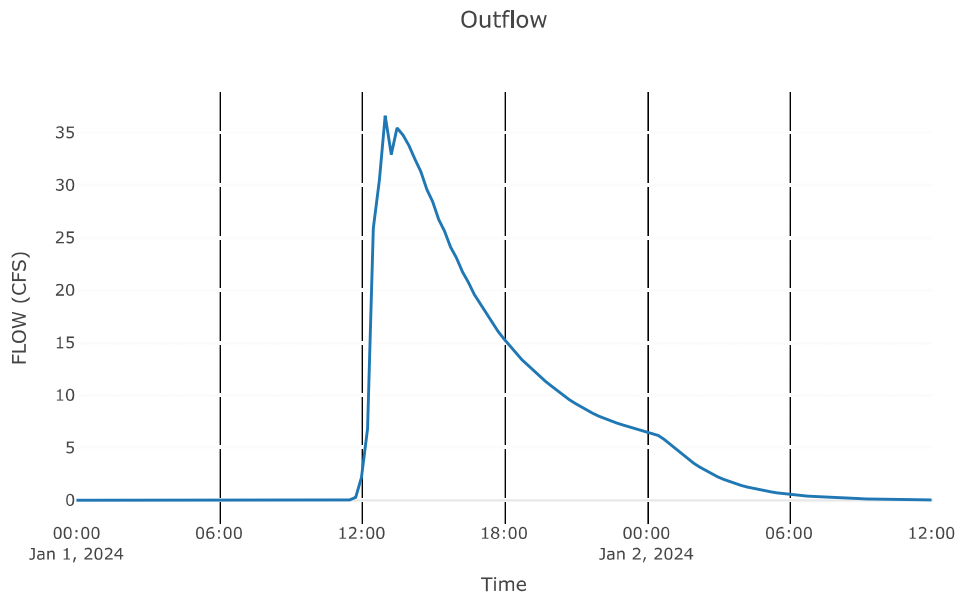
Results: Reach-31c	
Peak Discharge (CFS)	10.97
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.5
Peak Inflow (CFS)	12.14
Inflow Volume (AC - FT)	2.77



Reach: Reach-44b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	130
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-44b	
Peak Discharge (CFS)	36.61
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.69
Peak Inflow (CFS)	36.77
Inflow Volume (AC - FT)	18.73

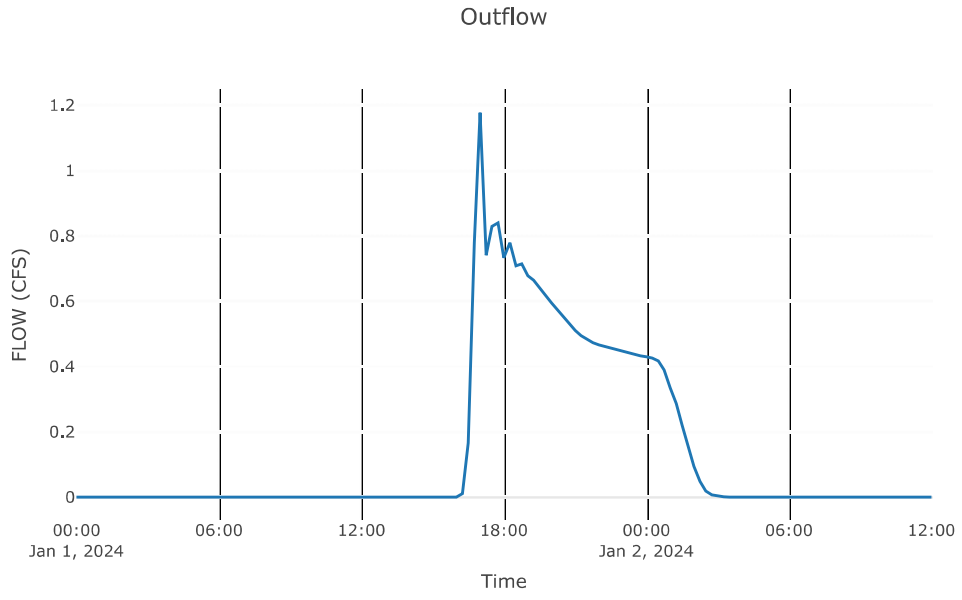


Reach: Reach-7b

Downstream : 22c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1530
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-7b	
Peak Discharge (CFS)	1.18
Time of Peak Discharge	01Jan2024, 17:00
Volume (IN)	0.18
Peak Inflow (CFS)	1.15
Inflow Volume (AC - FT)	0.46

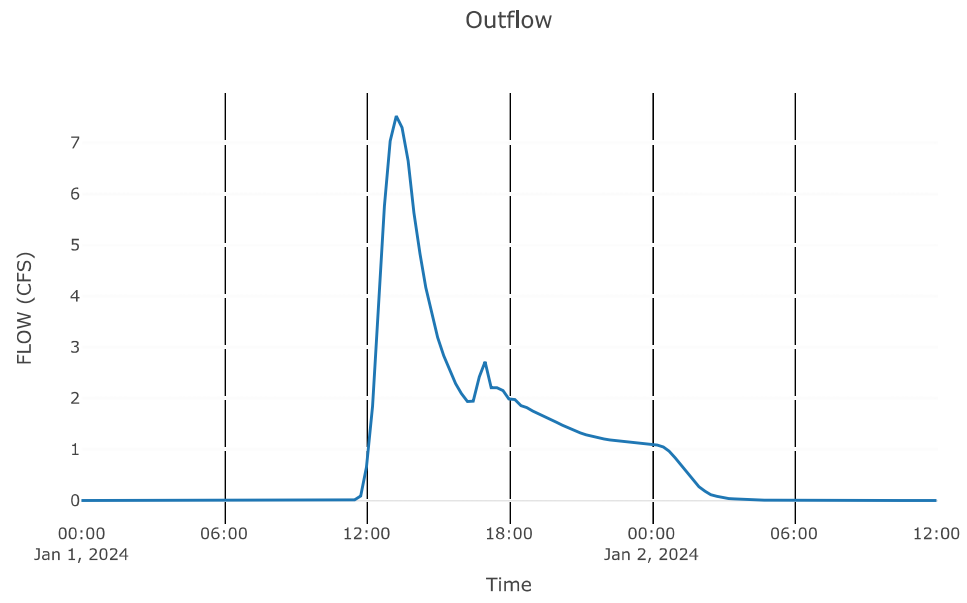


Reach: Reach-108b

Downstream : Junction - 101a

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	100
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-108b	
Peak Discharge (CFS)	7.52
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.48
Peak Inflow (CFS)	7.53
Inflow Volume (AC - FT)	2.67

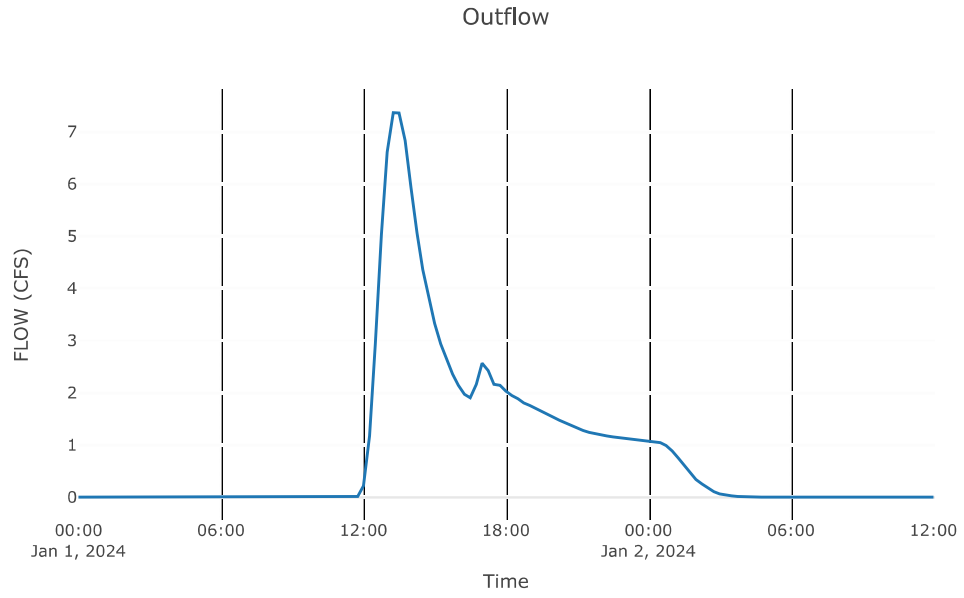


Reach: Reach-108c

Downstream : Junction - 101c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	620
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-108c	
Peak Discharge (CFS)	7.36
Time of Peak Discharge	01Jan2024, 13:15
Volume (IN)	0.48
Peak Inflow (CFS)	7.52
Inflow Volume (AC - FT)	2.67

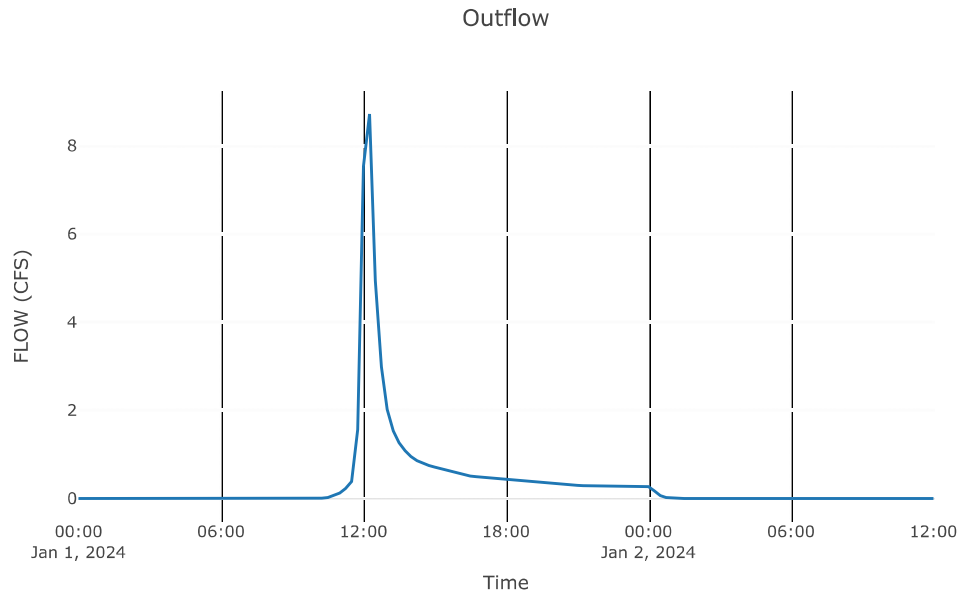


Reach: Reach-6b

Downstream : Junction - 101b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	100
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-6b	
Peak Discharge (CFS)	8.72
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	0.93
Peak Inflow (CFS)	8.75
Inflow Volume (AC - FT)	1.04

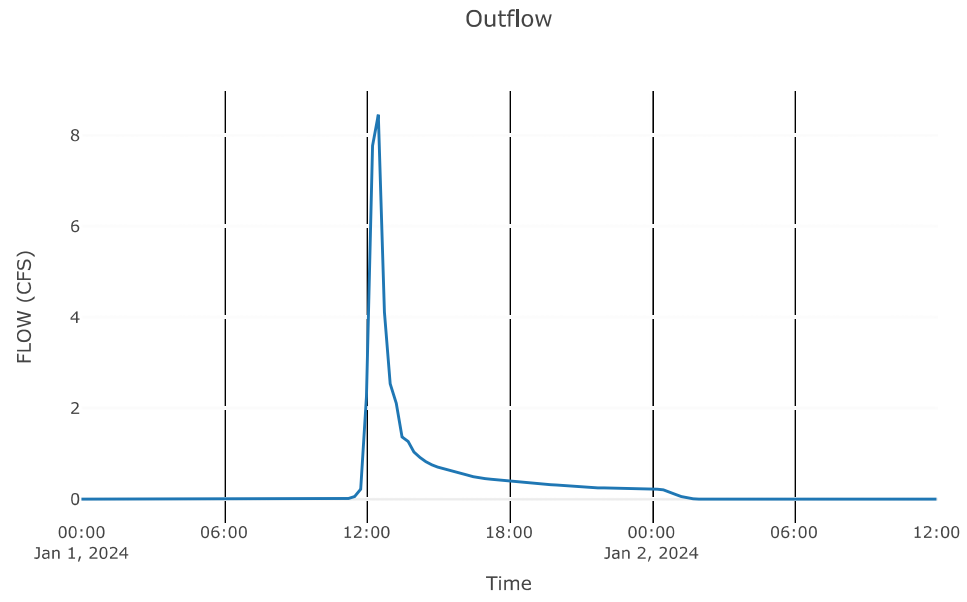


Reach: Reach-6c

Downstream : Junction - 101c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1350
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-6c	
Peak Discharge (CFS)	8.46
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.89
Peak Inflow (CFS)	8.72
Inflow Volume (AC - FT)	1.04

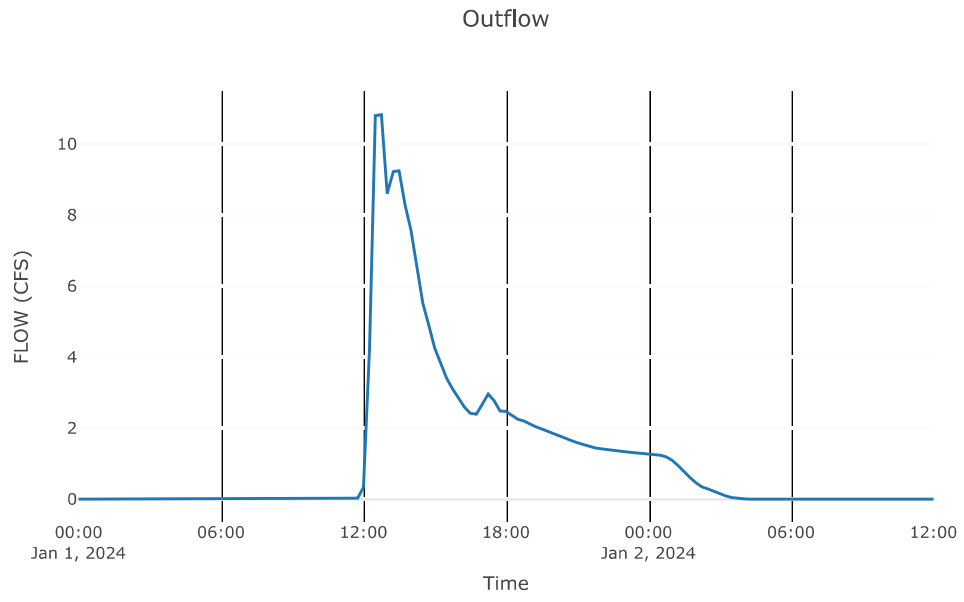


Reach: Reach-108d

Downstream : Reservoir - 84&85

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1100
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-108d	
Peak Discharge (CFS)	10.82
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.54
Peak Inflow (CFS)	11.39
Inflow Volume (AC - FT)	3.63

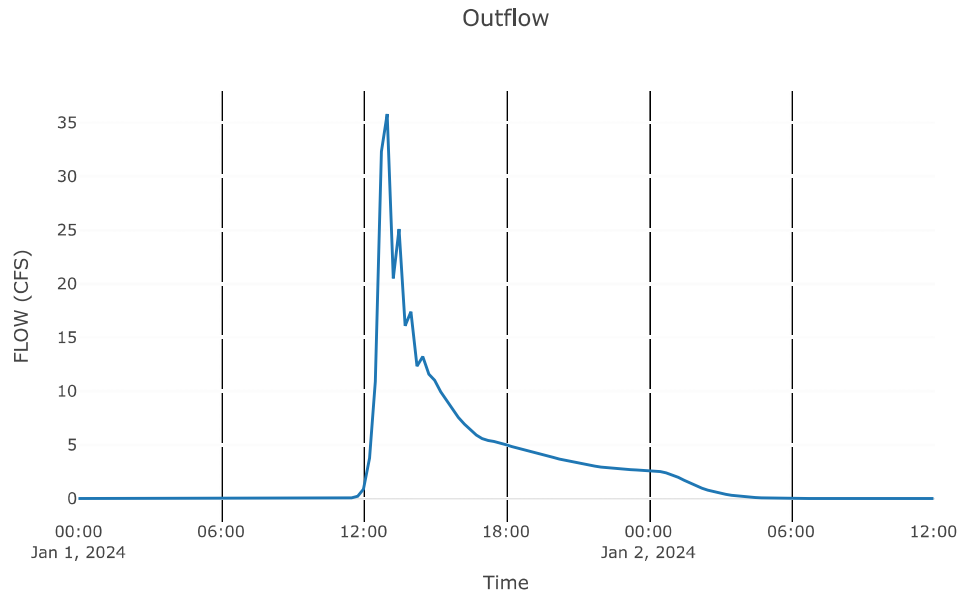


Reach: Reach-101b

Downstream : 9c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	1800
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-101b	
Peak Discharge (CFS)	35.8
Time of Peak Discharge	01Jan2024, 13:00
Volume (IN)	0.68
Peak Inflow (CFS)	45.63
Inflow Volume (AC - FT)	8.15

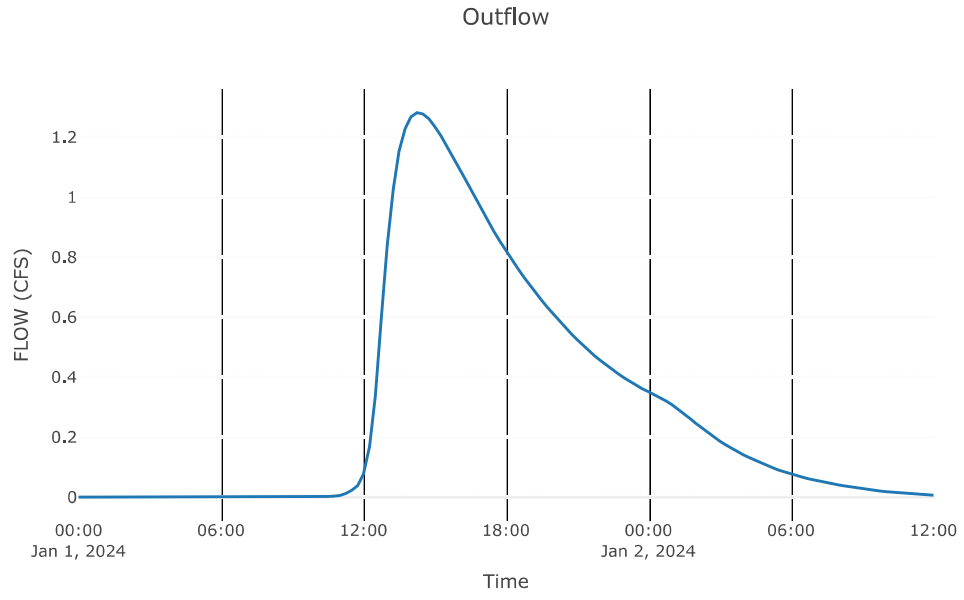


Reach: Reach-1b

Downstream : 7c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	420
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-1b	
Peak Discharge (CFS)	1.28
Time of Peak Discharge	01Jan2024, 14:15
Volume (IN)	1.13
Peak Inflow (CFS)	1.3
Inflow Volume (AC - FT)	0.9

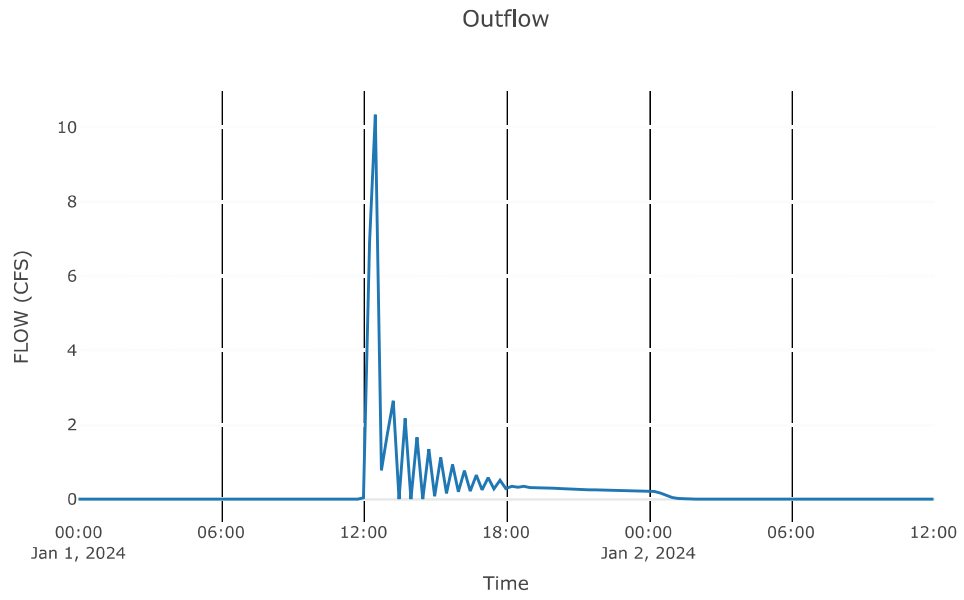


Reach: Reach-8b

Downstream : Reservoir - 88

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	800
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-8b	
Peak Discharge (CFS)	10.34
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.8
Peak Inflow (CFS)	15.11
Inflow Volume (AC - FT)	0.85

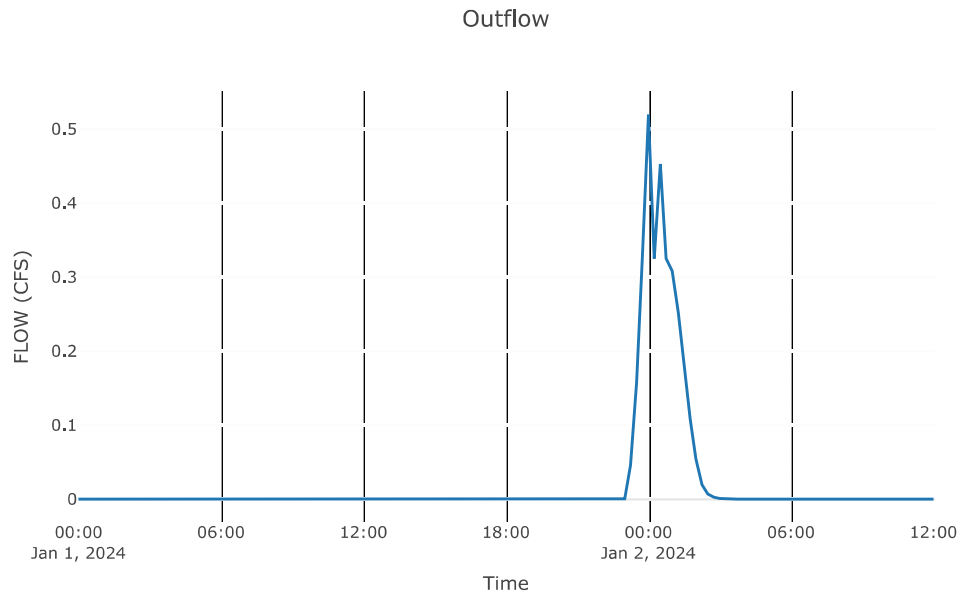


Reach: Reach-5b

Downstream : 25c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1320
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-5b	
Peak Discharge (CFS)	0.52
Time of Peak Discharge	01Jan2024, 24:00
Volume (IN)	0.03
Peak Inflow (CFS)	0.51
Inflow Volume (AC - FT)	0.07

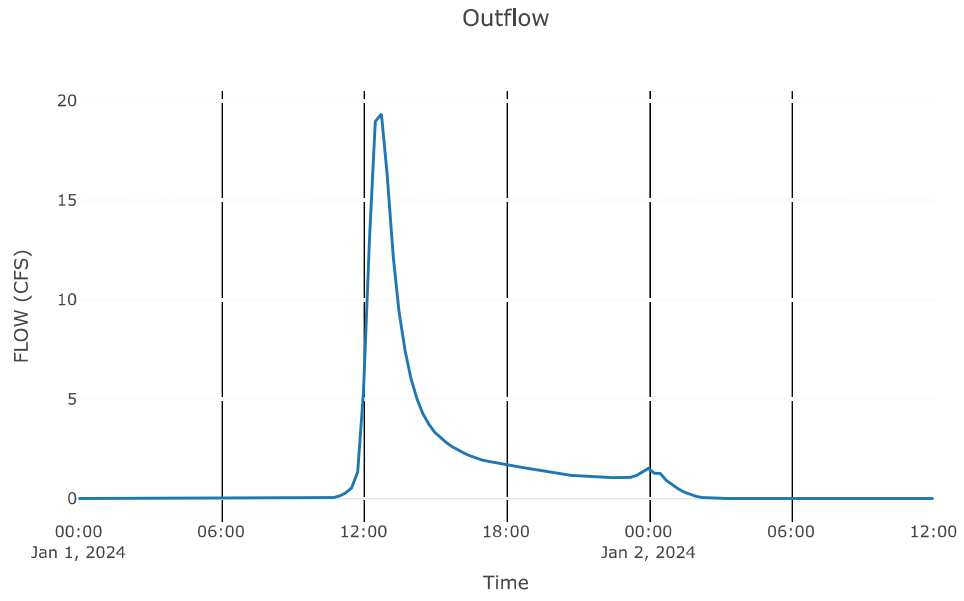


Reach: Reach-4b

Downstream : Junction - 3

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	110
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-4b	
Peak Discharge (CFS)	19.33
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.63
Peak Inflow (CFS)	19.33
Inflow Volume (AC - FT)	3.89

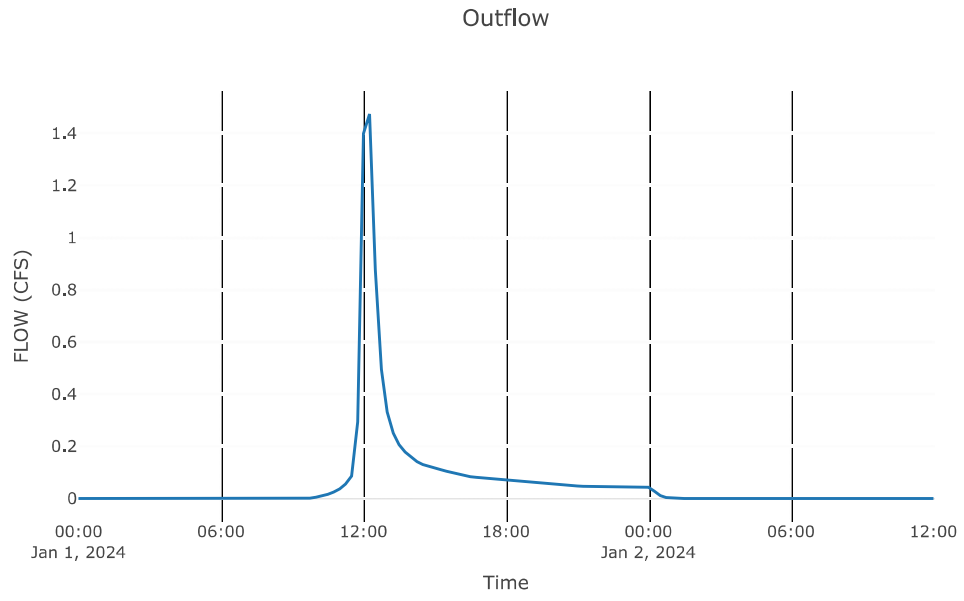


Reach: Reach-116b

Downstream : Junction - 3

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	850
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-116b	
Peak Discharge (CFS)	1.47
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	1.05
Peak Inflow (CFS)	1.69
Inflow Volume (AC - FT)	0.18

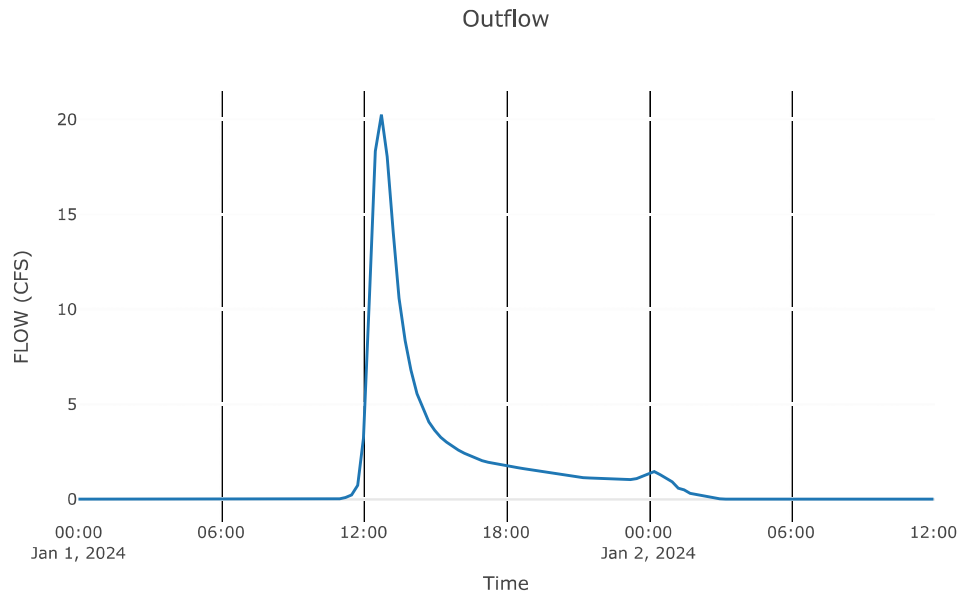


Reach: Reach-4c

Downstream : 20c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	970
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-4c	
Peak Discharge (CFS)	20.25
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.63
Peak Inflow (CFS)	19.83
Inflow Volume (AC - FT)	4.07

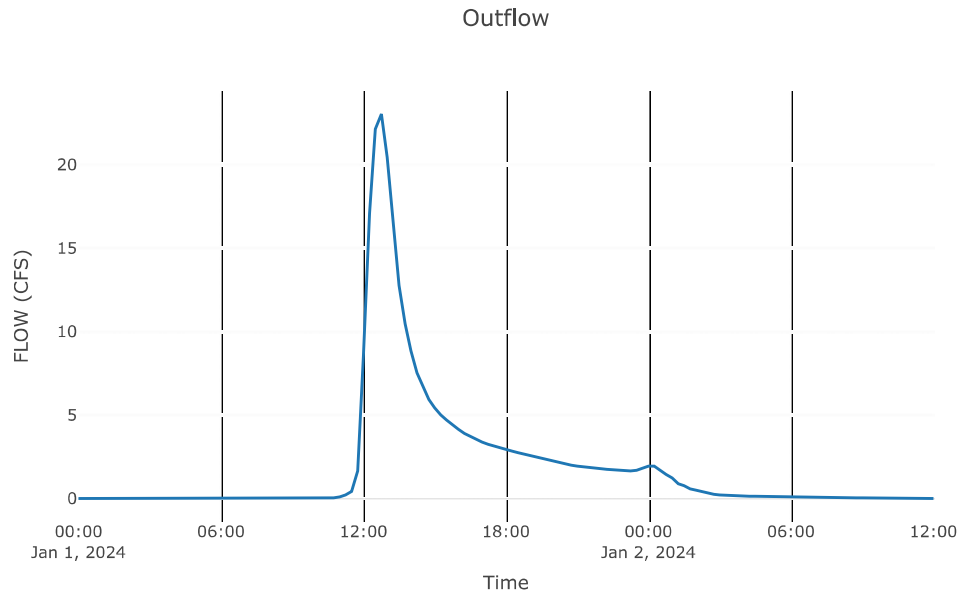


Reach: Reach-3b

Downstream : Junction - 107

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.25
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-3b	
Peak Discharge (CFS)	23.04
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.69
Peak Inflow (CFS)	23.05
Inflow Volume (AC - FT)	5.68

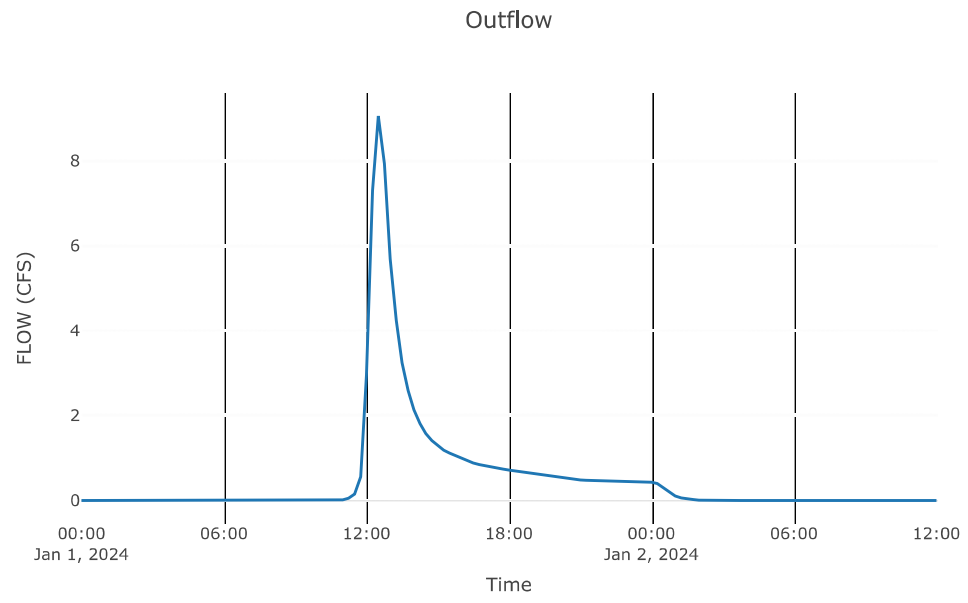


Reach: Reach-111b

Downstream : Junction - 101

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-111b	
Peak Discharge (CFS)	9.05
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.82
Peak Inflow (CFS)	9.07
Inflow Volume (AC - FT)	1.58

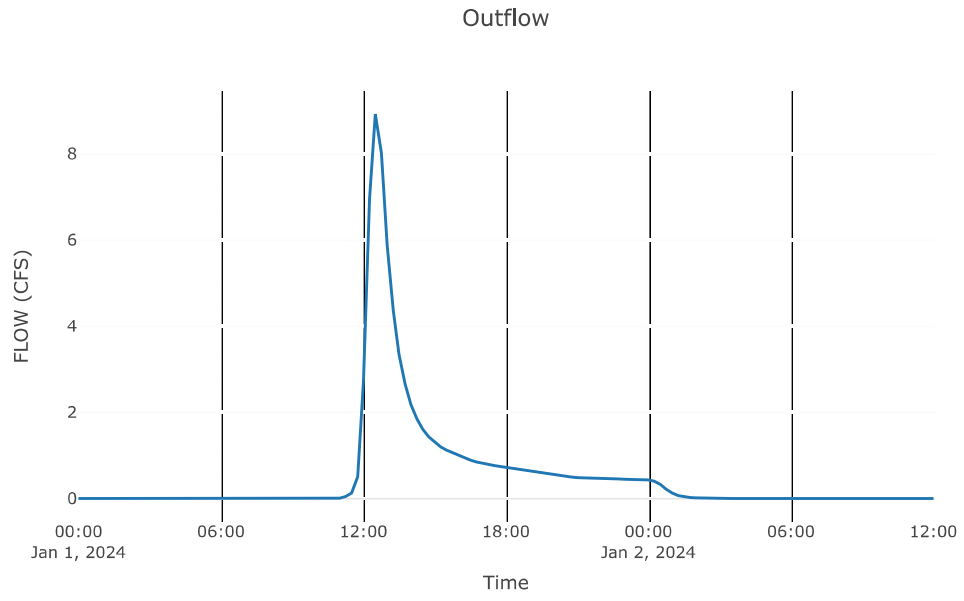


Reach: Reach-111c

Downstream : Junction - 100

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	430
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-111c	
Peak Discharge (CFS)	8.92
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.82
Peak Inflow (CFS)	9.05
Inflow Volume (AC - FT)	1.58

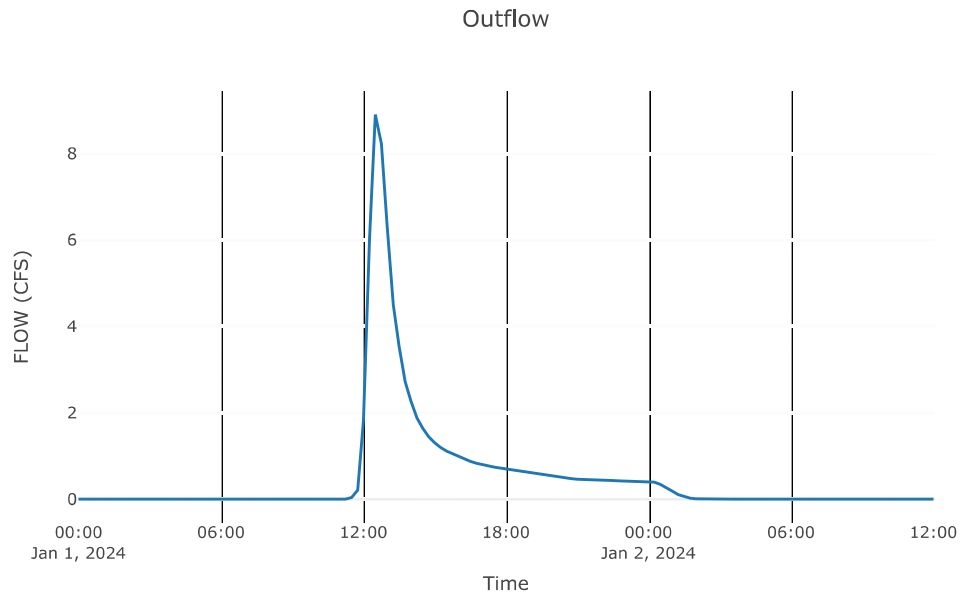


Reach: Reach-111d

Downstream : Junction - 107

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	900
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-111d	
Peak Discharge (CFS)	8.9
Time of Peak Discharge	01Jan2024, 12:30
Volume (IN)	0.81
Peak Inflow (CFS)	8.92
Inflow Volume (AC - FT)	1.58

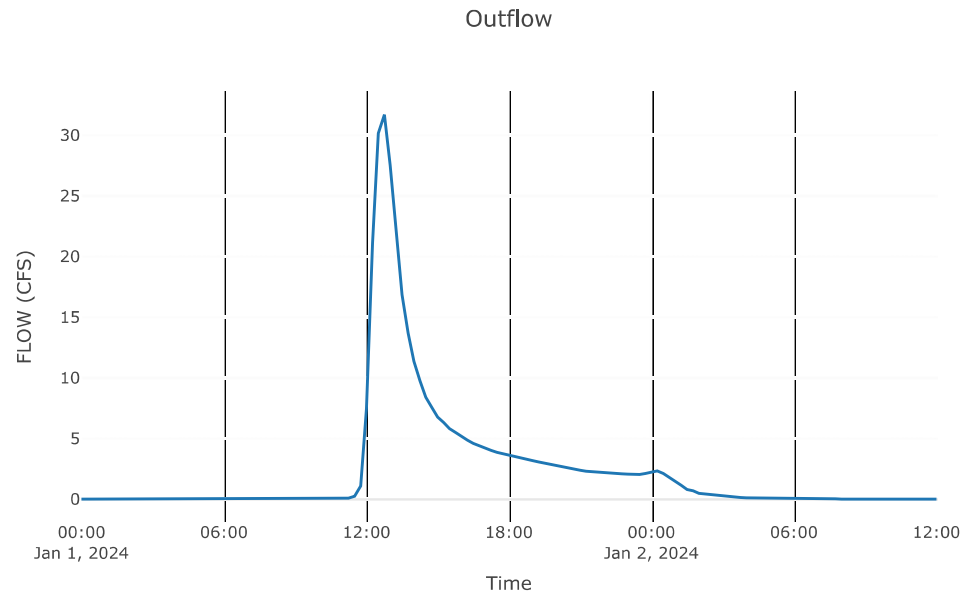


Reach: Reach-107b

Downstream : 8c

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1130
Energy Slope (FT/FT)	0
Mannings n	0.01
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

Results: Reach-107b	
Peak Discharge (CFS)	31.69
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.71
Peak Inflow (CFS)	31.26
Inflow Volume (AC - FT)	7.22

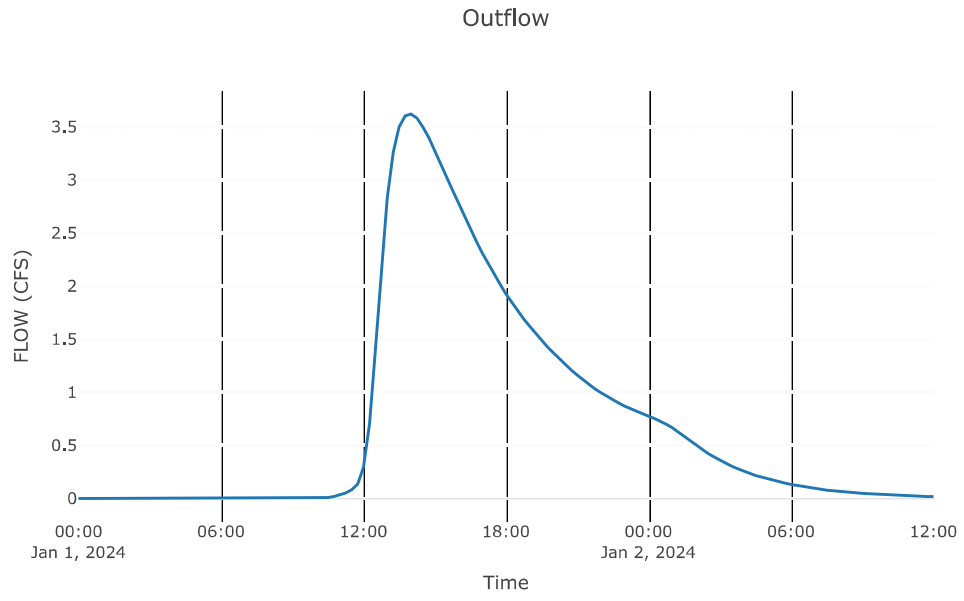


Reach: Reach-92b

Downstream : Junction - 79

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	125
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-92b	
Peak Discharge (CFS)	3.62
Time of Peak Discharge	01Jan2024, 14:00
Volume (IN)	1.06
Peak Inflow (CFS)	3.62
Inflow Volume (AC - FT)	2.17

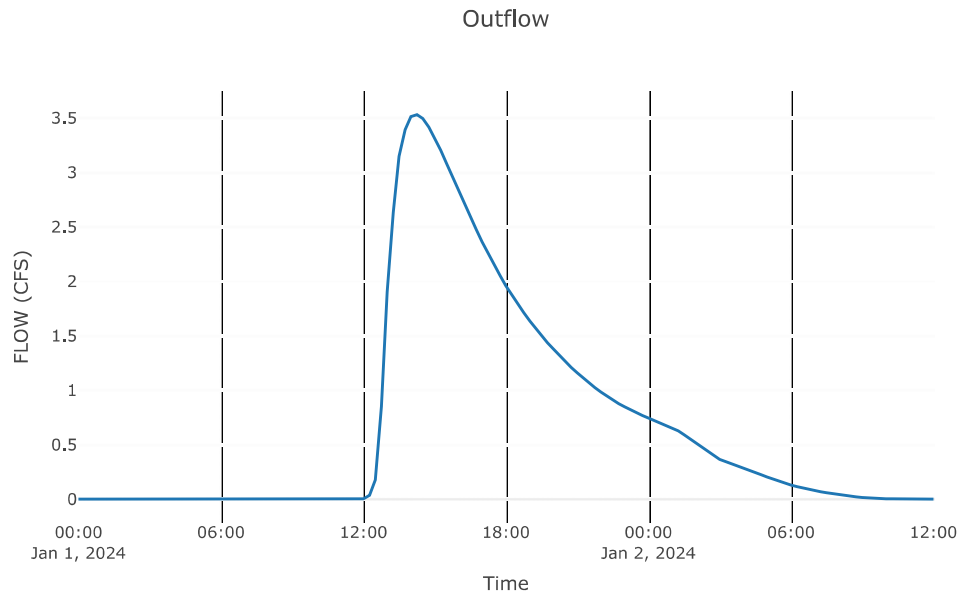


Reach: Reach-92c

Downstream : IIIc

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Trapezoid
Length (FT)	1800
Energy Slope (FT/FT)	0
Mannings n	0.04
Bottom Width (FT)	3
Side Slope (FT/FT)	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30
Channel Loss	Percolation
Channel Loss Percolation Rate	0.4
End Channel Loss	

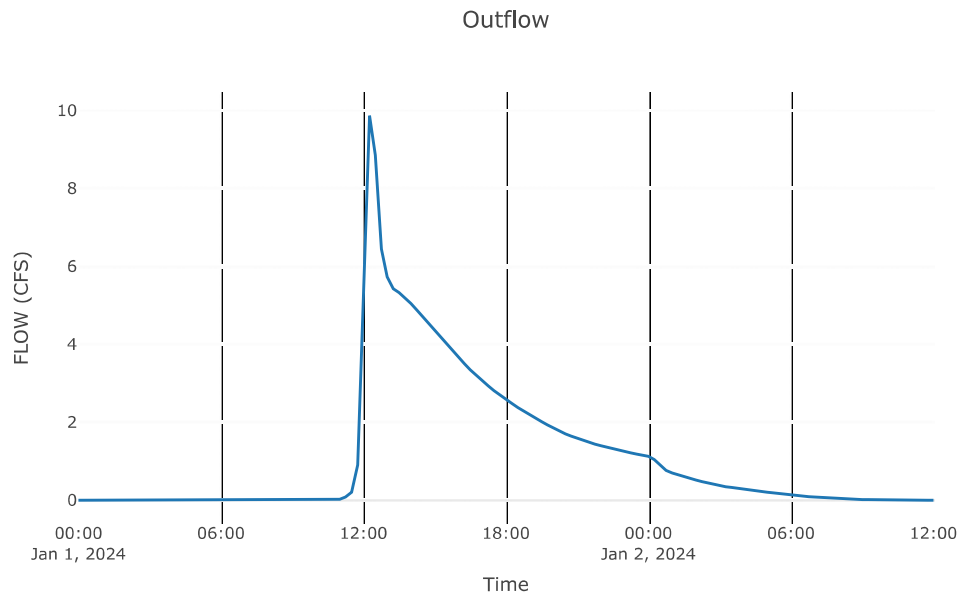
Results: Reach-92c	
Peak Discharge (CFS)	3.53
Time of Peak Discharge	01Jan2024, 14:15
Volume (IN)	1
Peak Inflow (CFS)	3.62
Inflow Volume (AC - FT)	2.17



Reach: Reach-79b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	60
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-79b	
Peak Discharge (CFS)	9.87
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	0.92
Peak Inflow (CFS)	9.92
Inflow Volume (AC - FT)	3.45



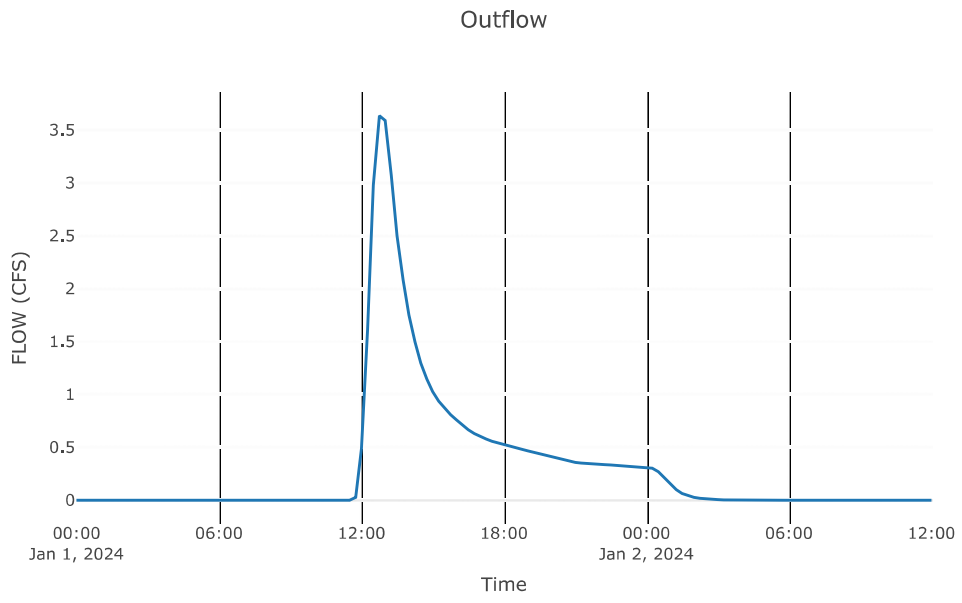
Reach: Reach-104b

Route: Muskingum Cunge

Method	Muskingum Cunge
Channel	Circular
Length (FT)	50
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	1.5
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-104b

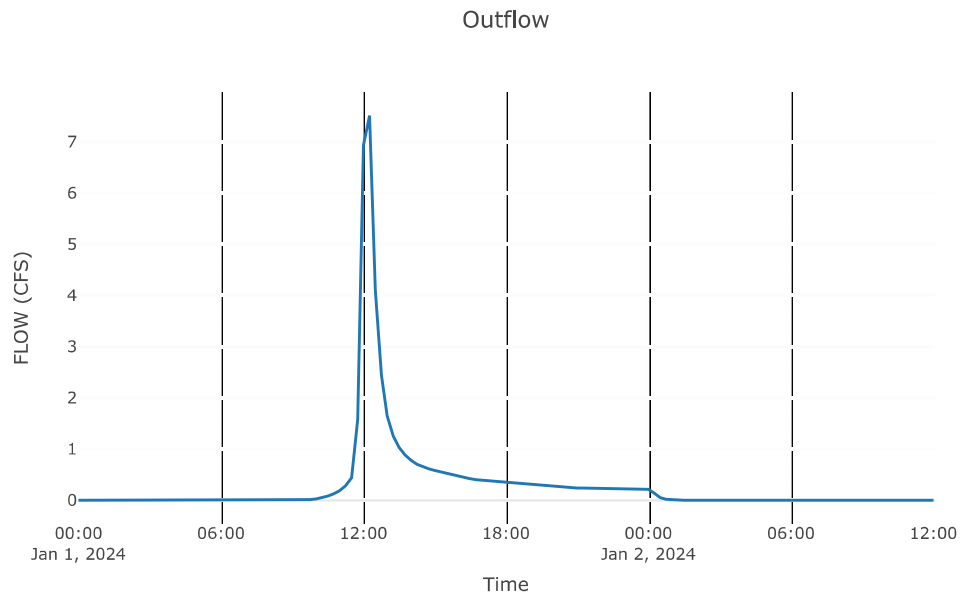
Peak Discharge (CFS)	3.64
Time of Peak Discharge	01Jan2024, 12:45
Volume (IN)	0.52
Peak Inflow (CFS)	3.64
Inflow Volume (AC - FT)	0.93



Reach: Reach-113b

Route: Muskingum Cunge	
Method	Muskingum Cunge
Channel	Circular
Length (FT)	140
Energy Slope (FT/FT)	0
Mannings n	0.01
Diameter	2
Initial Variable	Combined Inflow
Space - Time Method	Automatic DX and DT
Index Parameter Type	Index Flow
Index Flow	0.1
Number Subreaches	1
Maximum Depth Iterations	20
Maximum Route Step Iterations	30

Results: Reach-113b	
Peak Discharge (CFS)	7.51
Time of Peak Discharge	01Jan2024, 12:15
Volume (IN)	1.05
Peak Inflow (CFS)	7.52
Inflow Volume (AC - FT)	0.89



APPENDIX C

NIBLEY CITY IMPACT FEE CODES

Chapter 36a
Impact Fees Act

Part 1
General Provisions

11-36a-101 Title.

This chapter is known as the "Impact Fees Act."

Enacted by Chapter 47, 2011 General Session

11-36a-102 Definitions.

As used in this chapter:

(1)

(a) "Affected entity" means each county, municipality, special district under Title 17B, Limited Purpose Local Government Entities - Special Districts, special service district under Title 17D, Chapter 1, Special Service District Act, school district, interlocal cooperation entity established under Chapter 13, Interlocal Cooperation Act, and specified public utility:

(i) whose services or facilities are likely to require expansion or significant modification because of the facilities proposed in the proposed impact fee facilities plan; or

(ii) that has filed with the local political subdivision or private entity a copy of the general or long-range plan of the county, municipality, special district, special service district, school district, interlocal cooperation entity, or specified public utility.

(b) "Affected entity" does not include the local political subdivision or private entity that is required under Section 11-36a-501 to provide notice.

(2) "Charter school" includes:

(a) an operating charter school;

(b) an applicant for a charter school whose application has been approved by a charter school authorizer as provided in Title 53G, Chapter 5, Part 6, Charter School Credit Enhancement Program; and

(c) an entity that is working on behalf of a charter school or approved charter applicant to develop or construct a charter school building.

(3) "Development activity" means any construction or expansion of a building, structure, or use, any change in use of a building or structure, or any changes in the use of land that creates additional demand and need for public facilities.

(4) "Development approval" means:

(a) except as provided in Subsection (4)(b), any written authorization from a local political subdivision that authorizes the commencement of development activity;

(b) development activity, for a public entity that may develop without written authorization from a local political subdivision;

(c) a written authorization from a public water supplier, as defined in Section 73-1-4, or a private water company:

(i) to reserve or provide:

(A) a water right;

(B) a system capacity; or

(C) a distribution facility; or

(ii) to deliver for a development activity:

(A) culinary water; or
(B) irrigation water; or
(d) a written authorization from a sanitary sewer authority, as defined in Section 10-9a-103:
(i) to reserve or provide:
(A) sewer collection capacity; or
(B) treatment capacity; or
(ii) to provide sewer service for a development activity.
(5) "Enactment" means:
(a) a municipal ordinance, for a municipality;
(b) a county ordinance, for a county; and
(c) a governing board resolution, for a special district, special service district, or private entity.
(6) "Encumber" means:
(a) a pledge to retire a debt; or
(b) an allocation to a current purchase order or contract.
(7) "Expense for overhead" means a cost that a local political subdivision or private entity:
(a) incurs in connection with:
(i) developing an impact fee facilities plan;
(ii) developing an impact fee analysis; or
(iii) imposing an impact fee, including any related overhead expenses; and
(b) calculates in accordance with a methodology that is consistent with generally accepted cost accounting practices.
(8) "Hookup fee" means a fee for the installation and inspection of any pipe, line, meter, or appurtenance to connect to a gas, water, sewer, storm water, power, or other utility system of a municipality, county, special district, special service district, or private entity.
(9)
(a) "Impact fee" means a payment of money imposed upon new development activity as a condition of development approval to mitigate the impact of the new development on public infrastructure.
(b) "Impact fee" does not mean a tax, a special assessment, a building permit fee, a hookup fee, a fee for project improvements, or other reasonable permit or application fee.
(10) "Impact fee analysis" means the written analysis of each impact fee required by Section 11-36a-303.
(11) "Impact fee facilities plan" means the plan required by Section 11-36a-301.
(12) "Level of service" means the defined performance standard or unit of demand for each capital component of a public facility within a service area.
(13)
(a) "Local political subdivision" means a county, a municipality, a special district under Title 17B, Limited Purpose Local Government Entities - Special Districts, a special service district under Title 17D, Chapter 1, Special Service District Act, or the Point of the Mountain State Land Authority, created in Section 11-59-201.
(b) "Local political subdivision" does not mean a school district, whose impact fee activity is governed by Section 11-36a-206.
(14) "Private entity" means an entity in private ownership with at least 100 individual shareholders, customers, or connections, that is located in a first, second, third, or fourth class county and provides water to an applicant for development approval who is required to obtain water from the private entity either as a:
(a) specific condition of development approval by a local political subdivision acting pursuant to a prior agreement, whether written or unwritten, with the private entity; or

(b) functional condition of development approval because the private entity:
(i) has no reasonably equivalent competition in the immediate market; and
(ii) is the only realistic source of water for the applicant's development.
(15)
(a) "Project improvements" means site improvements and facilities that are:
(i) planned and designed to provide service for development resulting from a development activity;
(ii) necessary for the use and convenience of the occupants or users of development resulting from a development activity; and
(iii) not identified or reimbursed as a system improvement.
(b) "Project improvements" does not mean system improvements.
(16) "Proportionate share" means the cost of public facility improvements that are roughly proportionate and reasonably related to the service demands and needs of any development activity.
(17) "Public facilities" means only the following impact fee facilities that have a life expectancy of 10 or more years and are owned or operated by or on behalf of a local political subdivision or private entity:
(a) water rights and water supply, treatment, storage, and distribution facilities;
(b) wastewater collection and treatment facilities;
(c) storm water, drainage, and flood control facilities;
(d) municipal power facilities;
(e) roadway facilities;
(f) parks, recreation facilities, open space, and trails;
(g) public safety facilities;
(h) environmental mitigation as provided in Section 11-36a-205; or
(i) municipal natural gas facilities.
(18)
(a) "Public safety facility" means:
(i) a building constructed or leased to house police, fire, or other public safety entities; or
(ii) a fire suppression vehicle costing in excess of $500,000.
(b) "Public safety facility" does not mean a jail, prison, or other place of involuntary incarceration.
(19)
(a) "Roadway facilities" means a street or road that has been designated on an officially adopted subdivision plat, roadway plan, or general plan of a political subdivision, together with all necessary appurtenances.
(b) "Roadway facilities" includes associated improvements to a federal or state roadway only when the associated improvements:
(i) are necessitated by the new development; and
(ii) are not funded by the state or federal government.
(c) "Roadway facilities" does not mean federal or state roadways.
(20)
(a) "Service area" means a geographic area designated by an entity that imposes an impact fee on the basis of sound planning or engineering principles in which a public facility, or a defined set of public facilities, provides service within the area.
(b) "Service area" may include the entire local political subdivision or an entire area served by a private entity.
(21) "Specified public agency" means:
(a) the state;

(b) a school district; or
(c) a charter school.
(22)
(a) "System improvements" means:
(i) existing public facilities that are:
(A) identified in the impact fee analysis under Section 11-36a-304; and
(B) designed to provide services to service areas within the community at large; and
(ii) future public facilities identified in the impact fee analysis under Section 11-36a-304 that are intended to provide services to service areas within the community at large.
(b) "System improvements" does not mean project improvements.

Amended by Chapter 16, 2023 General Session

Part 2
Impact Fees

11-36a-201 Impact fees.
(1) A local political subdivision or private entity shall ensure that any imposed impact fees comply with the requirements of this chapter.
(2) A local political subdivision and private entity may establish impact fees only for those public facilities defined in Section 11-36a-102.
(3) Nothing in this chapter may be construed to repeal or otherwise eliminate an impact fee in effect on the effective date of this chapter that is pledged as a source of revenues to pay bonded indebtedness that was incurred before the effective date of this chapter.

Enacted by Chapter 47, 2011 General Session

11-36a-202 Prohibitions on impact fees.
(1) A local political subdivision or private entity may not:
(a) impose an impact fee to:
(i) cure deficiencies in a public facility serving existing development;
(ii) raise the established level of service of a public facility serving existing development; or
(iii) recoup more than the local political subdivision's or private entity's costs actually incurred for excess capacity in an existing system improvement;
(b) delay the construction of a school or charter school because of a dispute with the school or charter school over impact fees; or
(c) impose or charge any other fees as a condition of development approval unless those fees are a reasonable charge for the service provided.
(2)
(a) Notwithstanding any other provision of this chapter, a political subdivision or private entity may not impose an impact fee:
(i) on residential components of development to pay for a public safety facility that is a fire suppression vehicle;
(ii) on a school district or charter school for a park, recreation facility, open space, or trail;
(iii) on a school district or charter school unless:

(A) the development resulting from the school district's or charter school's development activity directly results in a need for additional system improvements for which the impact fee is imposed; and
(B) the impact fee is calculated to cover only the school district's or charter school's proportionate share of the cost of those additional system improvements;
(iv) to the extent that the impact fee includes a component for a law enforcement facility, on development activity for:
(A) the Utah National Guard;
(B) the Utah Highway Patrol; or
(C) a state institution of higher education that has its own police force;
(v) on development activity on state-owned land, as defined in Section 11-70-101; or
(vi) on development activity that consists of the construction of an internal accessory dwelling unit, as defined in Section 10-9a-530, within an existing primary dwelling.
(b)
(i) Notwithstanding any other provision of this chapter, a political subdivision or private entity may not impose an impact fee on development activity that consists of the construction of a school, whether by a school district or a charter school, if:
(A) the school is intended to replace another school, whether on the same or a different parcel;
(B) the new school creates no greater demand or need for public facilities than the school or school facilities, including any portable or modular classrooms that are on the site of the replaced school at the time that the new school is proposed; and
(C) the new school and the school being replaced are both within the boundary of the local political subdivision or the jurisdiction of the private entity.
(ii) If the imposition of an impact fee on a new school is not prohibited under Subsection (2)(b)(i) because the new school creates a greater demand or need for public facilities than the school being replaced, the impact fee shall be based only on the demand or need that the new school creates for public facilities that exceeds the demand or need that the school being replaced creates for those public facilities.
(c) Notwithstanding any other provision of this chapter, a political subdivision or private entity may impose an impact fee for a road facility on the state only if and to the extent that:
(i) the state's development causes an impact on the road facility; and
(ii) the portion of the road facility related to an impact fee is not funded by the state or by the federal government.
(3) Notwithstanding any other provision of this chapter, a local political subdivision may impose and collect impact fees on behalf of a school district if authorized by Section 11-36a-206.

Amended by Chapter 419, 2024 General Session

11-36a-203 Private entity assessment of impact fees -- Charges for water rights, physical infrastructure -- Notice -- Audit.

(1) A private entity:
(a) shall comply with the requirements of this chapter before imposing an impact fee; and
(b) except as otherwise specified in this chapter, is subject to the same requirements of this chapter as a local political subdivision.
(2) A private entity may only impose a charge for water rights or physical infrastructure necessary to provide water or sewer facilities by imposing an impact fee.

(3) Where notice and hearing requirements are specified, a private entity shall comply with the notice and hearing requirements for special districts.
(4) A private entity that assesses an impact fee under this chapter is subject to the audit requirements of Title 51, Chapter 2a, Accounting Reports from Political Subdivisions, Interlocal Organizations, and Other Local Entities Act.

Amended by Chapter 16, 2023 General Session

11-36a-204 Other names for impact fees.
(1) A fee that meets the definition of impact fee under Section 11-36a-102 is an impact fee subject to this chapter, regardless of what term the local political subdivision or private entity uses to refer to the fee.
(2) A local political subdivision or private entity may not avoid application of this chapter to a fee that meets the definition of an impact fee under Section 11-36a-102 by referring to the fee by another name.

Enacted by Chapter 47, 2011 General Session

11-36a-205 Environmental mitigation impact fees.
Notwithstanding the requirements and prohibitions of this chapter, a local political subdivision may impose and assess an impact fee for environmental mitigation when:
(1) the local political subdivision has formally agreed to fund a Habitat Conservation Plan to resolve conflicts with the Endangered Species Act of 1973, 16 U.S.C. Sec. 1531, et seq. or other state or federal environmental law or regulation;
(2) the impact fee bears a reasonable relationship to the environmental mitigation required by the Habitat Conservation Plan; and
(3) the legislative body of the local political subdivision adopts an ordinance or resolution:
  (a) declaring that an impact fee is required to finance the Habitat Conservation Plan;
  (b) establishing periodic sunset dates for the impact fee; and
  (c) requiring the legislative body to:
    (i) review the impact fee on those sunset dates;
    (ii) determine whether or not the impact fee is still required to finance the Habitat Conservation Plan; and
    (iii) affirmatively reauthorize the impact fee if the legislative body finds that the impact fee must remain in effect.

Enacted by Chapter 47, 2011 General Session

11-36a-206 Prohibition of school impact fees.
(1) As used in this section, "school impact fee" means a charge on new development in order to generate revenue for funding or recouping the costs of capital improvements for schools or school facility expansions necessitated by and attributable to the new development.
(2) Beginning March 21, 1995, there is a moratorium prohibiting a county, city, town, local school board, or any other political subdivision from imposing or collecting a school impact fee unless hereafter authorized by the Legislature by statute.
(3) Collection of any fees authorized before March 21, 1995, by any ordinance, resolution or rule of any county, city, town, local school board, or other political subdivision shall terminate on May 1, 1996, unless hereafter authorized by the Legislature by statute.

Renumbered and Amended by Chapter 3, 2018 General Session

Part 3
Establishing an Impact Fee

11-36a-301 Impact fee facilities plan.

(1) Before imposing an impact fee, each local political subdivision or private entity shall, except as provided in Subsection (3), prepare an impact fee facilities plan to determine the public facilities required to serve development resulting from new development activity.

(2) A municipality or county need not prepare a separate impact fee facilities plan if the general plan required by Section 10-9a-401 or 17-27a-401, respectively, contains the elements required by Section 11-36a-302.

(3) A local political subdivision or a private entity with a population, or serving a population, of less than 5,000 as of the last federal census that charges impact fees of less than $250,000 annually need not comply with the impact fee facilities plan requirements of this part, but shall ensure that:

(a) the impact fees that the local political subdivision or private entity imposes are based upon a reasonable plan that otherwise complies with the common law and this chapter; and

(b) each applicable notice required by this chapter is given.

Amended by Chapter 200, 2013 General Session

11-36a-302 Impact fee facilities plan requirements -- Limitations -- School district or charter school.

(1)

(a) An impact fee facilities plan shall:

(i) identify the existing level of service;

(ii) subject to Subsection (1)(c), establish a proposed level of service;

(iii) identify any excess capacity to accommodate future growth at the proposed level of service;

(iv) identify demands placed upon existing public facilities by new development activity at the proposed level of service; and

(v) identify the means by which the political subdivision or private entity will meet those growth demands.

(b) A proposed level of service may diminish or equal the existing level of service.

(c) A proposed level of service may:

(i) exceed the existing level of service if, independent of the use of impact fees, the political subdivision or private entity provides, implements, and maintains the means to increase the existing level of service for existing demand within six years of the date on which new growth is charged for the proposed level of service; or

(ii) establish a new public facility if, independent of the use of impact fees, the political subdivision or private entity provides, implements, and maintains the means to increase the existing level of service for existing demand within six years of the date on which new growth is charged for the proposed level of service.

(2) In preparing an impact fee facilities plan, each local political subdivision shall generally consider all revenue sources to finance the impacts on system improvements, including:

(a) grants;
(b) bonds;
(c) interfund loans;
(d) impact fees; and
(e) anticipated or accepted dedications of system improvements.

(3) A local political subdivision or private entity may only impose impact fees on development activities when the local political subdivision's or private entity's plan for financing system improvements establishes that impact fees are necessary to maintain a proposed level of service that complies with Subsection (1)(b) or (c).

(4)
(a) Subject to Subsection (4)(c), the impact fee facilities plan shall include a public facility for which an impact fee may be charged or required for a school district or charter school if the local political subdivision is aware of the planned location of the school district facility or charter school:
(i) through the planning process; or
(ii) after receiving a written request from a school district or charter school that the public facility be included in the impact fee facilities plan.
(b) If necessary, a local political subdivision or private entity shall amend the impact fee facilities plan to reflect a public facility described in Subsection (4)(a).
(c)
(i) In accordance with Subsections 10-9a-305(3) and 17-27a-305(3), a local political subdivision may not require a school district or charter school to participate in the cost of any roadway or sidewalk.
(ii) Notwithstanding Subsection (4)(c)(i), if a school district or charter school agrees to build a roadway or sidewalk, the roadway or sidewalk shall be included in the impact fee facilities plan if the local jurisdiction has an impact fee facilities plan for roads and sidewalks.

Amended by Chapter 200, 2013 General Session

11-36a-303 Impact fee analysis.

(1) Subject to the notice requirements of Section 11-36a-504, each local political subdivision or private entity intending to impose an impact fee shall prepare a written analysis of each impact fee.

(2) Each local political subdivision or private entity that prepares an impact fee analysis under Subsection (1) shall also prepare a summary of the impact fee analysis designed to be understood by a lay person.

Enacted by Chapter 47, 2011 General Session

11-36a-304 Impact fee analysis requirements.

(1) An impact fee analysis shall:
(a) identify the anticipated impact on or consumption of any existing capacity of a public facility by the anticipated development activity;
(b) identify the anticipated impact on system improvements required by the anticipated development activity to maintain the established level of service for each public facility;
(c) subject to Subsection (2), demonstrate how the anticipated impacts described in Subsections (1)(a) and (b) are reasonably related to the anticipated development activity;
(d) estimate the proportionate share of:

(i) the costs for existing capacity that will be recouped; and
(ii) the costs of impacts on system improvements that are reasonably related to the new development activity; and
(e) based on the requirements of this chapter, identify how the impact fee was calculated.
(2) In analyzing whether or not the proportionate share of the costs of public facilities are reasonably related to the new development activity, the local political subdivision or private entity, as the case may be, shall identify, if applicable:
(a) the cost of each existing public facility that has excess capacity to serve the anticipated development resulting from the new development activity;
(b) the cost of system improvements for each public facility;
(c) other than impact fees, the manner of financing for each public facility, such as user charges, special assessments, bonded indebtedness, general taxes, or federal grants;
(d) the relative extent to which development activity will contribute to financing the excess capacity of and system improvements for each existing public facility, by such means as user charges, special assessments, or payment from the proceeds of general taxes;
(e) the relative extent to which development activity will contribute to the cost of existing public facilities and system improvements in the future;
(f) the extent to which the development activity is entitled to a credit against impact fees because the development activity will dedicate system improvements or public facilities that will offset the demand for system improvements, inside or outside the proposed development;
(g) extraordinary costs, if any, in servicing the newly developed properties; and
(h) the time-price differential inherent in fair comparisons of amounts paid at different times.

Enacted by Chapter 47, 2011 General Session

11-36a-305 Calculating impact fees.
(1) In calculating an impact fee, a local political subdivision or private entity may include:
(a) the construction contract price;
(b) the cost of acquiring land, improvements, materials, and fixtures;
(c) for services provided for and directly related to the construction of the system improvements, the cost for planning and surveying, and engineering fees;
(d) for a political subdivision, debt service charges, if the political subdivision might use impact fees as a revenue stream to pay the principal and interest on bonds, notes, or other obligations issued to finance the costs of the system improvements; and
(e) one or more expenses for overhead.
(2) In calculating an impact fee, each local political subdivision or private entity shall base amounts calculated under Subsection (1) on realistic estimates, and the assumptions underlying those estimates shall be disclosed in the impact fee analysis.

Amended by Chapter 35, 2021 General Session

11-36a-306 Certification of impact fee analysis.
(1) An impact fee facilities plan shall include a written certification from the person or entity that prepares the impact fee facilities plan that states the following:
"I certify that the attached impact fee facilities 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; or

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; and

3. complies in each and every relevant respect with the Impact Fees Act."

(2) An impact fee analysis shall include a written certification from the person or entity that prepares the impact fee analysis which states as follows:

"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; or

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;

3. offsets costs with grants or other alternate sources of payment; and

4. complies in each and every relevant respect with the Impact Fees Act."

Amended by Chapter 35, 2021 General Session

Part 4
Enactment of Impact Fees

11-36a-401 Impact fee enactment.

(1)

(a) A local political subdivision or private entity wishing to impose impact fees shall pass an impact fee enactment in accordance with Section 11-36a-402.

(b) An impact fee imposed by an impact fee enactment may not exceed the highest fee justified by the impact fee analysis.

(2) An impact fee enactment may not take effect until 90 days after the day on which the impact fee enactment is approved.

Enacted by Chapter 47, 2011 General Session

11-36a-402 Required provisions of impact fee enactment.

(1) A local political subdivision or private entity shall ensure, in addition to the requirements described in Subsections (2) and (3), that an impact fee enactment contains:

(a) a provision establishing one or more service areas within which the local political subdivision or private entity calculates and imposes impact fees for various land use categories;

(b)

(i) a schedule of impact fees for each type of development activity that specifies the amount of the impact fee to be imposed for each type of system improvement; or

(ii) the formula that the local political subdivision or private entity, as the case may be, will use to calculate each impact fee;

(c) a provision authorizing the local political subdivision or private entity, as the case may be, to adjust the standard impact fee at the time the fee is charged to:

(i) respond to:

(A) unusual circumstances in specific cases; or

(B) a request for a prompt and individualized impact fee review for the development activity of the state, a school district, or a charter school and an offset or credit for a public facility for which an impact fee has been or will be collected; and

(ii) ensure that the impact fees are imposed fairly; and

(d) a provision governing calculation of the amount of the impact fee to be imposed on a particular development that permits adjustment of the amount of the impact fee based upon studies and data submitted by the developer.

(2) A local political subdivision or private entity shall ensure that an impact fee enactment allows a developer, including a school district or a charter school, to receive a credit against or proportionate reimbursement of an impact fee if the developer:

(a) dedicates land for a system improvement;

(b) builds and dedicates some or all of a system improvement; or

(c) dedicates a public facility that the local political subdivision or private entity and the developer agree will reduce the need for a system improvement.

(3) A local political subdivision or private entity shall include a provision in an impact fee enactment that requires a credit against impact fees for any dedication of land for, improvement to, or new construction of, any system improvements provided by the developer if the facilities:

(a) are system improvements; or

(b)

(i) are dedicated to the public; and

(ii) offset the need for an identified system improvement.

Enacted by Chapter 47, 2011 General Session

11-36a-403 Other provisions of impact fee enactment.

(1) A local political subdivision or private entity may include a provision in an impact fee enactment that:

(a) provides an impact fee exemption for:

(i) development activity attributable to:

(A) low income housing;

(B) the state;

(C) subject to Subsection (2), a school district; or

(D) subject to Subsection (2), a charter school; or

(ii) other development activity with a broad public purpose; and

(b) except for an exemption under Subsection (1)(a)(i)(A), establishes one or more sources of funds other than impact fees to pay for that development activity.

(2) An impact fee enactment that provides an impact fee exemption for development activity attributable to a school district or charter school shall allow either a school district or a charter school to qualify for the exemption on the same basis.

(3) An impact fee enactment that repeals or suspends the collection of impact fees is exempt from the notice requirements of Section 11-36a-504.

Enacted by Chapter 47, 2011 General Session

Part 5
Notice

11-36a-501 Notice of intent to prepare an impact fee facilities plan.

(1) Before preparing or amending an impact fee facilities plan, a local political subdivision or private entity shall provide written notice of its intent to prepare or amend an impact fee facilities plan.

(2) A notice required under Subsection (1) shall:

(a) indicate that the local political subdivision or private entity intends to prepare or amend an impact fee facilities plan;

(b) describe or provide a map of the geographic area where the proposed impact fee facilities will be located; and

(c) subject to Subsection (3), be provided for the geographic area where the proposed impact fee facilities will be located, as a class A notice under Section 63G-30-102, for at least 10 days.

(3) For a private entity required to post notice under Subsection (2)(c):

(a) the private entity shall give notice to the general purpose local government in which the private entity's private business office is located; and

(b) the general purpose local government described in Subsection (3)(a) shall post the notice on the Utah Public Notice Website and, as available, on the general purpose local government's website.

Amended by Chapter 435, 2023 General Session

11-36a-502 Notice to adopt or amend an impact fee facilities plan.

(1) If a local political subdivision chooses to prepare an independent impact fee facilities plan rather than include an impact fee facilities element in the general plan in accordance with Section 11-36a-301, the local political subdivision shall, before adopting or amending the impact fee facilities plan:

(a) give public notice, in accordance with Subsection (2), of the plan or amendment at least 10 days before the day on which the public hearing described in Subsection (1)(d) is scheduled;

(b) make a copy of the plan or amendment, together with a summary designed to be understood by a lay person, available to the public;

(c) place a copy of the plan or amendment and summary in each public library within the local political subdivision; and

(d) hold a public hearing to hear public comment on the plan or amendment.

(2) With respect to the public notice required under Subsection (1)(a):

(a) each municipality shall comply with the notice and hearing requirements of, and, except as provided in Subsection 11-36a-701(3)(b)(ii), receive the protections of Sections 10-9a-205 and 10-9a-801 and Subsection 10-9a-502(2);

(b) each county shall comply with the notice and hearing requirements of, and, except as provided in Subsection 11-36a-701(3)(b)(ii), receive the protections of Sections 17-27a-205 and 17-27a-801 and Subsection 17-27a-502(2); and

(c) each special district, special service district, and private entity shall comply with the notice and hearing requirements of, and receive the protections of, Section 17B-1-111.

(3) Nothing contained in this section or Section 11-36a-503 may be construed to require involvement by a planning commission in the impact fee facilities planning process.

Amended by Chapter 16, 2023 General Session

11-36a-503 Notice of preparation of an impact fee analysis.

(1) Before preparing or contracting to prepare an impact fee analysis, each local political subdivision or, subject to Subsection (2), private entity shall provide a public notice for the local political subdivision, as a class A notice under Section 63G-30-102, for at least 10 days.

(2) For a private entity required to post notice under Subsection (1):

(a) the private entity shall give notice to the general purpose local government in which the private entity's primary business is located; and

(b) the general purpose local government described in Subsection (2)(a) shall post the notice on the Utah Public Notice Website and, as available, on the general purpose local government's website.

Amended by Chapter 435, 2023 General Session

11-36a-504 Notice of intent to adopt impact fee enactment -- Hearing -- Protections.

(1) Before adopting an impact fee enactment:

(a) a municipality legislative body shall:

(i) comply with the notice requirements of Section 10-9a-205 as if the impact fee enactment were a land use regulation;

(ii) hold a hearing in accordance with Section 10-9a-502 as if the impact fee enactment were a land use regulation; and

(iii) except as provided in Subsection 11-36a-701(3)(b)(ii), receive the protections of Section 10-9a-801 as if the impact fee were a land use regulation;

(b) a county legislative body shall:

(i) comply with the notice requirements of Section 17-27a-205 as if the impact fee enactment were a land use regulation;

(ii) hold a hearing in accordance with Section 17-27a-502 as if the impact fee enactment were a land use regulation; and

(iii) except as provided in Subsection 11-36a-701(3)(b)(ii), receive the protections of Section 17-27a-801 as if the impact fee were a land use regulation;

(c) a special district or special service district shall:

(i) comply with the notice and hearing requirements of Section 17B-1-111; and

(ii) receive the protections of Section 17B-1-111;

(d) a local political subdivision shall at least 10 days before the day on which a public hearing is scheduled in accordance with this section:

(i) make a copy of the impact fee enactment available to the public; and

(ii) provide notice of the local political subdivision's intent to enact or modify the impact fee, specifying the type of impact fee being enacted or modified, for the local political subdivision, as a class A notice under Section 63G-30-102, for at least 10 days; and

(e) a local political subdivision shall submit a copy of the impact fee analysis and a copy of the summary of the impact fee analysis prepared in accordance with Section 11-36a-303 on its website or to each public library within the local political subdivision.

(2) Subsection (1)(a) or (b) may not be construed to require involvement by a planning commission in the impact fee enactment process.

Amended by Chapter 16, 2023 General Session
Amended by Chapter 435, 2023 General Session

Part 6
Impact Fee Proceeds

11-36a-601 Accounting of impact fees.

A local political subdivision that collects an impact fee shall:

(1) establish a separate interest bearing ledger account for each type of public facility for which an impact fee is collected;

(2) deposit a receipt for an impact fee in the appropriate ledger account established under Subsection (1);

(3) retain the interest earned on each fund or ledger account in the fund or ledger account;

(4) at the end of each fiscal year, prepare a report that:

(a) for each fund or ledger account, shows:

(i) the source and amount of all money collected, earned, and received by the fund or ledger account during the fiscal year; and

(ii) each expenditure from the fund or ledger account;

(b) accounts for all impact fee funds that the local political subdivision has on hand at the end of the fiscal year;

(c) identifies the impact fee funds described in Subsection (4)(b) by:

(i) the year in which the impact fee funds were received;

(ii) the project from which the impact fee funds were collected;

(iii) the project for which the impact fee funds are budgeted; and

(iv) the projected schedule for expenditure; and

(d) is:

(i) in a format developed by the state auditor;

(ii) certified by the local political subdivision's chief financial officer; and

(iii) transmitted to the state auditor within 180 days after the day on which the fiscal year ends.

Amended by Chapter 394, 2017 General Session

11-36a-602 Expenditure of impact fees.

(1) A local political subdivision may expend impact fees only for a system improvement:

(a) identified in the impact fee facilities plan; and

(b) for the specific public facility type for which the fee was collected.

(2)

(a) Except as provided in Subsection (2)(b), a local political subdivision shall expend or encumber an impact fee collected with respect to a lot:

(i) for a permissible use; and

(ii) within six years after the impact fee with respect to that lot is collected.

(b) A local political subdivision may hold the fees for longer than six years if it identifies, in writing:

(i) an extraordinary and compelling reason why the fees should be held longer than six years; and

(ii) an absolute date by which the fees will be expended.

Amended by Chapter 190, 2017 General Session

11-36a-603 Refunds.

(1) A local political subdivision shall refund any impact fee paid by a developer, plus interest earned, when:
  (a) the developer does not proceed with the development activity and has filed a written request for a refund;
  (b) the fee has not been spent or encumbered; and
  (c) no impact has resulted.

(2)
  (a) As used in this Subsection (2):
    (i) "Affected lot" means the lot or parcel with respect to which a local political subdivision collected an impact fee that is subject to a refund under this Subsection (2).
    (ii) "Claimant" means:
      (A) the original owner;
      (B) the person who paid an impact fee; or
      (C) another person who, under Subsection (2)(d), submits a timely notice of the person's valid legal claim to an impact fee refund.
    (iii) "Original owner" means the record owner of an affected lot at the time the local political subdivision collected the impact fee.
    (iv) "Unclaimed refund" means an impact fee that:
      (A) is subject to refund under this Subsection (2); and
      (B) the local political subdivision has not refunded after application of Subsections (2)(b) and (c).
  (b) If an impact fee is not spent or encumbered in accordance with Section 11-36a-602, the local political subdivision shall, subject to Subsection (2)(c):
    (i) refund the impact fee to:
      (A) the original owner, if the original owner is the sole claimant; or
      (B) to the claimants, as the claimants agree, if there are multiple claimants; or
    (ii) interplead the impact fee refund to a court of competent jurisdiction for a determination of the entitlement to the refund, if there are multiple claimants who fail to agree on how the refund should be paid to the claimants.
  (c) If the original owner's last known address is no longer valid at the time a local political subdivision attempts under Subsection (2)(b) to refund an impact fee to the original owner, the local political subdivision shall:
    (i) post a notice on the local political subdivision's website, stating the local political subdivision's intent to refund the impact fee and identifying the original owner;
    (ii) maintain the notice on the website for a period of one year; and
    (iii) disqualify the original owner as a claimant unless the original owner submits a written request for the refund within one year after the first posting of the notice under Subsection (2)(c)(i).
  (d)
    (i) In order to be considered as a claimant for an impact fee refund under this Subsection (2), a person, other than the original owner, shall submit a written notice of the person's valid legal claim to the impact fee refund.
    (ii) A notice under Subsection (2)(d)(i) shall:
      (A) explain the person's valid legal claim to the refund; and

(B) be submitted to the local political subdivision no later than 30 days after expiration of the time specified in Subsection 11-36a-602(2) for the impact fee that is the subject of the refund.

(e) A local political subdivision:

(i) may retain an unclaimed refund; and

(ii) shall expend any unclaimed refund on capital facilities identified in the current capital facilities plan for the type of public facility for which the impact fee was collected.

Amended by Chapter 215, 2018 General Session

Part 7
Challenges

11-36a-701 Impact fee challenge.

(1) A person or an entity residing in or owning property within a service area, or an organization, association, or a corporation representing the interests of persons or entities owning property within a service area, has standing to file a declaratory judgment action challenging the validity of an impact fee.

(2)

(a) A person or an entity required to pay an impact fee who believes the impact fee does not meet the requirements of law may file a written request for information with the local political subdivision who established the impact fee.

(b) Within two weeks after the receipt of the request for information under Subsection (2)(a), the local political subdivision shall provide the person or entity with the impact fee analysis, the impact fee facilities plan, and any other relevant information relating to the impact fee.

(3)

(a) Subject to the time limitations described in Section 11-36a-702 and procedures set forth in Section 11-36a-703, a person or an entity that has paid an impact fee that a local political subdivision imposed may challenge:

(i) if the impact fee enactment was adopted on or after July 1, 2000:

(A) subject to Subsection (3)(b)(i) and except as provided in Subsection (3)(b)(ii), whether the local political subdivision complied with the notice requirements of this chapter with respect to the imposition of the impact fee; and

(B) whether the local political subdivision complied with other procedural requirements of this chapter for imposing the impact fee; and

(ii) except as limited by Subsection (3)(c), the impact fee.

(b)

(i) The sole remedy for a challenge under Subsection (3)(a)(i)(A) is the equitable remedy of requiring the local political subdivision to correct the defective notice and repeat the process.

(ii) The protections given to a municipality under Section 10-9a-801 and to a county under Section 17-27a-801 do not apply in a challenge under Subsection (3)(a)(i)(A).

(c) The sole remedy for a challenge under Subsection (3)(a)(ii) is a refund of the difference between what the person or entity paid as an impact fee and the amount the impact fee should have been if it had been correctly calculated.

(4)

(a) Subject to Subsection (4)(d), if an impact fee that is the subject of an advisory opinion under Section 13-43-205 is listed as a cause of action in litigation, and that cause of action is litigated on the same facts and circumstances and is resolved consistent with the advisory opinion:
(i) the substantially prevailing party on that cause of action:
(A) may collect reasonable attorney fees and court costs pertaining to the development of that cause of action from the date of the delivery of the advisory opinion to the date of the court's resolution; and
(B) shall be refunded an impact fee held to be in violation of this chapter, based on the difference between the impact fee paid and what the impact fee should have been if the local political subdivision had correctly calculated the impact fee; and
(ii) in accordance with Section 13-43-206, a local political subdivision shall refund an impact fee held to be in violation of this chapter to the person who was in record title of the property on the day on which the impact fee for the property was paid if:
(A) the impact fee was paid on or after the day on which the advisory opinion on the impact fee was issued but before the day on which the final court ruling on the impact fee is issued; and
(B) the person described in Subsection (3)(a)(ii) requests the impact fee refund from the local political subdivision within 30 days after the day on which the court issued the final ruling on the impact fee.
(b) A local political subdivision subject to Subsection (3)(a)(ii) shall refund the impact fee based on the difference between the impact fee paid and what the impact fee should have been if the local political subdivision had correctly calculated the impact fee.
(c) This Subsection (4) may not be construed to create a new cause of action under land use law.
(d) Subsection (4)(a) does not apply unless the cause of action described in Subsection (4)(a) is resolved and final.
(5) Subject to the time limitations described in Section 11-36a-702 and procedures described in Section 11-36a-703, a claimant, as defined in Section 11-36a-603, may challenge whether a local political subdivision spent or encumbered an impact fee in accordance with Section 11-36a-602.

Amended by Chapter 215, 2018 General Session

11-36a-702 Time limitations.
(1) A person or an entity that initiates a challenge under Subsection 11-36a-701(3)(a) may not initiate that challenge unless it is initiated within:
(a) for a challenge under Subsection 11-36a-701(3)(a)(i)(A), 30 days after the day on which the person or entity pays the impact fee;
(b) for a challenge under Subsection 11-36a-701(3)(a)(i)(B), 180 days after the day on which the person or entity pays the impact fee;
(c) for a challenge under Subsection 11-36a-701(5):
(i) if the local political subdivision has spent or encumbered the impact fee, one year after the expiration of the time specified in Subsection 11-36a-602(2); or
(ii) if the local political subdivision has not yet spent or encumbered the impact fee, two years after the expiration of the time specified in Subsection 11-36a-602(2); or
(d) for a challenge under Subsection 11-36a-701(3)(a)(ii), one year after the day on which the person or entity pays the impact fee.

(2) The deadline to file an action in district court is tolled from the date that a challenge is filed using an administrative appeals procedure described in Section 11-36a-703 until 30 days after the day on which a final decision is rendered in the administrative appeals procedure.

Amended by Chapter 215, 2018 General Session

11-36a-703 Procedures for challenging an impact fee.

(1)
  (a) A local political subdivision may establish, by ordinance or resolution, or a private entity may establish by prior written policy, an administrative appeals procedure to consider and decide a challenge to an impact fee.
  (b) If the local political subdivision or private entity establishes an administrative appeals procedure, the local political subdivision shall ensure that the procedure includes a requirement that the local political subdivision make its decision no later than 30 days after the day on which the challenge to the impact fee is filed.

(2) A challenge under Subsection 11-36a-701(3)(a) is initiated by filing:
  (a) if the local political subdivision or private entity has established an administrative appeals procedure under Subsection (1), the necessary document, under the administrative appeals procedure, for initiating the administrative appeal;
  (b) a request for arbitration as provided in Section 11-36a-705; or
  (c) an action in district court.

(3) The sole remedy for a successful challenge under Subsection 11-36a-701(1), which determines that an impact fee process was invalid, or an impact fee is in excess of the fee allowed under this act, is a declaration that, until the local political subdivision or private entity enacts a new impact fee study, from the date of the decision forward, the entity may charge an impact fee only as the court has determined would have been appropriate if it had been properly enacted.

(4) Subsections (2), (3), 11-36a-701(3), and 11-36a-702(1) may not be construed as requiring a person or an entity to exhaust administrative remedies with the local political subdivision before filing an action in district court under Subsections (2), (3), 11-36a-701(3), and 11-36a-702(1).

(5) The judge may award reasonable attorney fees and costs to the prevailing party in an action brought under this section.

(6) This chapter may not be construed as restricting or limiting any rights to challenge impact fees that were paid before the effective date of this chapter.

Amended by Chapter 200, 2013 General Session

11-36a-704 Mediation.

(1) In addition to the methods of challenging an impact fee under Section 11-36a-701, a specified public agency may require a local political subdivision or private entity to participate in mediation of any applicable impact fee.

(2) To require mediation, the specified public agency shall submit a written request for mediation to the local political subdivision or private entity.

(3) The specified public agency may submit a request for mediation under this section at any time, but no later than 30 days after the day on which an impact fee is paid.

(4) Upon the submission of a request for mediation under this section, the local political subdivision or private entity shall:
  (a) cooperate with the specified public agency to select a mediator; and
  (b) participate in the mediation process.

Enacted by Chapter 47, 2011 General Session

11-36a-705 Arbitration.

(1) A person or entity intending to challenge an impact fee under Section 11-36a-703 shall file a written request for arbitration with the local political subdivision within the time limitation described in Section 11-36a-702 for the applicable type of challenge.

(2) If a person or an entity files a written request for arbitration under Subsection (1), an arbitrator or arbitration panel shall be selected as follows:

(a) the local political subdivision and the person or entity filing the request may agree on a single arbitrator within 10 days after the day on which the request for arbitration is filed; or

(b) if a single arbitrator is not agreed to in accordance with Subsection (2)(a), an arbitration panel shall be created with the following members:

(i) each party shall select an arbitrator within 20 days after the date the request is filed; and

(ii) the arbitrators selected under Subsection (2)(b)(i) shall select a third arbitrator.

(3) The arbitration panel shall hold a hearing on the challenge no later than 30 days after the day on which:

(a) the single arbitrator is agreed on under Subsection (2)(a); or

(b) the two arbitrators are selected under Subsection (2)(b)(i).

(4) The arbitrator or arbitration panel shall issue a decision in writing no later than 10 days after the day on which the hearing described in Subsection (3) is completed.

(5) Except as provided in this section, each arbitration shall be governed by Title 78B, Chapter 11, Utah Uniform Arbitration Act.

(6) The parties may agree to:

(a) binding arbitration;

(b) formal, nonbinding arbitration; or

(c) informal, nonbinding arbitration.

(7) If the parties agree in writing to binding arbitration:

(a) the arbitration shall be binding;

(b) the decision of the arbitration panel shall be final;

(c) neither party may appeal the decision of the arbitration panel; and

(d) notwithstanding Subsection (10), the person or entity challenging the impact fee may not also challenge the impact fee under Subsection 11-36a-701(1) or Subsection 11-36a-703(2)(a) or (2)(c).

(8)

(a) Except as provided in Subsection (8)(b), if the parties agree to formal, nonbinding arbitration, the arbitration shall be governed by the provisions of Title 63G, Chapter 4, Administrative Procedures Act.

(b) For purposes of applying Title 63G, Chapter 4, Administrative Procedures Act, to a formal, nonbinding arbitration under this section, notwithstanding Section 63G-4-502, "agency" means a local political subdivision.

(9)

(a) An appeal from a decision in an informal, nonbinding arbitration may be filed with the district court in which the local political subdivision is located.

(b) An appeal under Subsection (9)(a) shall be filed within 30 days after the day on which the arbitration panel issues a decision under Subsection (4).

(c) The district court shall consider de novo each appeal filed under this Subsection (9).

(d) Notwithstanding Subsection (10), a person or entity that files an appeal under this Subsection (9) may not also challenge the impact fee under Subsection 11-36a-701(1) or Subsection 11-36a-703(2)(a) or (2)(c).

(10)

(a) Except as provided in Subsections (7)(d) and (9)(d), this section may not be construed to prohibit a person or entity from challenging an impact fee as provided in Subsection 11-36a-701(1) or Subsection 11-36a-703(2)(a) or (2)(c).

(b) The filing of a written request for arbitration within the required time in accordance with Subsection (1) tolls all time limitations under Section 11-36a-702 until the day on which the arbitration panel issues a decision.

(11) The person or entity filing a request for arbitration and the local political subdivision shall equally share all costs of an arbitration proceeding under this section.

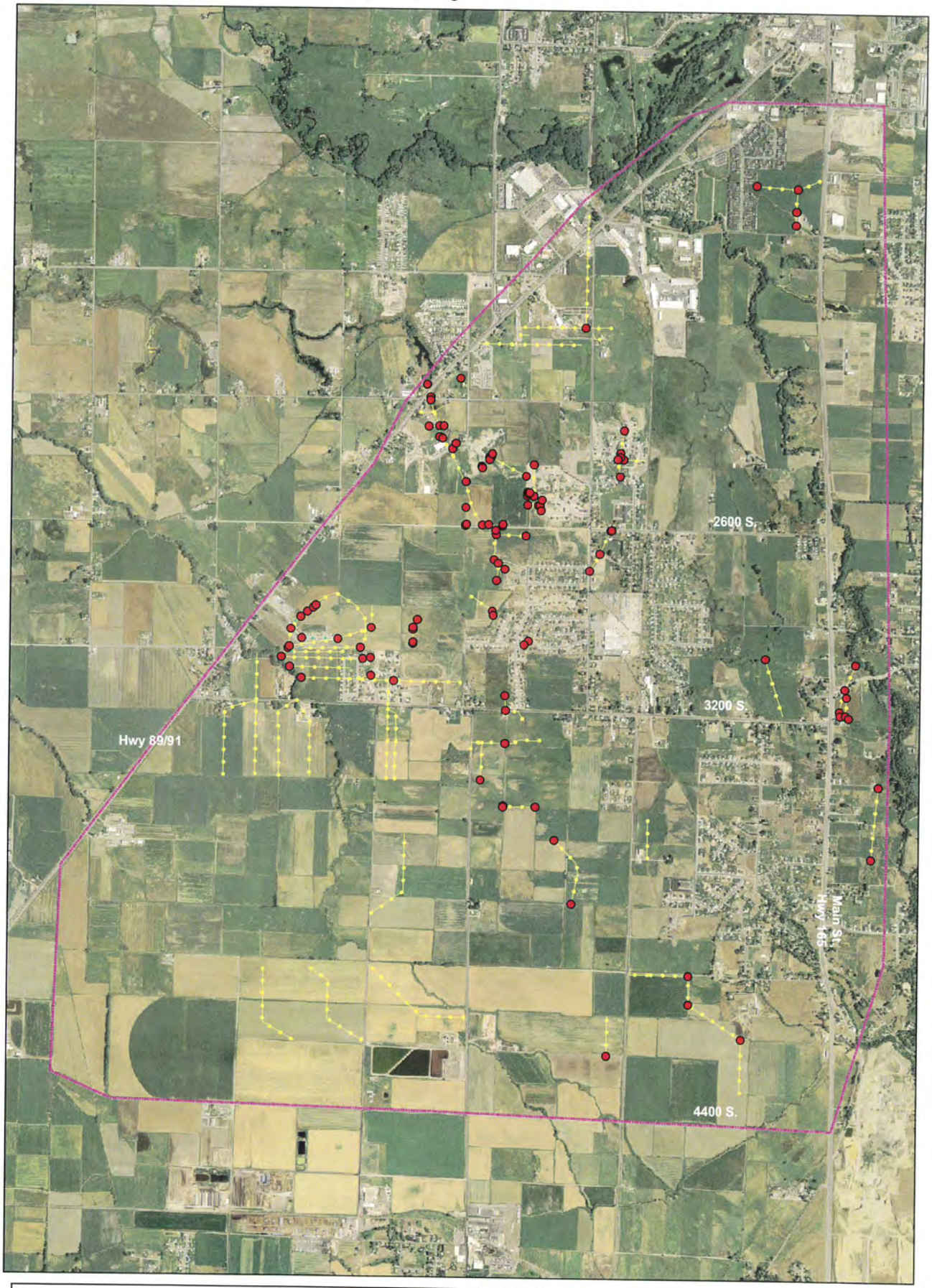
Enacted by Chapter 47, 2011 General Session

APPENDIX D

FIELD DRAIN REPORT

1:22,000

Nibley City Field Drains



Legend

- Nibley GPS actual points
- Heritage Business Park Lines
- Nibley drains

0 1,100 2,200 4,400 Feet

N

Nibley City Field Drain Identification Project

Located in Nibley, Utah (Cache County)

By
Utah Association of Conservation Districts
Thayne Mickelson, Zone One Resource Coordinator
Danny McBride, Planner
Taylor Payne, Planner/ Technician

December 19, 2007

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Nibley GPS points (description by label)

Nibley field drain pictures with GPS points

Nibley Soils Maps (outlined)

Nibley Soils Maps (outlined colored)

Soils descriptions report

III-Historical Collections

Sumner Marggett Collection Data, University of Utah, Marriott Library

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1954 NRCS Publication "Keep Your Tile Drains Working"

Nibley City Field Drain Identification Project
Located in Nibley, Utah (Cache County)

The Blacksmith Fork Conservation District

Since the organization of the Blacksmith Fork Conservation District in 1950, large strides have been made toward increasing and sustaining the natural recourses in Cache County. The district provides the local leadership and education to connect private property owners with state and federal assistance to improve, protect and sustain soil, water, and related resources.

The Blacksmith Fork Conservation District board consists of Jon White, serving as chairman; Richard Nielsen, vice-chair, Paul Leishmen, treasurer; with Jay Tuddenham and Thomas Bailey as additional elected board members. This board directs conservation efforts in the Southern portion of Cache County. They have partnered with local landowners and various local state and federal agencies to provide financing and technical assistance to assist landowners striving to improve soil, water, and air quality.

A resource assessment in 2006 of the district focuses on promoting a positive view of conservation to landowners and communities, improving the quality of grazing lands in Cache County, coordinating wise and efficient use of natural resources while also supporting agriculture as a viable and sustainable industry. The issues of properly functioning field drains are a renewed priority. Flooding in the low lying areas have been occurring and identification of the Nibley City field drains were a necessity.

A team of employees from the Utah Association of Conservation Districts is working on the Nibley City Field Drain Identification Project. Thayne Mickelson is the resource coordinator; Danny McBride and Taylor Payne are the planners and technicians.

extensiveness and the considerable time required to do so.

CACHE COUNTY

Cache County has approximately ninety systems that drain 24,878 acres through 426,420 feet of closed drains and 331,372 feet of open drains. This is 39 percent of the drains in the Bear River Basin.

The Lewiston Bench System drains 14,080 acres through 54,648 feet of closed drains and 227,832 feet of open drains. This is the largest system in Bear River Basin and is 57 percent of Cache County drainage systems.

There is some silting in closed drains. There is also vegetation, and erosion due to animals in open drains. An improvement opportunity exists to drain approximately 5,000 acres between Cutler Reservoir and Trenton Town.

RICH COUNTY

Rich County has two systems which drain 105 acres through 16,320 feet of open drains. Another 750 acres of proposed drainage was identified in Randolph and Garden City. An additional 40,000 acres of improvement opportunities exist along the Bear River, northwest of Laketown and in Round Valley.

SUMMIT COUNTY

Summit County reported no drainage systems.

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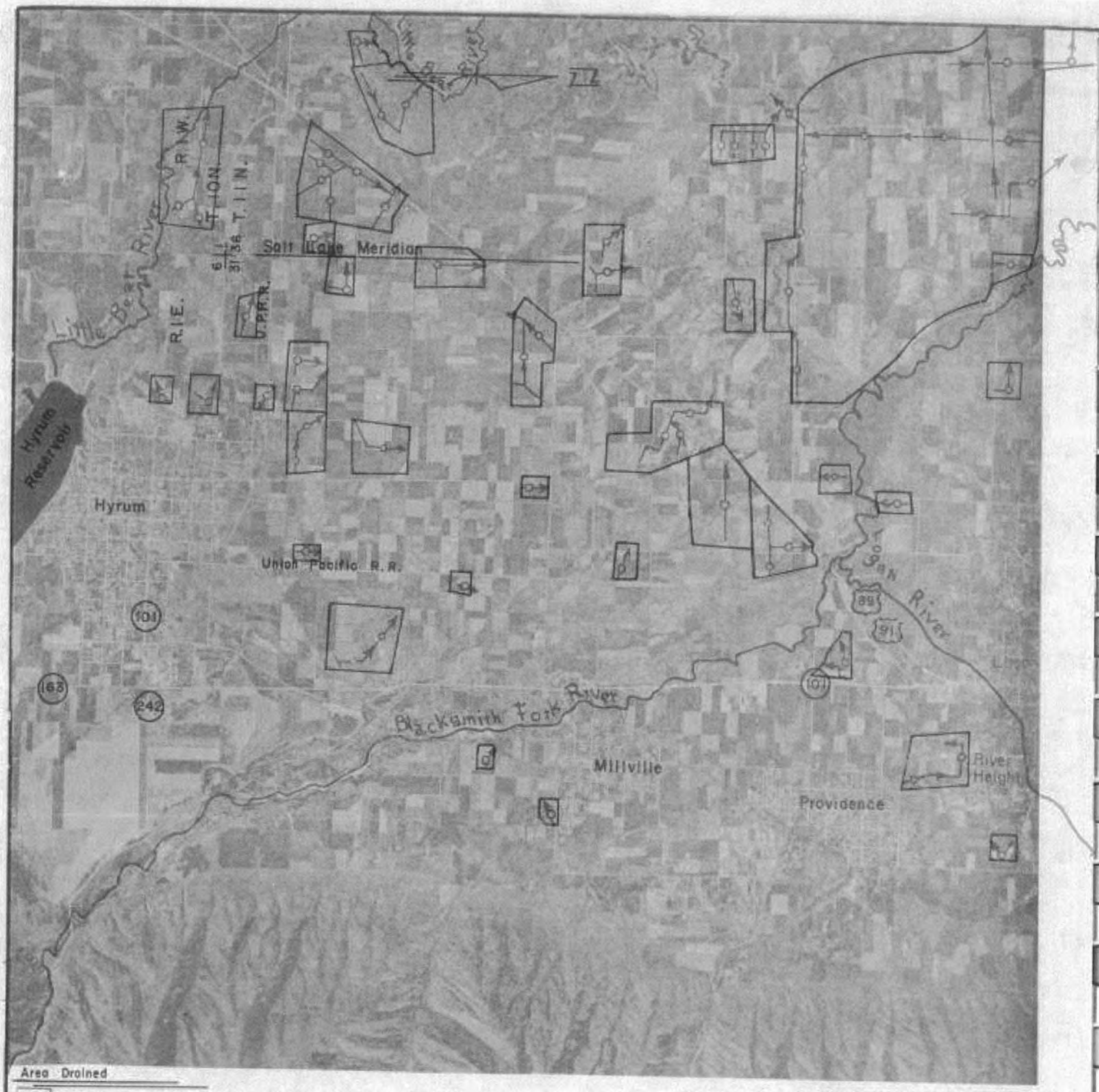
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MAPS



LEGEND

Closed Drain

Open Drain

MILLVILLE-HYRUM AREA

DRAINAGE SYSTEMS-BEAR RIVER BASIN

IDAHO - UTAH - WYOMING

1 0 1 2

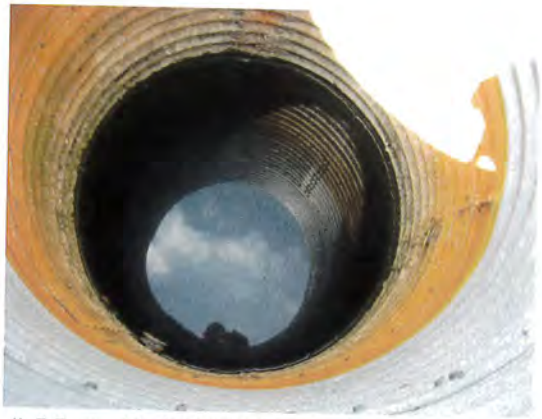
SCALE IN MILES

SOURCE: Drainage systems inventory of the S.C.S. 1975.

USDA-SCS-PORTLAND, OR. 1976



5 Lat. 41.697078 Long. 111.852976



5 Lat. 41.697078 Long. 111.852976



25 Lat. 41.688077 Long. 111.862072
Tile drain cut by excavation that was not repaired.



26 Lat. 41.688074 Long. 111.862022
Flooding of trench because of cut tile drain.



68 Lat. 41.678375 Long. 111.875476



68 Lat. 41.678375 Long. 111.875476



94 Lat. 41.673028 Long. 111.858588
Lavern Riggs tile line with many cave-ins.



94 Lat. 41.673028 Long. 111.858588



#93 Lat. 41.674933 Long. 111.858602



93 Lat. 41.674933 Long. 111.858602





4 Lat. 41.703233 Long. 111.836782



106 Lat. 41.758662 Long. 111.814401



9 Lat. 41.692749 Long. 111.864923



102 Lat. 41.666788 Long. 111.829966



7 Lat. 41.693625 Long. 111.865208





Nibley City GPS Coordinates

Waypoint number	Latitude	Longitude	Notes
1	41.70546	111.839861	clean out
2	41.705303	111.836694	clean out
3	41.704016	111.83677	clean out
4	41.703233	111.836782	outlet
5	41.697078	111.852976	cleanout
6	41.694014	111.862645	well point
7	41.693625	111.865208	major outlet
8	41.692902	111.864937	drainage road crossing
9	41.692749	111.864923	drainage road crossing
10	41.691226	111.865012	drain inlet by school
11	41.691267	111.864203	drain inlet by school
12	41.691276	111.863865	drain inlet by school
13	41.690637	111.864176	drain inlet
14	41.690548	111.863936	inlet from open drainage
15	41.690268	111.862901	
16	41.689955	111.863137	
17	41.689727	111.860041	sub division drain inlet
18	41.689536	111.860122	drain line cut by excavation
19	41.689384	111.860243	storm drain outlets
20	41.689134	111.856805	end point for drainage
21	41.689	111.86085	sub division drain inlet
22	41.688963	111.860853	sub division drain inlet
23	41.688886	111.860811	sub division drain inlet
24	41.688463	111.857374	inlet for tile drain
25	41.688077	111.862072	sub division drain inlet
26	41.688074	111.862022	sub division drain inlet
27	41.687476	111.857185	sub division drain inlet
28	41.687354	111.857254	outlet
29	41.687328	111.856739	elbow junction point
30	41.687113	111.856114	sub division drain inlet
31	41.6868	111.857211	sub division drain outlet
32	41.686802	111.856407	sub division drain inlet
33	41.6791	111.856278	sub division drain inlet
34	41.686491	111.856176	sub division drain inlet
35	41.68658	111.86203	sub division drain inlet
36	41.685563	111.862036	sub division drain inlet
37	41.685665	111.86194	sub division drain inlet
38	41.6856	111.860716	tile drain endpoint
39	41.685648	111.86023	sub division drain inlet
40	41.685671	111.859107	sub division drain inlet
41	41.685588	111.859133	sub division drain
42	41.685303	111.859649	
43	41.685058	111.859618	drain elbow
44	41.685027	111.8573	drain outlet
45	41.683613	111.859717	sub division inlet
46	41.683409	111.859408	sub division collection
47	41.683037	111.858886	sub division drain inlet
48	41.682417	111.859501	sub division drain inlet
49	41.691232	111.849834	sub division drain inlet

50	41.689917	111.850074	drainage road crossing
51	41.689563	111.850283	drainage road crossing
52	41.689546	111.849842	drainage inlet
53	41.688546	111.850059	drain outlet into storm drain
54	41.685449	111.850638	drainage inlet
55	41.685404	111.850694	drainage inlet
56	41.684072	111.851504	drainage inlet
57	41.683078	111.852285	drain outlet into storm drain
58	41.680645	111.859777	caving tile drain
59	41.680404	111.859695	tile drain inlet
60	41.680772	111.873454	open drain
61	41.680644	111.873632	open drain
62	41.680399	111.874111	open drain
63	41.680089	111.87462	tile drain outlet
64	41.679385	111.875364	tile drain cleanout
65	41.679522	111.869157	tile drain cleanout
66	41.678866	111.874516	clean out
67	41.678854	111.8717	clean out
68	41.678375	111.875476	old clean out
69	41.678277	111.875565	new clean out
70	41.678383	111.869971	tile drain elbow junction
71	41.677742	111.876067	end point
72	41.677724	111.869771	man hole cleanout
73	41.67779	111.869186	man hole cleanout
74	41.677201	111.875404	outlet
75	41.676564	111.874792	outlet
76	41.676778	111.869106	man hole cleanout
77	41.676509	111.867332	man hole cleanout
78	41.680059	111.86559	sub division drain outlet
79	41.679596	111.86591	sun division drain inlet
80	41.67949	111.865914	sun division drain inlet
81	41.678756	111.86589	sub division drain inlet
82	41.678672	111.865904	sub division drain inlet
83	41.678749	111.8572522	sub division drain inlet
84	41.678213	111.83844	tile drain outlet
85	41.677985	111.831475	outlet for 2 drain lines
86	41.676554	111.832254	clean out
87	41.676113	111.83212	clean out
88	41.675257	111.832645	drain line pathway
89	41.675032	111.832608	endpoint
90	41.675046	111.832167	tile drain pathway
91	41.6749	111.831922	tile drain pathway
92	41.675777	111.858673	wet spring (inlet)
93	41.674933	111.858602	outlet for 2 drain lines
94	41.673028	111.858588	outlet for drain line
95	41.670874	111.860447	abandoned inlet
96	41.669429	111.858634	endpoint
97	41.669366	111.858655	tile pathway
98	41.669407	111.856151	endpoint
99	41.667495	111.85462	endpoint
100	41.663838	111.853198	endpoint
101	41.67095	111.829531	outlet

102	41.666788	111.829996	inlet
103	41.659835	111.844005	clean out
104	41.658187	111.843954	clean out
105	41.656233	111.843954	clean out
106	41.758662	111.814401	inlet

Non Technical Soil Description (NASIS derived)

Soil Survey Area **UT603** **Cache Valley Area, Parts of Cache and Box Elder Counties, Utah**

Mapunit Ck **COLLETT SILTY CLAY LOAM**

Soil Component Name COLLETT 95 % of the mapunit

Slope range (%): 0 to 3 Depth class: Very deep Drainage class: Somewhat poorly drained

Permeability: Slow Available water capacity class: High

Total available water in top five feet (in.): 11.4

Land capability subclass, non-irrigated: 5w Land capability subclass, irrigated: 3w

Ecological Site: Semiwet Fresh Meadow

Runoff class: Not Rated Depth to seasonal high water table: 27 - 72

Flooding frequency: None Other restrictions (in): NA -

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
Ap	0 - 7	SICL	silty clay loam	7.4 - 7.8	NA -	NA -
A1	7 - 12	SICL	silty clay loam	7.4 - 7.8	NA -	NA -
B2	12 - 17	SICL	silty clay loam	7.4 - 8.4	NA -	NA -
C1ca	17 - 24	SICL	silty clay loam	7.4 - 8.4	NA -	NA -
C2ca	24 - 34	SICL	silty clay loam	7.4 - 8.4	NA -	NA -
C3	34 - 60	SICL	silty clay loam	7.4 - 8.4	NA -	NA -

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Mapunit GsB GREENSON LOAM, 3 TO 6 PERCENT SLOPES

Soil Component Name GREENSON 90 % of the mapunit

Slope range (%): 3 to 6 Depth class: Very deep Drainage class: Somewhat poorly drained

Permeability: Moderate Available water capacity class: High

Total available water in top five feet (in.): 13.1

Land capability subclass, non-irrigated: 4w Land capability subclass, irrigated: 3w

Ecological Site: Semiwet Fresh Meadow

Runoff class: Not Rated Depth to seasonal high water table: 45 - 72

Flooding frequency: None Other restrictions (in): NA

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
Ap	0 - 7	L	loam	7.4 - 7.8	NA -	NA -
A1	7 - 16	L	loam	7.4 - 7.8	NA -	NA -
B2	16 - 23	L	loam	7.9 - 8.4	NA -	0 - 8
C1ca	23 - 39	L	loam	7.9 - 9	5 - 20	4 - 8
C2ca	39 - 51	L	loam	7.9 - 9	5 - 20	4 - 8
C3	51 - 72	L	loam	7.9 - 9	5 - 20	4 - 8

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Mapunit GvA **GREENSON LOAM, DEEP OVER GRAVEL, 0 TO 1 PERCENT SLOPES**

Soil Component Name GREENSON 95 % of the mapunit

Slope range (%): 0 to 1 Depth class: Very deep Drainage class: Moderately well drained

Permeability: Moderate Available water capacity class: High

Total available water in top five feet (in.): 13.1

Land capability subclass, non-irrigated: 4w Land capability subclass, irrigated: 2w

Ecological Site: Semiwet Fresh Meadow

Runoff class: Not Rated Depth to seasonal high water table: 36 - 72

Flooding frequency: None Other restrictions (in): NA

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
Ap	0 - 7	L	loam	7.4 - 7.8	NA -	NA -
A1	7 - 16	L	loam	7.4 - 7.8	NA -	NA -
B2	16 - 23	L	loam	7.9 - 8.4	NA -	0 - 8
C1ca	23 - 39	L	loam	7.9 - 9	5 - 20	4 - 8
C2ca	39 - 51	L	loam	7.9 - 9	5 - 20	4 - 8
C3	51 - 72	L	loam	7.9 - 9	5 - 20	4 - 8

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Mapunit Lr LOGAN SILTY CLAY LOAM

Soil Component Name LOGAN 90 % of the mapunit

Slope range (%): 0 to 3 Depth class: Very deep Drainage class: Poorly drained

Permeability: Slow Available water capacity class: High

Total available water in top five feet (in.): 10.3

Land capability subclass, non-irrigated: 5w Land capability subclass, irrigated: 3w

Ecological Site: Wet Fresh Meadow

Runoff class: Not Rated Depth to seasonal high water table: 21 - 72

Flooding frequency: Rare Other restrictions (in): NA

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 13	SICL	silty clay loam	7.4 - 8.4	NA -	NA -
C1cag	13 - 26	SICL	silty clay loam	7.4 - 9	NA -	NA -
C2g	26 - 45	SIC	silty clay	7.4 - 9	NA -	NA -
C3g	45 - 60	SIC	silty clay	7.4 - 9	NA -	NA -

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Mapunit NbC NEBEKER SILT LOAM, 6 TO 10 PERCENT SLOPES

Soil Component Name NEBEKER 95 % of the mapunit

Slope range (%): 6 to 10 Depth class: Very deep Drainage class: Well drained

Permeability: Slow Available water capacity class: High

Total available water in top five feet (in.): 12.3

Land capability subclass, non-irrigated: 3e Land capability subclass, irrigated: 3e

Ecological Site: Mountain Loam (Mountain Big Sagebrush)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): NA -

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
Ap	0 - 8	SIL	silt loam	5.6 - 7.3	NA -	NA -
B1	8 - 14	SIL	silt loam	5.6 - 7.3	NA -	NA -
B21t	14 - 26	SICL	silty clay loam	6.1 - 7.3	NA -	NA -
B22t	26 - 48	C	clay	6.1 - 7.3	NA -	NA -
B23t	48 - 55	C	clay	6.1 - 7.3	NA -	NA -
IIC	55 - 70	CL	clay loam	6.6 - 7.8	NA -	NA -

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Mapunit NcB NIBLEY SILTY CLAY LOAM, 3 TO 6 PERCENT SLOPES

Soil Component Name NIBLEY 95 % of the mapunit

Slope range (%): 3 to 6 Depth class: Very deep Drainage class: Somewhat poorly drained

Permeability: Slow Available water capacity class: High

Total available water in top five feet (in.): 10.9

Land capability subclass, non-irrigated: 3w Land capability subclass, irrigated: 3w

Ecological Site: Semiwet Fresh Meadow

Runoff class: Not Rated Depth to seasonal high water table: 39 - 72

Flooding frequency: None Other restrictions (in): NA

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
Ap	0 - 7	SICL	silty clay loam	6.6 - 7.8	NA -	NA -
A1	7 - 13	SICL	silty clay loam	6.6 - 7.8	NA -	NA -
B21t	13 - 20	SIC SICL	silty clay silty clay loam	6.6 - 8.4	NA -	NA -
B22tca	20 - 32	SIC	silty clay	7.9 - 9	NA -	NA -
B3ca	32 - 43	SIC	silty clay	7.9 - 9	NA -	NA -
C	43 - 60	SIC	silty clay	7.9 - 9	NA -	NA -

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline: >=16 saline.

Mapunit Pv PROVO GRAVELLY LOAM

Soil Component Name PROVO VARIANT 90 % of the mapunit

Slope range (%): 0 to 3 Depth class: Very deep Drainage class: Poorly drained

Permeability: Moderate Available water capacity class: Low

Total available water in top five feet (in.): 4.7

Land capability subclass, non-irrigated: 5w Land capability subclass, irrigated: 3w

Ecological Site: Wet Fresh Meadow

Runoff class: Not Rated Depth to seasonal high water table: 33 - 72

Flooding frequency: Rare Other restrictions (in): NA

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A11	0 - 7	GR-L	gravelly loam	7.4 - 7.8	NA -	NA -
A12	7 - 13	GR-L	gravelly loam	7.4 - 7.8	NA -	NA -
C1ca	13 - 19	GRX-L	extremely gravelly loam	7.4 - 7.8	NA -	NA -
C2ca	19 - 27	GRX-L	extremely gravelly loam	7.4 - 7.8	NA -	NA -
C3ca	27 - 60	GRX-SL	extremely gravelly sandy loam	7.4 - 7.8	NA -	NA -

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Mapunit RhB RICKS GRAVELLY LOAM, 3 TO 6 PERCENT SLOPES

Soil Component Name RICKS 90 % of the mapunit

Slope range (%): 3 to 6 Depth class: Very deep Drainage class: Somewhat excessively drained

Permeability: Moderate Available water capacity class: Low

Total available water in top five feet (in.): 3.4

Land capability subclass, non-irrigated: 6s Land capability subclass, irrigated: 4s

Ecological Site: Upland Loam (Mountain Big Sagebrush)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): NA -

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
Ap	0 - 4	GR-L	gravelly loam	6.6 - 7.8	NA -	NA -
A1	4 - 9	GR-L	gravelly loam	7.4 - 8.4	NA -	NA -
B2	9 - 14	GR-SL	gravelly sandy loam	7.4 - 8.4	NA -	NA -
		GR-L	gravelly loam			
B3ca	14 - 18	GR-SL	gravelly sandy loam	7.4 - 8.4	NA -	NA -
IIC1ca	18 - 24	GRV-S	very gravelly sand	4.5 - 8.4	NA -	NA -
		GRV-LS	very gravelly loamy sand			
		GRX-S	extremely gravelly sand			
IIC2ca	24 - 60	GRV-S	very gravelly sand	4.5 - 8.4	NA -	NA -
		GRX-S	extremely gravelly sand			
		GRV-LS	very gravelly loamy sand			

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Mapunit Rs ROSHE SPRINGS SILT LOAM

Soil Component Name ROSHE SPRINGS 90 % of the mapunit

Slope range (%): 0 to 3 Depth class: Very deep Drainage class: Poorly drained

Permeability: Moderate Available water capacity class: High

Total available water in top five feet (in.): 10.8

Land capability subclass, non-irrigated: 5w Land capability subclass, irrigated: 3w

Ecological Site: Wet Fresh Meadow

Runoff class: Not Rated Depth to seasonal high water table: 24 - 72

Flooding frequency: None Other restrictions (in): NA

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
A1	0 - 8	SIL	silt loam	7.9 - 9	NA -	NA -
C1ca	8 - 14	SIL	silt loam	7.9 - 9	NA -	NA -
C2ca	14 - 23	SIL	silt loam	7.9 - 9	NA -	NA -
C3ca	23 - 35	SIL	silt loam	7.9 - 9	NA -	NA -
C4	35 - 60	SIL	silt loam	7.9 - 9	NA -	NA -

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

Mapunit WhE WHEELON SILT LOAM, 10 TO 30 PERCENT SLOPES

Soil Component Name WHEELON 95 % of the mapunit

Slope range (%): 10 to 30 Depth class: Very deep Drainage class: Well drained

Permeability: Moderate Available water capacity class: High

Total available water in top five feet (in.): 11.2

Land capability subclass, non-irrigated: 6e Land capability subclass, irrigated: Not rated

Ecological Site: Upland Shallow Loam (Black Sagebrush)

Runoff class: Not Rated Depth to seasonal high water table: NA -

Flooding frequency: None Other restrictions (in): NA -

Horizon Information

	Depth (in)	Textures		pH range	Sodium	Salinity (mmhos/cm)
Ap	0 - 6	SIL	silt loam	7.4 - 8.4	NA -	NA -
AC	6 - 12	SIL	silt loam	7.9 - 8.4	NA -	NA -
C1ca	12 - 23	SIL	silt loam	7.9 - 9	NA -	NA -
C2ca	23 - 43	SIL	silt loam	7.9 - 9	NA -	NA -
C3	43 - 66	SIL	silt loam	7.9 - 9	NA -	NA -

pH classes: 3.5-4.4 extremely acid; 4.5-5.0 very strongly acid; 5.1-5.5 strongly acid; 5.6-6.0 moderately acid; 6.1-6.5 slightly acid; 6.6-7.3 neutral; 7.4-7.8 slightly alkaline; 7.9-8.4 moderately alkaline; 8.5-9.0 strongly alkaline; >9.0 very strongly alkaline.

Salinity classes (if applicable): 0-2 non saline; 2-4 very slightly saline; 4-8 slightly saline; 8-16 moderately saline; >=16 saline.

HISTORICAL COLLECTIONS

Sumner Stewart says:

'DRAINAGE DOESN'T COST IT PAY$!'

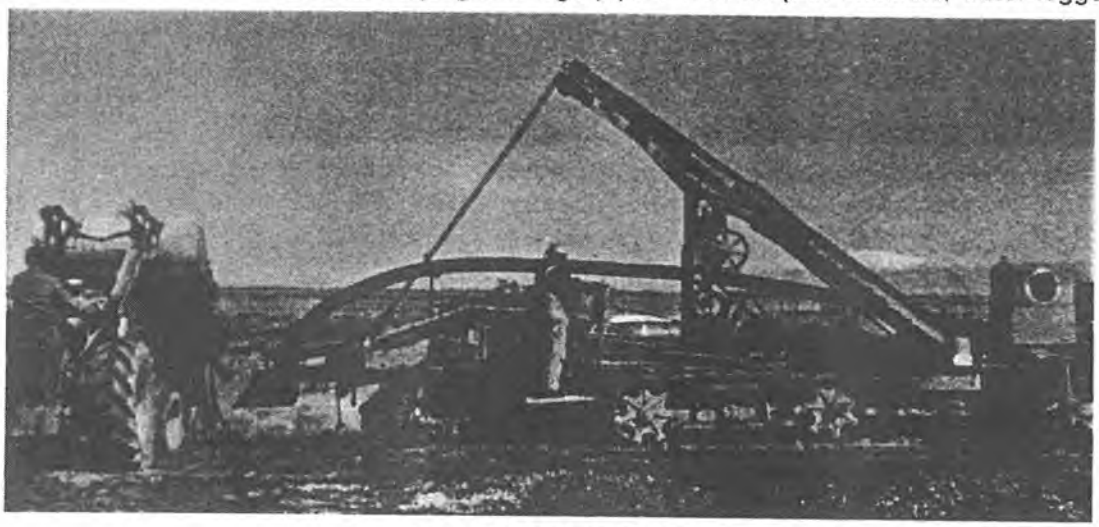
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Turn liability of land and water into more money for you...

How:

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2. Leaching ground of alkali.
3. Re-using water.
4. Restoring land areas to productive use.
5. Base stabilization for roads, parking areas, and building sites.

Machine laying drainage pipe 7 feet deep in unstable, water-logged soils.





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ENGINEERS

Most experienced & competent sump-pump designers and/or installers in the area.

(please turn page)



Here is the mechanical device that lays the plastic tube a sample of which is being held by A. Alvin Bishop, USU drainage engineer. The other man is Jack T. Sorenson, Peterson Tractor Co., Logan. Sorenson is standing next to the deep chisel blade that opens up the cut, right beind comes the next blade down which is fed the plastic sheet from the reel above. The sheet is folded into a tube in the bottom of the blade, and layed in the bottom of the earth crevase.

Low priced 2 bedroom located 247 S. 1st W. Immediate occupancy.

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REAL ESTATE INSURANCE
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86 So. Main Brigham City..... 723-5269

Wm. L. Packer	723-6391	Mel Foxley	257-5061
C.B. Williams	723-2115	Lee Packer	723-8630
Jeff S. Packer	723-6391	Mel Johnson	723-7916

the area from Mantua north to Beaver Dam and east of the Bear River was Norm Hunsaker of Honeyville.

Commissioners also named Merrill Glen North Willard to serve the South JP Precinct.

The position of JP in both precincts will be up for grabs in the upcoming election but no one's name will appear on the ballot since no one filed for the offices.

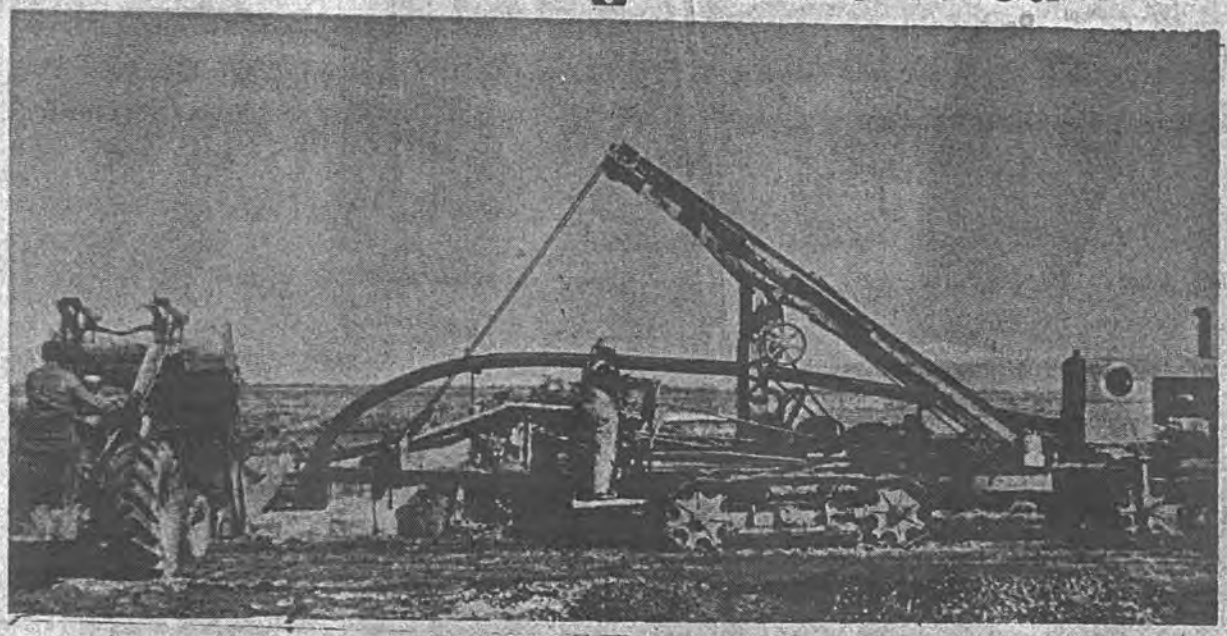
Any write-in candidate who gets a majority of the votes cast will automatically become the new JP.

day. Alan is working on his masters degree in Van Couver and will spend the next two weeks here with his parents.

Mrs. Wynn John accompanied by her mother Mrs. Leona Williams of Malad went to the Salt Lake Air Port Friday to meet their son and brother, John J. Williams of Henderson, Nevada, who spent the weekend here.

Mr. and Mrs. Wendell C. Hall went to Ogden Thursday and met their daughter Mrs. Brenda Love and

—Now Working In This Area—



The only machine of its kind in the world.
Government Accepted and Approved

"Plastic and Concrete Tile Installed"

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Oct-12-74



Here the feeder blade is seen with the plastic drain tube feeding out of the end exactly as it is done underground. The men checking the tub are A. Alvin Bishop, professor of civil and irrigation engineering, USU and Lyman Willardson, USDA
~~USU~~ drainage and irrigation expert assigned to the Utah State University, Logan.



Trencher—tile laying machine developed by Sumner G. Margetts Corp. does safe, complete job in once-over operation.

Subdivision Stabilized by Underdrainage

Dewatering System Developed by Sumner G. Margetts Corporation Gives New Buoyancy To Waterlogged Residential Real Estate



Tile lengths are handed to worker in protective crib in bottom of trench. Crib is an integrated part of machine. Note gravel envelope in trench bottom.

A means for reducing prevailing high costs for suitable residential and industrial building sites has been developed by the Sumner G. Margetts Corporation of Salt Lake City. The firm recently demonstrated what can be done by underdraining a tract of inexpensive, waterlogged property in the west Murray area—property which previously had been fit only for grazing livestock and which is now the location for a 45-home subdivision underway by Utah Realty & Construction Co.

Margetts engineers in underdraining the property first established that groundwater movement through the area was from east to west and from south to north. Then, with their company-developed machine which trenches, lays the pipe and encases it in a porous gravel envelope in a once-over operation (Industry Sept. 1955), they enclosed the property on three sides (south, east and north) with a tile underground line placed an average 6½ feet deep on a 0.13 percent grade.

Groundwater Intercepted

Incoming groundwater is intercepted by the line, and upon entering the pipe through the joints, it is diverted away from the area to be discharged into a slough out away from the site. A total 2250 lineal feet were laid, with the first 568 feet when put into service showing a discharge of 53 gallons per minute.

Six-inch tongue and groove pipe in 3-foot lengths, rather than the usual 4-foot section, was used to provide more joints to pick up more water.

The line was engineered so as to be from 10 to 22 inches below the footings of the basements. This procedure, enabling complete dewatering of the area, not only insures stability of the buildings being erected, but also eliminates the need for costly, waterproofing measures

The Sumner G. Margetts & Co., Inc. method of

Tile Underdrainage

reclaims water-logged bottom lands in a once-over operation.

A thousand feet per day—that's the average laid by a tile drainage machine designed, developed and perfected by the late Sumner G. Margetts, a leading Utah civil and consulting engineer, and manufactured in the company shops at Layton, Utah.

In an all-inclusive, once-over operation, the novel invention—the only one of its type in the world—excavates trench, lays pipe or tile to grade and alignment and applies a gravel filter completely over, under and around the pipe. This it does at less cost and with far less time and labor requirements than ordinary trenching and hand-laying methods.

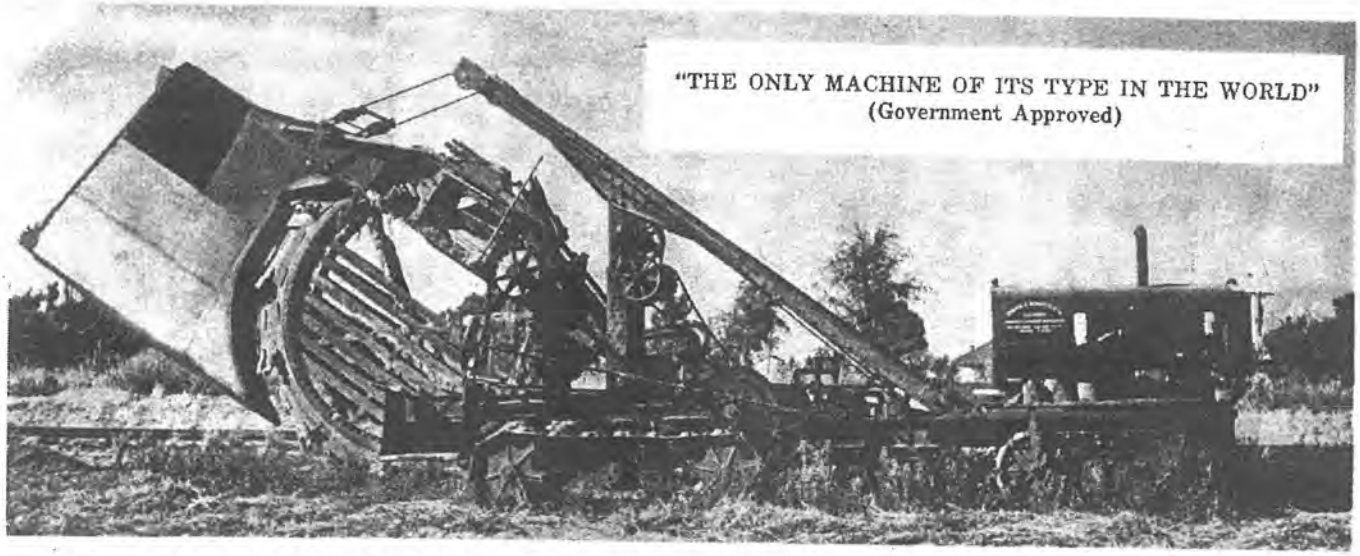
Powered by Cummins Diesel, the track-type machine trenches to an eight-foot maximum depth, works in up to eight inches of frost and handles any type of sub-soil conditions from clay gumbo to slimes and quicksand.

One man of a three-man crew works in a steel crib positioned behind the 12-foot excavating wheel (see cut). Lengths of tile or pipe handed down to him are placed in the bottom of the trench, then a hydraulic plunger pushes the length into position to join it with the section previously laid for a precision fit and alignment. Crushed gravel, flowing down from a gravity feed chute at the rear of the crib, encases the line in a four-inch envelope as the machine travels along.

This filter envelope prevents fine particles of sand and silt from entering the drain tile, stabilizes unstable soil conditions and provides passageways for the water to flow along the pipe until it can enter at the joints. Desilting boxes are located at changes in grade or at points where the line switches direction. Pipe sizes laid range from six to fifteen inches in diameter. Three types are handled: butt-end, bell and spigot, and tongue and groove.

Underdrainage projects completed to date include water-logged farm lands, subdivision and industrial sites, airports, road and borrowpit drainage, and water and outfall sewer line excavations. Lands too swampy to support a man or an animal have been ready for plowing within 15 days from the time the underdrainage line was installed.

Sumner G. Margetts & Company, Inc., headquartering at 204 Felt Building, Salt Lake City, has been working closely with soil conservation districts throughout Utah and southeastern Idaho, and is making efforts to become acquainted with all areas having acute drainage problems.





Top—Machine to dig trench, lay pipe and apply gravel filter in one operation is invention of the late Sumner G. Margetts. Device is manufactured at Layton shop.

At left—Arnold Anderson lowers length of clay pipe to Jack Stephens working in crib at bottom of trench. Hydraulic ram will insure precision fit and alignment.

At right—Gravel for filter envelope is dumped into gravity feed chute. Crew installed 8200 feet of pipe to lower water table at the Industrial Center in Salt Lake.

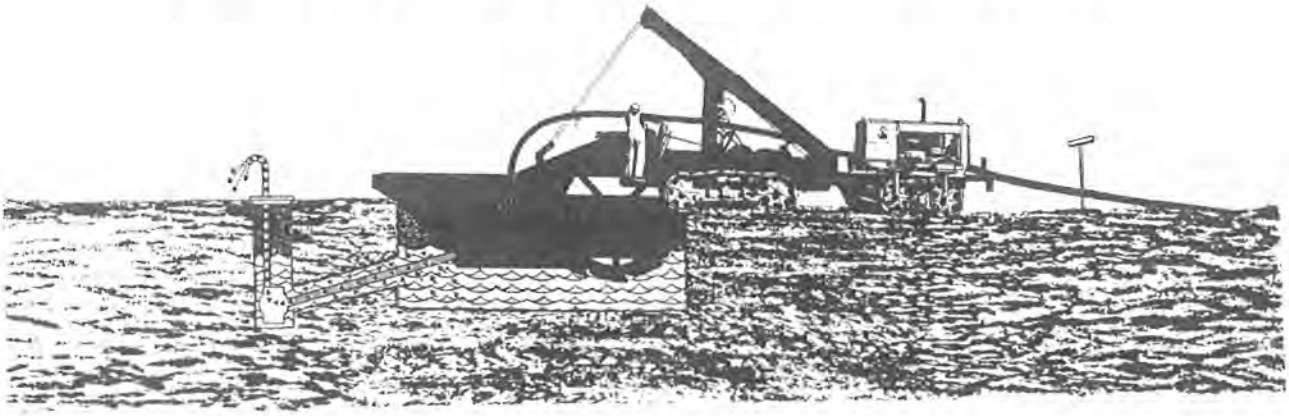


Reprinted from the Sept. 1955 Issue of Intermountain Industry Magazine

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Sumner G. Margetts Company

'DRAIN THE LAND, USE THE WATER'

Develop UTAH by developing the basic natural resources of LAND & WATER

Local Firm Has Remedy for Areas of High Ground Water.

A Salt Lake civil and consulting engineering firm has a remedy for the extensive high water tables that make large areas generally unfit for construction.

Doug Stewart, of Sumner G. Margetts, Co., has noticed that much of this high water table land is ideally located for industrial development, near railroads and freeways along the Wasatch Front.

In fact, Stewart observes, there isn't much other land available along the Wasatch Front for industrial sites. But when prospective plant builders are shown soggy land, they throw up their hands at the prospect of having to haul in expensive fill before construction can start.

Drainage is the answer, Stewart believes, and points to large subdivisions and industrial developments in Salt Lake County and hundreds of acres of farmland throughout the state that are trouble-free, thanks to efficient drainage systems.

In cooperation with Utah State University, the Margetts firm has developed a method of draining land that has been applied with great success, turning low-value bogs into productive farmland, attractive housing developments or profitable industrial areas.

The system consists of burying tile drain lines five to seven feet underground to collect the water through the tract. The drains empty into a central sump from which the water is pumped into a river, canal or drainage ditch which carries it away from the area. If the developer desires, he can file a claim on the water and utilize it for air conditioning and heating, fire protection or irrigation.

"Water is money," Stewart declares.

His firm has specialized in the installation as well as the planning of drainage systems and has built two large machines that dig the trenches, install the drain tile and surround the tile with gravel in one operation at a rate of 700 to 1,000 feet a day. The gravel filters out small particles that would tend to clog the drains and permits water to flow along outside the tiles until it reaches an opening.

Reprinted from "Intermountain Contractor"

(8-79)

(Over)

Keep Your Tile Drains Working



U. S. Department
of Agriculture

SOIL CONSERVATION SERVICE

LEAFLET NO. 347

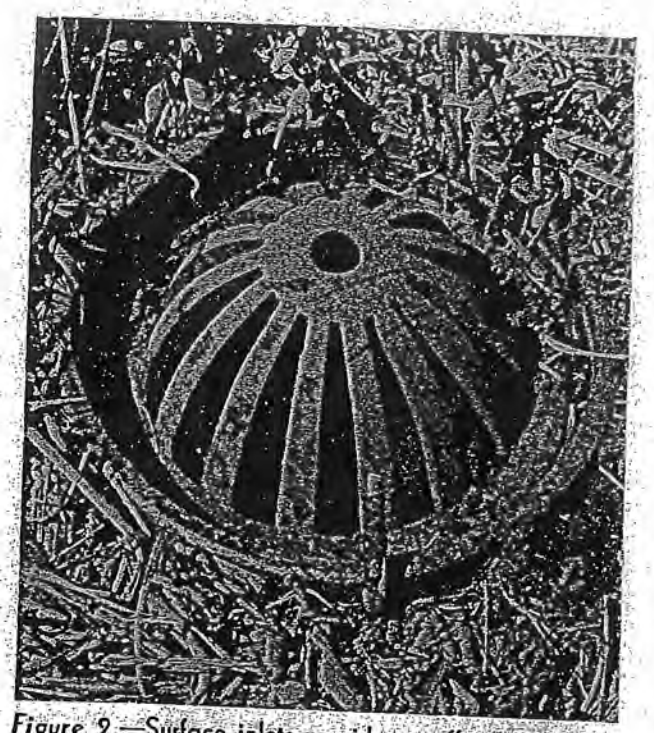


Figure 2.—Surface inlets provide an effective way of removing ponded surface water, but intake covers must be cleaned frequently.

If your job is a major one, you will need the assistance of an engineer to make this survey. You can get this help through your local soil conservation district.

After you have found out how much work is needed, choose some method of cleanout. There are several methods to pick from:

1. A ditch-blasting job:

On ditches where removal of only a foot or two of silt for a few hundred feet is necessary and where the sides of the ditch are stable, the cheapest method is probably by blasting. This can be done by the propagation method. In this method charges are spaced close enough that the detonation of one automatically explodes the next until the whole series is set off.

If ditch blasting is to be economical, a saturated soil is absolutely necessary.

Blasting is dangerous and no one but a person experienced in such work should ever undertake it.

2. Scraper cleanout:

A cheap way to remove small shoals or sand or silt bars is with a slip scraper. If the ditch is dry and the side slopes are not too steep, attach a scraper directly to the tractor and remove the shoal by working across the ditch. Generally where side slopes will not permit crossing the ditch you can operate the equipment on top of the bank and use a cable to pull the scraper.

3. Dragline cleanout:

If your survey shows that a lot of excavation and bank-sloping work is needed to restore your outlet, you probably will need a dragline (fig. 1).

For drainage work, draglines usually range in size from 3/8 to 2½ cubic yards and are normally owned and operated by contractors. These contractors are easily accessible in most localities where drainage work is done. For further information see USDA Farmers' Bulletin 2047, Maintaining Drainage Systems.

If stoppage is caused by an outlet not under your control, the first step, obviously, is to find out who owns it. It may be the property of a legally organized drainage district, or several landowners may be involved.

Maintenance laws will control the methods of cleanout if the outlet belongs to a district. These laws, of course, differ from State to State. Your local soil conservation district can tell you whether the outlet is in a legal district and what cleanout methods to use.

On outlets not in a legal district and where several landowners are involved, a mutual agreement should be drawn up. The agreement should provide that all members of the group, as well as equipment, have access to the outlet to repair it should the landowner neglect to do so.

It should also include methods of care, annual cost estimates, the amount and type of work each group



Figure 3.—Blowouts sometimes occur on tile lines. Prompt repair is necessary to prevent large quantities of soil from being washed into tile lines.

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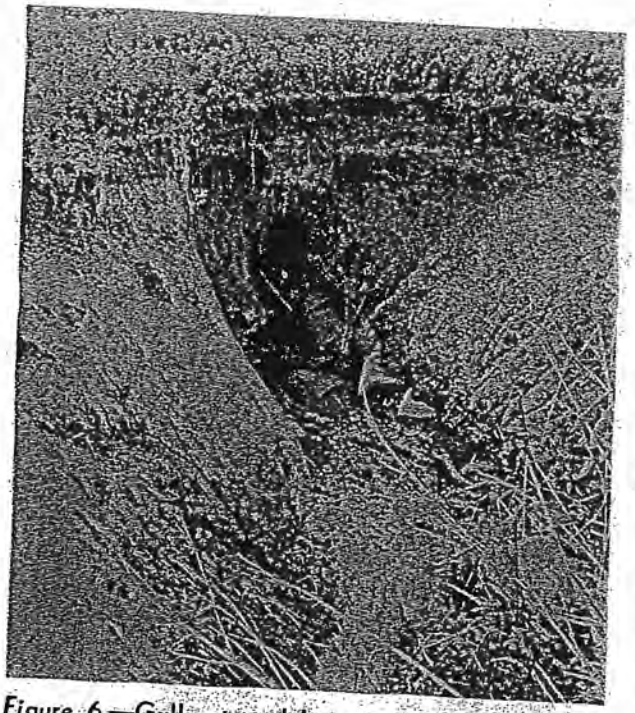


Figure 6.—Gully started by unprotected tile outlet.

the wide joint to prevent soil from washing into the tile.

Check Sand Traps and Catch Basins

Where tile lines are laid in sand, usually sand traps or catch basins are built to catch the sand. But traps will not keep sand from filling tile lines unless you keep the traps clean. Check them every few days when lines are first laid, as a lot of fine sand will wash in through the joints. Later on sand will wash in more slowly; then you need to check the traps only once or twice a year. In fact, you can notice how often the traps fill with sand and set up a schedule indicating when they will need cleanout.

Control Small Animals

Tile outlets should be protected against small animals. One way is to use a flap-type outlet. You can obtain several kinds from dealers in corrugated pipe.

A simple device can be made at home. The end of a pipe is first cut off on a 30-degree angle. Then using a piece of one-eighth-inch thick sheet-metal steel cut a circular flap large enough to extend well beyond the sides and bottom of the pipe. Trim the top of the flap to permit easy opening and fold back the edges for rigidity. Finally fasten the flap to the pipe at the top with large, loose wire links. Another effective type is shown in figure 4.

For lines without surface intakes, insert pins not more than 1½ inches apart through the end of the pipe to make a screen (fig. 5). This must be checked frequently to keep roots carried by the water from filling up the openings between the bars.

Control Tree Roots

If tile lines are not functioning, if no holes appear on the lines, and if the outlets are open, check for trees in the vicinity of the lines. This is especially needed if these are elms, willows, or cottonwoods. To get moisture, the roots of these trees will often go a hundred feet or more to a tile line, and then will eventually plug up the line.

To merely repair the line you can dig it up, clean out the roots, and then relay it.

A permanent way to keep the line working is to kill the trees by girdling. Another is to replace a part of the line close to the trees with sewer tile, and then carefully mortar the joints. If killing the trees is necessary, girdling is best done in August.

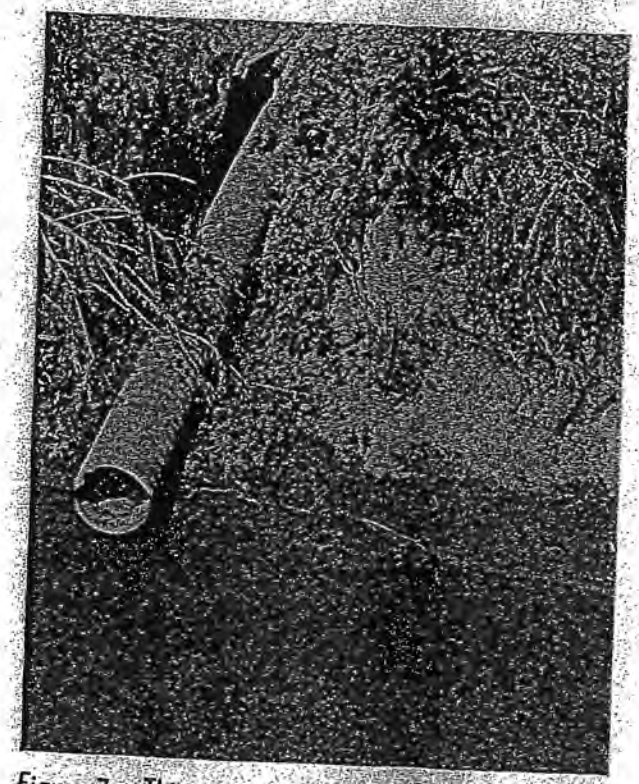


Figure 7.—This erosion was caused by water running underneath the outlet pipe because of poor backfilling and unsealed pipe end. The soil should be carefully tamped when the outlet is installed.

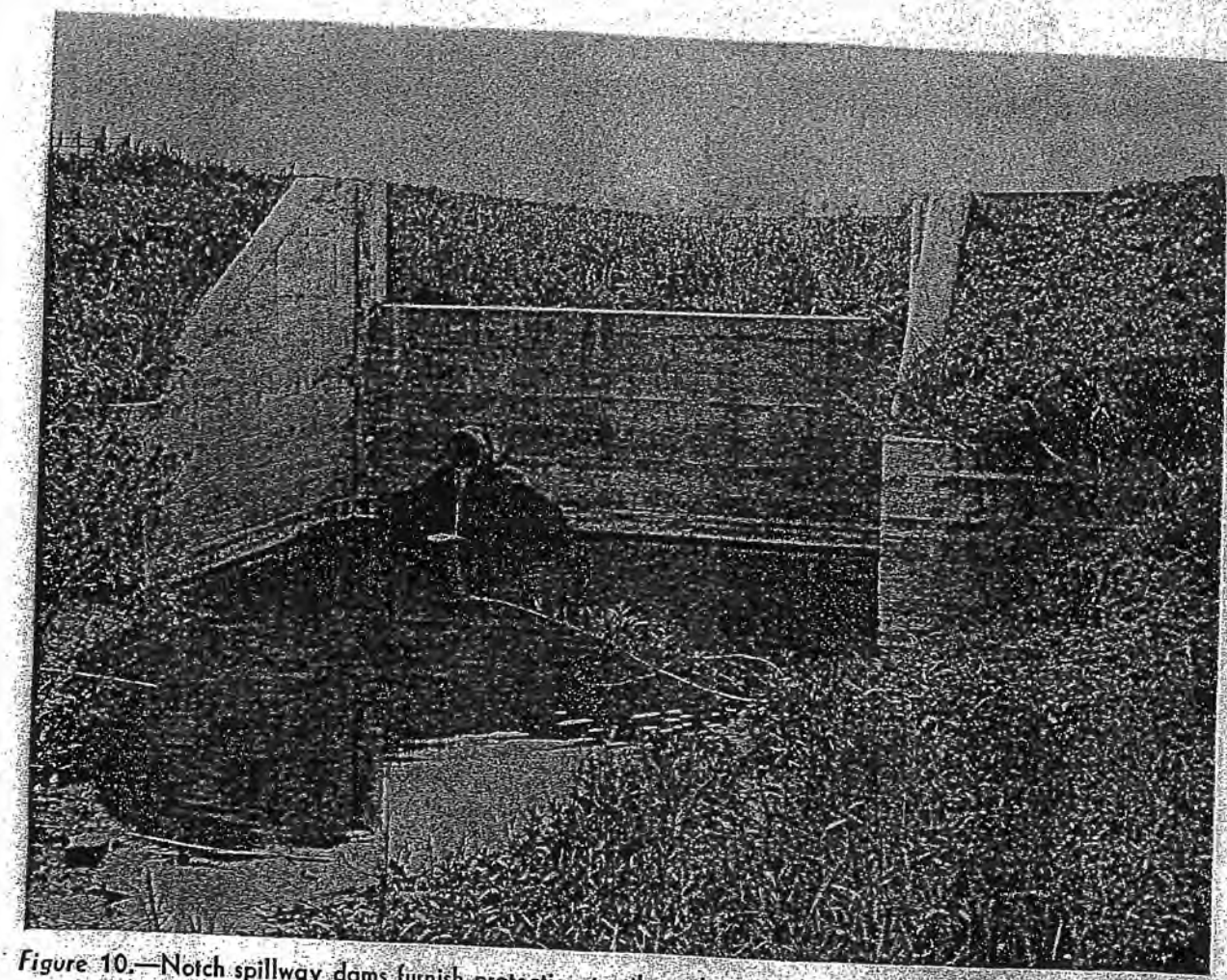


Figure 10.—Notch spillway dams furnish protection to tile outlets and provide a means for large quantities of water to enter the ditch without causing erosion.

over the last tile and fastened with a concrete collar connection. Also the pipe should extend beyond the ditchbank so that the water will drop without eroding the bank. If this outlet is in clay soils and if you do a good job of tamping of the earth supporting it, a concrete supporting block and collar is not needed. Otherwise it is well to have one.

Where you have both surface and tile water emptying into the ditch at the same place, you need a structure that is a major engineering job (fig. 9). Your local soil conservation district technician can help you. You can use either a notch dam (fig. 10) or a pipe that will carry both surface and tile water.

Keep Up Waterways Over Tile Lines

If the fall of a waterway is more than 1½ to 2 percent, lay tile on each side of the waterway rather than one line down the middle. This prevents damage to the tile system should gullying develop in the waterway. It also stops surface water from finding a small hole into the tile line, which often happens if the tile is laid in the center of the waterway. When this occurs, the water will carry soil, and eventually a large hole instead of a small one will be washed over the tile line.

For methods of seeding waterways see USDA Leaflet 257, Grass Waterways.

Use Crop Rotations

Quite often a drainage system fails over a whole field. On digging down to the tile, it is found clean, yet little water is flowing through it. Probably the cause is broken-down soil tilth. Thus water is prevented from reaching the tile. Crop rotations must contain enough legumes and grasses to keep the soil tilth in condition to allow penetration of water. To have good tilth, the length of time the land must be kept in meadow depends

APPENDIX E

ENGINEER'S OPINION OF PROBABLE COSTS

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Nibley Stormwater Master Plan
Capital Improvement Projects

Date: 4/10/2025

Owner: Nibley City

By: HP

ITEM NO.	ITEM	TIME PERIOD
	Stormwater Improvements Summary	
CIP #1	CIP #1: Hideaway Storm Drain Phase 2	Now
CIP #2	CIP #2: Hideaway Storm Drain Phase 1	Now
CIP #3	CIP #3: Culvert Maintenance	1 - 5 Years
CIP #4	CIP #4: 1200 W & 3350 S Crossing (48")	5 - 10 Years
CIP #5	CIP #5: Madison Basin - 1200 W Regional Pond	5 - 10 Years
CIP #6	CIP #6: 2200 S Crossing (30")	1 - 5 Years
CIP #7	CIP #7: Road Crossing	5 - 10 Years
CIP #8	CIP #8: 1500 West Canal Piping (48")	5 - 10 Years
CIP #9	CIP 9: 3200 S Crossing (72")	10 - 20 Years
CIP #10	CIP #10: Pipe Upsizing & Road Crossing	10 - 20 Years
CIP #11	CIP #11: 5.5 ac-ft Detention Basin	1 - 5 Years
CIP #12	CIP #12: 2600 S & 1300 W Crossing (48")	1 - 5 Years
CIP #13	CIP #13: 1200 W & 3650 S Crossing (42")	10 - 20 Years

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Nibley Stormwater Master Plan
Capital Improvement Projects

Date: 4/10/2025

Owner: Nibley City

By: SDW & HP

ITEM NO.	ITEM	URGENCY	MAGNITUDE	IMPORTANCE	TOTAL PROJECT AMOUNT	IMPACT FEE ELIGIBILITY	IMPACT FEE AMOUNT
	Stormwater Improvements Summary						
CIP #1	CIP #1: Hideaway Storm Drain Phase 2	5	5	10	$ 161,000	100%	$ 161,000
CIP #2	CIP #2: Hideaway Storm Drain Phase 1	5	5	10	$ 999,000	100%	$ 999,000
CIP #3	CIP #3: Culvert Maintenance	5	4	9	$ 13,700	0%	$ -
CIP #4	CIP #4: 1200 W & 3350 S Crossing (48")	5	4	9	$ 64,000	77%	$ 49,586
CIP #5	CIP #5: Madison Basin - 1200 W Regional Pond	5	4	9	$ 597,000	100%	$ 597,000
CIP #6	CIP #6: 2200 S Crossing (30")	4	4	8	$ 176,000	0%	$ -
CIP #7	CIP #7: Road Crossing	4	3	7	$ 65,000	0%	$ -
CIP #8	CIP #8: 1500 West Canal Piping (48")	4	3	7	$ 327,000	0%	$ -
CIP #9	CIP 9: 3200 S Crossing (72")	4	3	7	$ 103,000	0%	$ -
CIP #10	CIP #10: Pipe Upsizing & Road Crossing	3	4	7	$ 67,000	0%	$ -
CIP #11	CIP #11: 5.5 ac-ft Detention Basin	4	3	7	$ 411,000	100%	$ 411,000
CIP #12	CIP #12: 2600 S & 1300 W Crossing (48")	3	3	6	$ 53,000	0%	$ -
CIP #13	CIP #13: 1200 W & 3650 S Crossing (42")	3	3	6	$ 87,000	0%	$ -
	Immidiate Future Projects (CIP #1 & CIP #2)				$ 1,160,000	100%	$ 1,160,000
	1-5 Year Period CIP Projects				$ 653,700	63%	$ 411,000
	5-10 Year Period CIP Projects				$ 1,053,000	61%	$ 646,586
	10-20 Year Period CIP Projects				$ 257,000	0%	$ -
	TOTAL				**$ 3,123,700.00**	71%	**$ 2,217,585.92**

Rate Structure				
Rates	**# of Connections**	**Avg Connection Bill**	**Factors - Based on 3,000 ft2**	
Residential	2437.00	8.00	R Factor	1.00
Commercial	17.00	69.99	C Factor	8.75
Industrial	7.00	194.73	Industrial	24.34
Institutional	8.00	148.18	Industrial	18.52
			A Factor	0.00

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #1: Hideaway Storm Drain Phase 2
1400 W Piping

Date: 4/10/2025

Owner: Nibley City

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 8,500	$ 8,500
2	Subsurface Investigation		4	HR	$ 250	$ 1,000
3	Install 18" HDPE Storm Drain Pipe		1100	LF	$ 90	$ 99,000
4	Inlet Box Structure		1	EA	$ 1,700	$ 1,700
5	Catch Basins		1	EA	$ 1,700	$ 1,700
6	Connection to Phase 2		1	EA	$ 2,000	$ 2,000
	Construction Subtotal					**$ 114,000**
7	Contingency	15%	1	L.S.		$ 18,000
	Construction Total					**$ 132,000**
	Professional Services & Project Incidentals					
8	Engineering	12%	1	LS	$ 15,840	$ 15,840
9	Construction Administration	8%	1	LS	$ 10,560	$ 10,560
10	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 29,000**
	TOTAL					**$ 161,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #2: Hideaway Storm Drain Phase 1
Maple Valley Canal Piping
1850 W 3000 S
Owner: Nibley City

Date: 4/10/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 52,900	$ 52,900
2	Traffic Control		1	LS	$ 2,000	$ 2,000
3	Subsurface Investigation		4	HR	$ 250	$ 1,000
4	Install 42" HDPE Storm Drain Pipe		2600	LF	$ 230	$ 598,000
5	Box Structure/Junction		5	EA	$ 6,000	$ 30,000
6	Flared End Section		1	EA	$ 6,000	$ 6,000
7	Irrigation Control Turn Out Box		3	EA	$ 7,000	$ 21,000
8	Gravel Access Road		70	LF	$ 40	$ 2,800
	Construction Subtotal					**$ 714,000**
9	Contingency	15%	1	L.S.		$ 108,000
	Construction Total					**$ 822,000**
	Professional Services & Project Incidentals					
10	Engineering	12%	1	LS	$ 98,640	$ 98,640
11	Construction Administration	8%	1	LS	$ 65,760	$ 65,760
12	Permitting - Army Corp		1	LS	$ 10,000	$ 10,000
13	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 177,000**
	TOTAL					**$ 999,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #3: Culvert Maintenance
Hwy 91 & Nibley Pkwy Crossing
Reach 10b

Owner: Nibley City

Date: 4/10/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Maintenance					
1	Mobilization	8.0%	1	LS	$ 900	$ 900
2	Removal of Debris & Blockage & Vegetation		1	LS	$ 6,000	$ 6,000
3	Installation of Barrier Fence		100	LF	$ 50	$ 5,000
	Maintenance Subtotal					**$ 11,900**
4	Contingency	15%	1	LS		$ 1,800
	Maintenance Total					**$ 13,700**
	TOTAL					**$ 13,700**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #4: 1200 W & 3350 S Crossing (48")
1200 W & 3350 S Crossing

Date: 4/10/2025

Owner: Nibley City

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 3,400	$ 3,400
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 250	$ 1,000
4	Pavement Sawing (Asphalt)		100	LF	$ 3	$ 300
5	Removal of Existing Storm Drain Pipe		1	LS	$ 1,000	$ 1,000
6	Removal of Asphalt & Subgrade		42	SY	$ 15	$ 700
7	Removal of Curb and Gutter		10	LF	$ 10	$ 100
8	Install 48" HDPE Storm Drain Pipe		60	LF	$ 250	$ 15,000
9	Install 4" Hot Plant Mix Bituminous Surfacing		42	SY	$ 35	$ 1,500
10	Install 4" UTBC		42	SY	$ 7	$ 300
11	Imported Backfill		39	CY	$ 10	$ 400
12	72" Manhole		1	EA	$ 6,000	$ 6,000
13	Flared End Section		1	EA	$ 5,000	$ 5,000
	Construction Subtotal					**$ 45,000**
14	Contingency	15%	1	L.S.		$ 7,000
	Construction Total					**$ 52,000**
	Professional Services & Project Incidentals					
15	Engineering	12%	1	LS	$ 6,000	$ 6,000
16	Construction Administration	8%	1	LS	$ 4,000	$ 4,000
17	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 12,000**
	TOTAL					**$ 64,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #5: Madison Basin - 1200 W Regional Pond
1200 W Regional Pond

Date: 4/10/2025

Owner: Nibley City

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 32,600	$ 32,600
2	Subsurface Investigation		4	HR	$ 250	$ 1,000
3	Foundation Excavation		6930	CY	$ 15	$ 110,000
4	Compacted Embankment		1450	CY	$ 25	$ 36,300
5	Detention Basin Grading		5.2	AC	$ 12,000	$ 62,400
6	Export Earthen Material		5480	CY	$ 2	$ 11,000
7	Emergency Overflow		1	EA	$ 10,000	$ 10,000
8	Hydroseed Grass		25170	SY	$ 3	$ 76,000
9	Landscape Irrigation Sprinklers		25170	SY	$ 4	$ 100,680
	Construction Subtotal					**$ 440,000**
10	Contingency	15%	1	L.S.		$ 66,000
	Construction Total					**$ 506,000**
	Professional Services & Project Incidentals					
11	Engineering	10%	1	LS	$ 53,000	$ 53,000
12	Construction Administration	7%	1	LS	$ 36,000	$ 36,000
13	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 91,000**
	TOTAL					**$ 597,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #6: 2200 S Crossing (30")
2200 S Crossing
Reach 44b

Date: 4/10/2025

Owner: Nibley City

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 9,400	$ 9,400
2	Traffic Control		1	LS	$ 15,000	$ 15,000
3	Subsurface Investigation		4	HR	$ 250	$ 1,000
4	Pavement Sawing (Asphalt)		80	LF	$ 3	$ 300
5	Removal of Asphalt & Subgrade		63	SY	$ 15	$ 1,000
6	Removal of Existing Storm Drain Pipe		1	LS	$ 1,000	$ 1,000
7	Install 30" HDPE Storm Drain Pipe (Roadway)		40	LF	$ 120	$ 4,800
8	Install 30" HDPE Storm Drain Pipe		600	LF	$ 120	$ 72,000
9	Install 4" Hot Plant Mix Bituminous Surfacing		63	SY	$ 35	$ 2,300
10	Install 4" UTBC		63	SY	$ 7	$ 500
11	Imported Fill		59	CY	$ 10	$ 600
12	30" Flared End Section with Trash Grate		1	EA	$ 2,500	$ 2,500
13	Storm Drain Junction Box		4	EA	$ 4,000	$ 16,000
	Construction Subtotal					**$ 127,000**
14	Contingency	15%	1	L.S.		$ 20,000
	Construction Total					**$ 147,000**
	Professional Services & Project Incidentals					
15	Engineering	11%	1	LS	$ 16,000	$ 16,000
16	Construction Administration	7%	1	LS	$ 11,000	$ 11,000
17	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 29,000**
	TOTAL					**$ 176,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #7: Road Crossing
1500 W Crossing
Reach 21b & 21c

Owner: Nibley City

Date: 4/10/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 3,400	$ 3,400
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Pavement Sawing (Asphalt)		70	LF	$ 3	$ 300
5	Removal of Asphalt & Subgrade		43	SY	$ 15	$ 700
6	Removal of Existing Storm Drain Pipe		1	LS	$ 1,000	$ 1,000
7	Install 48" HDPE Storm Drain Pipe		50	LF	$ 250	$ 12,500
8	Install 4" Hot Plant Mix Bituminous Surfacing		43	SY	$ 35	$ 1,600
9	Install 4" UTBC		43	SY	$ 7	$ 400
10	Install 3" Subbase Granular Fill (3" Minus)		15	CY	$ 40	$ 600
11	Install Discharge Structure		1	LS	$ 7,000	$ 7,000
12	Replace Existing Storm Drain Box		1	EA	$ 6,000	$ 6,000
13	Install Concrete Curb		10	LF	$ 45	$ 500
14	Install Concrete Sidewalk		10	LF	$ 50	$ 500
	Construction Subtotal					**$ 46,000**
15	Contingency	15%	1	LS		$ 7,000
	Construction Total					**$ 53,000**
	Professional Services & Project Incidentals					
16	Engineering	11%	1	LS	$ 6,000	$ 6,000
17	Construction Administration	8%	1	LS	$ 4,000	$ 4,000
18	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 12,000**
	TOTAL					**$ 65,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #8: 1500 West Canal Piping (48")
1500 W Canal Piping
Reach 21b & 21c

Owner: Nibley City

Date: 4/10/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 17,500	$ 17,500
2	Subsurface Investigation		4	HR	$ 250	$ 1,000
3	Install 48" HDPE Storm Drain Pipe		790	LF	$ 250	$ 197,500
4	48" Flared End Section with Trash Grate		1	EA	$ 4,000	$ 4,000
5	6' Diameter Manhole		2	EA	$ 6,000	$ 12,000
6	Outlet Discharge and Slough Protection		1	LS	$ 4,000	$ 4,000
	Construction Subtotal					**$ 236,000**
7	Contingency	15%	1	LS		$ 36,000
	Construction Total					**$ 272,000**
	Professional Services & Project Incidentals					
8	Engineering	11%	1	LS	$ 29,000	$ 29,000
9	Construction Administration	7%	1	LS	$ 19,000	$ 19,000
10	Army Corp Permitting		1	LS	$ 5,000	$ 5,000
11	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 55,000**
	TOTAL					**$ 327,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP 9: 3200 S Crossing (72")
3200 S Crossing
Reach 102b

Owner: Nibley City

Date: 4/10/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 5,500	$ 5,500
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 250	$ 1,000
4	Pavement Sawing (Asphalt)		80	LF	$ 3	$ 300
5	Removal of Asphalt & Subgrade		55	SY	$ 15	$ 900
6	Removal of Existing Storm Drain Pipe		1	LS	$ 1,000	$ 1,000
7	Install 72" RCP		70	LF	$ 450	$ 31,500
8	Install 4" Hot Plant Mix Bituminous Surfacing		55	SY	$ 35	$ 2,000
9	Install 4" UTBC		55	SY	$ 7	$ 400
10	Imported Backfill		49	CY	$ 10	$ 500
11	72" Inlet Structure		1	EA	$ 10,000	$ 10,000
12	72" Outlet Structure		1	EA	$ 10,000	$ 10,000
	Construction Subtotal					**$ 74,000**
13	Contingency	15%	1	L.S.		$ 12,000
	Construction Total					**$ 86,000**
	Professional Services & Project Incidentals					
14	Engineering	10%	1	LS	$ 9,000	$ 9,000
15	Construction Administration	7%	1	LS	$ 6,000	$ 6,000
16	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 17,000**
	TOTAL					**$ 103,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #10: Pipe Upsizing & Road Crossing
1200 W & 3500 S Crossing

Date: 4/10/2025

Owner: Nibley City

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 3,500	$ 3,500
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 250	$ 1,000
4	Pavement Sawing (Asphalt)		74	LF	$ 3	$ 300
5	Removal of Existing Storm Drain Pipe		1	LS	$ 1,000	$ 1,000
6	Removal of Asphalt & Subgrade		47	SY	$ 15	$ 800
7	Removal of Curb and Gutter		10	LF	$ 10	$ 100
8	Install 48" HDPE Storm Drain Pipe		60	LF	$ 250	$ 15,000
9	Install 4" Hot Plant Mix Bituminous Surfacing		47	SY	$ 35	$ 1,700
10	Install 4" UTBC		47	SY	$ 7	$ 400
11	Imported Backfill		44	CY	$ 10	$ 500
12	Outlet Structure		1	EA	$ 6,000	$ 6,000
13	Inlet Structure		1	EA	$ 6,000	$ 6,000
	Construction Subtotal					**$ 47,000**
14	Contingency	15%	1	L.S.		$ 8,000
	Construction Total					**$ 55,000**
	Professional Services & Project Incidentals					
15	Engineering	11%	1	LS	$ 6,000	$ 6,000
16	Construction Administration	7%	1	LS	$ 4,000	$ 4,000
17	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 12,000**
	TOTAL					**$ 67,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #11: 5.5 ac-ft Detention Basin
City 2600 S Basin

Date: 4/10/2025

Owner: Nibley City

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 22,300	$ 22,300
2	Subsurface Investigation		4	HR	$ 250	$ 1,000
3	Foundation Excavation		4500	CY	$ 15	$ 70,000
4	Compacted Embankment		1175	CY	$ 25	$ 29,400
5	Detention Basin Grading		3.5	AC	$ 12,000	$ 42,000
6	Export Earthen Material		3325	CY	$ 2	$ 7,000
7	Emergency Overflow		1	EA	$ 10,000	$ 10,000
8	Hydroseed Grass		16940	SY	$ 3	$ 51,000
9	Landscape Irrigation Sprinklers		16940	SY	$ 4	$ 67,760
	Construction Subtotal					**$ 301,000**
10	Contingency	15%	1	L.S.		$ 46,000
	Construction Total					**$ 347,000**
	Professional Services & Project Incidentals					
11	Engineering	11%	1	LS	$ 37,000	$ 37,000
12	Construction Administration	7%	1	LS	$ 25,000	$ 25,000
13	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 64,000**
	TOTAL					**$ 411,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #12: 2600 S & 1300 W Crossing (48")

2600 S & 1300 W Crossing

Date: 4/10/2025

Owner: Nibley City

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 2,800	$ 2,800
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 250	$ 1,000
4	Pavement Sawing (Asphalt)		73	LF	$ 3	$ 300
5	Removal of Existing Storm Drain Pipe		1	LS	$ 1,000	$ 1,000
6	Removal of Asphalt & Subgrade		154	SY	$ 15	$ 2,400
7	Install 48" HDPE Storm Drain Pipe		50	LF	$ 250	$ 12,500
8	Install 4" Hot Plant Mix Bituminous Surfacing		154	SY	$ 22	$ 3,400
9	Install 4" UTBC		154	SY	$ 6	$ 1,000
10	Import Backfill		128	CY	$ 10	$ 1,300
11	Roadway Striping		1	LS	$ 1,000	$ 1,000
	Construction Subtotal					**$ 37,000**
12	Contingency	15%	1	L.S.		$ 6,000
	Construction Total					**$ 43,000**
	Professional Services & Project Incidentals					
13	Engineering	12%	1	LS	$ 5,000	$ 5,000
14	Construction Administration	7%	1	LS	$ 3,000	$ 3,000
15	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 10,000**
	TOTAL					**$ 53,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: CIP #13: 1200 W & 3650 S Crossing (42")
1200 W & 3650 S Crossing
Reach 28b

Owner: Nibley City

Date: 4/10/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 4,600	$ 4,600
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 250	$ 1,000
4	Pavement Sawing (Asphalt)		100	LF	$ 3	$ 300
5	Removal of Asphalt & Subgrade		278	SY	$ 15	$ 4,200
6	Removal of Existing Storm Drain Pipe		1	LS	$ 1,000	$ 1,000
7	Install 42" HDPE Storm Drain Pipe		60	LF	$ 230	$ 13,800
8	Install 4" Hot Plant Mix Bituminous Surfacing		278	SY	$ 35	$ 9,800
9	Install 4" UTBC		278	SY	$ 7	$ 2,000
10	42" Inlet Structure		1	EA	$ 6,000	$ 6,000
11	42" Outlet Structure		1	EA	$ 6,000	$ 6,000
12	Imported Backfill		231	CY	$ 10	$ 2,400
	Construction Subtotal					**$ 62,000**
13	Contingency	15%	1	L.S.		$ 10,000
	Construction Total					**$ 72,000**
	Professional Services & Project Incidentals					
14	Engineering	11%	1	LS	$ 8,000	$ 8,000
15	Construction Administration	7%	1	LS	$ 5,000	$ 5,000
16	Material Testing		1	LS	$ 2,000	$ 2,000
	Professional Services Total					**$ 15,000**
	TOTAL					**$ 87,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Nibley Stormwater Master Plan
Trunk Line Projects

Date: 4/1/2025

Owner: Nibley City

By: M.M.

ITEM NO.	TOTAL PROJECT AMOUNT	TOTAL PROJECT AMOUNT - DEVELOPER	DIFFERENCE
TL #1	$ 1,810,000	$ 1,760,000	$ 50,000
TL #2	$ 1,780,000	$ 1,640,000	$ 140,000
TL #3	$ 1,890,000	$ 1,690,000	$ 200,000
TL #4	$ 1,970,000	$ 1,660,000	$ 310,000
TL #5	$ 1,630,000	$ 1,540,000	$ 90,000
TL #6	$ 1,850,000	$ 1,510,000	$ 340,000
TL #7	$ 1,420,000	$ 1,150,000	$ 270,000
TL #8	$ 1,390,000	$ 1,150,000	$ 240,000
TL #9	$ 1,470,000	$ 1,180,000	$ 290,000
TL #10	$ 1,530,000	$ 1,250,000	$ 280,000
TL #11	$ 1,310,000	$ 1,080,000	$ 230,000
TL #12	$ 1,250,000	$ 1,070,000	$ 180,000
TL #13	$ 1,000,000	$ 920,000	$ 80,000
TL #14	$ 1,300,000	$ 1,070,000	$ 230,000
TL #15	$ 1,280,000	$ 1,060,000	$ 220,000
TL #16	$ 1,930,000	$ 1,160,000	$ 770,000
Total	**$ 24,810,000**	**$ 20,890,000**	**$ 3,920,000**
East TL	**$ 9,080,000**	**$ 8,290,000**	**$ 790,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #1
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 94,100	$ 94,100
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		12300	LF	$ 52	$ 639,600
5	Install 18" HDPE Dual Wall Storm Pipe		2400	LF	$ 65	$ 156,000
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		72	EA	$ 3,500	$ 252,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		360	LF	$ 3	$ 1,100
15	Removal of Asphalt & Subgrade		53	SY	$ 15	$ 800
16	Install 4" Hot Plant Mix Bituminous Surfacing		54	SY	$ 35	$ 1,900
17	Install 4" UTBC		54	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		54	SY	$ 40	$ 2,200
19	Repair Gravel Road		51	SY	$ 20	$ 1,100
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,270,000**
25	Contingency	15%	1	LS		$ 191,000
	Construction Total					**$ 1,461,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 176,000	$ 176,000
27	Construction Administration	8%	1	LS	$ 117,000	$ 117,000
28	Material Testing		1	LS	$ 8,000	$ 8,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 341,000**
	TOTAL					**$ 1,810,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #2
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 92,600	$ 92,600
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		8050	LF	$ 52	$ 418,600
5	Install 18" HDPE Dual Wall Storm Pipe		5500	LF	$ 65	$ 357,500
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		72	EA	$ 3,500	$ 252,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		360	LF	$ 3	$ 1,100
15	Removal of Asphalt & Subgrade		55	SY	$ 15	$ 900
16	Install 4" Hot Plant Mix Bituminous Surfacing		55	SY	$ 35	$ 2,000
17	Install 4" UTBC		55	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		55	SY	$ 40	$ 2,200
19	Repair Gravel Road		51	SY	$ 20	$ 1,100
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,250,000**
25	Contingency	15%	1	LS		$ 188,000
	Construction Total					**$ 1,438,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 173,000	$ 173,000
27	Construction Administration	8%	1	LS	$ 116,000	$ 116,000
28	Material Testing		1	LS	$ 7,000	$ 7,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 336,000**
	TOTAL					**$ 1,780,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #3
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 98,500	$ 98,500
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		7900	LF	$ 52	$ 410,800
5	Install 18" HDPE Dual Wall Storm Pipe		4800	LF	$ 65	$ 312,000
6	Install 24" HDPE Dual Wall Storm Pipe		1420	LF	$ 90	$ 127,800
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		72	EA	$ 3,500	$ 252,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		360	LF	$ 3	$ 1,100
15	Removal of Asphalt & Subgrade		55	SY	$ 15	$ 900
16	Install 4" Hot Plant Mix Bituminous Surfacing		55	SY	$ 35	$ 2,000
17	Install 4" UTBC		55	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		55	SY	$ 40	$ 2,200
19	Repair Gravel Road		51	SY	$ 20	$ 1,100
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,330,000**
25	Contingency	15%	1	LS		$ 200,000
	Construction Total					**$ 1,530,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 184,000	$ 184,000
27	Construction Administration	8%	1	LS	$ 123,000	$ 123,000
28	Material Testing		1	LS	$ 8,000	$ 8,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 355,000**
	TOTAL					**$ 1,890,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #4
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 103,000	$ 103,000
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		5930	LF	$ 52	$ 308,400
5	Install 18" HDPE Dual Wall Storm Pipe		4300	LF	$ 65	$ 279,500
6	Install 24" HDPE Dual Wall Storm Pipe		3540	LF	$ 90	$ 318,600
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		72	EA	$ 3,500	$ 252,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		360	LF	$ 3	$ 1,100
15	Removal of Asphalt & Subgrade		56	SY	$ 15	$ 900
16	Install 4" Hot Plant Mix Bituminous Surfacing		56	SY	$ 35	$ 2,000
17	Install 4" UTBC		56	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		56	SY	$ 40	$ 2,300
19	Repair Gravel Road		53	SY	$ 20	$ 1,100
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,391,000**
25	Contingency	15%	1	LS		$ 209,000
	Construction Total					**$ 1,600,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 192,000	$ 192,000
27	Construction Administration	8%	1	LS	$ 128,000	$ 128,000
28	Material Testing		1	LS	$ 7,000	$ 7,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 367,000**
	TOTAL					**$ 1,970,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #5
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 84,100	$ 84,100
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		7740	LF	$ 52	$ 402,500
5	Install 18" HDPE Dual Wall Storm Pipe		4800	LF	$ 65	$ 312,000
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		60	EA	$ 3,500	$ 210,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		240	LF	$ 3	$ 800
15	Removal of Asphalt & Subgrade		36	SY	$ 15	$ 600
16	Install 4" Hot Plant Mix Bituminous Surfacing		36	SY	$ 35	$ 1,300
17	Install 4" UTBC		36	SY	$ 7	$ 300
18	Install 3" Subbase Granular Fill (3" Minus)		36	SY	$ 40	$ 1,500
19	Repair Gravel Road		34	SY	$ 20	$ 700
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,135,000**
25	Contingency	15%	1	LS		$ 171,000
	Construction Total					**$ 1,306,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 157,000	$ 157,000
27	Construction Administration	8%	1	LS	$ 105,000	$ 105,000
28	Material Testing		1	LS	$ 7,000	$ 7,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ 10,000
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 319,000**
	TOTAL					**$ 1,630,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #6
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 98,500	$ 98,500
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		6100	LF	$ 52	$ 317,200
5	Install 18" HDPE Dual Wall Storm Pipe		3340	LF	$ 65	$ 217,100
6	Install 24" HDPE Dual Wall Storm Pipe		4280	LF	$ 90	$ 385,200
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		72	EA	$ 3,500	$ 252,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		120	LF	$ 3	$ 400
15	Removal of Asphalt & Subgrade		18	SY	$ 15	$ 300
16	Install 4" Hot Plant Mix Bituminous Surfacing		18	SY	$ 35	$ 700
17	Install 4" UTBC		18	SY	$ 7	$ 200
18	Install 3" Subbase Granular Fill (3" Minus)		18	SY	$ 40	$ 800
19	Repair Gravel Road		17	SY	$ 20	$ 400
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		2	EA	$ 15,000	$ 30,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,329,000**
25	Contingency	15%	1	LS		$ 200,000
	Construction Total					**$ 1,529,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 184,000	$ 184,000
27	Construction Administration	8%	1	LS	$ 123,000	$ 123,000
28	Material Testing		1	LS	$ 7,000	$ 7,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 318,000**
	TOTAL					**$ 1,850,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #7
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 75,400	$ 75,400
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		3940	LF	$ 52	$ 204,900
5	Install 18" HDPE Dual Wall Storm Pipe		2580	LF	$ 65	$ 167,700
6	Install 24" HDPE Dual Wall Storm Pipe		3840	LF	$ 90	$ 345,600
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		48	EA	$ 3,500	$ 168,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		2	EA	$ 15,000	$ 30,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,018,000**
25	Contingency	15%	1	LS		$ 153,000
	Construction Total					**$ 1,171,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 141,000	$ 141,000
27	Construction Administration	8%	1	LS	$ 94,000	$ 94,000
28	Material Testing		1	LS	$ 6,000	$ 6,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 245,000**
	TOTAL					**$ 1,420,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #8
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 73,500	$ 73,500
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		4520	LF	$ 52	$ 235,100
5	Install 18" HDPE Dual Wall Storm Pipe		2920	LF	$ 65	$ 189,800
6	Install 24" HDPE Dual Wall Storm Pipe		2600	LF	$ 90	$ 234,000
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		54	EA	$ 3,500	$ 189,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		3	EA	$ 15,000	$ 45,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 993,000**
25	Contingency	15%	1	LS		$ 149,000
	Construction Total					**$ 1,142,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 138,000	$ 138,000
27	Construction Administration	8%	1	LS	$ 92,000	$ 92,000
28	Material Testing		1	LS	$ 6,000	$ 6,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 240,000**
	TOTAL					**$ 1,390,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #9
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 78,000	$ 78,000
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		4520	LF	$ 52	$ 235,100
5	Install 18" HDPE Dual Wall Storm Pipe		2920	LF	$ 65	$ 189,800
6	Install 24" HDPE Dual Wall Storm Pipe		2980	LF	$ 90	$ 268,200
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		60	EA	$ 3,500	$ 210,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		3	EA	$ 15,000	$ 45,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,052,000**
25	Contingency	15%	1	LS		$ 158,000
	Construction Total					**$ 1,210,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 146,000	$ 146,000
27	Construction Administration	8%	1	LS	$ 97,000	$ 97,000
28	Material Testing		1	LS	$ 6,000	$ 6,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 253,000**
	TOTAL					**$ 1,470,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #10
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 81,400	$ 81,400
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		3940	LF	$ 52	$ 204,900
5	Install 18" HDPE Dual Wall Storm Pipe		2580	LF	$ 65	$ 167,700
6	Install 24" HDPE Dual Wall Storm Pipe		4100	LF	$ 90	$ 369,000
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		54	EA	$ 3,500	$ 189,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		4	EA	$ 15,000	$ 60,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,098,000**
25	Contingency	15%	1	LS		$ 165,000
	Construction Total					**$ 1,263,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 152,000	$ 152,000
27	Construction Administration	8%	1	LS	$ 102,000	$ 102,000
28	Material Testing		1	LS	$ 6,000	$ 6,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 264,000**
	TOTAL					**$ 1,530,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #11
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 69,700	$ 69,700
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		3880	LF	$ 52	$ 201,800
5	Install 18" HDPE Dual Wall Storm Pipe		2460	LF	$ 65	$ 159,900
6	Install 24" HDPE Dual Wall Storm Pipe		2840	LF	$ 90	$ 255,600
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		48	EA	$ 3,500	$ 168,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		4	EA	$ 15,000	$ 60,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 941,000**
25	Contingency	15%	1	LS		$ 142,000
	Construction Total					**$ 1,083,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 130,000	$ 130,000
27	Construction Administration	8%	1	LS	$ 87,000	$ 87,000
28	Material Testing		1	LS	$ 5,000	$ 5,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 226,000**
	TOTAL					**$ 1,310,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #12
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 66,400	$ 66,400
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		4020	LF	$ 52	$ 209,100
5	Install 18" HDPE Dual Wall Storm Pipe		2460	LF	$ 65	$ 159,900
6	Install 24" HDPE Dual Wall Storm Pipe		1790	LF	$ 90	$ 161,100
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		48	EA	$ 3,500	$ 168,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		7	EA	$ 15,000	$ 105,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 896,000**
25	Contingency	15%	1	LS		$ 135,000
	Construction Total					**$ 1,031,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 124,000	$ 124,000
27	Construction Administration	8%	1	LS	$ 83,000	$ 83,000
28	Material Testing		1	LS	$ 5,000	$ 5,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 216,000**
	TOTAL					**$ 1,250,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #13
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 52,800	$ 52,800
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		4280	LF	$ 52	$ 222,600
5	Install 18" HDPE Dual Wall Storm Pipe		2680	LF	$ 65	$ 174,200
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		42	EA	$ 3,500	$ 147,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		6	EA	$ 15,000	$ 90,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 713,000**
25	Contingency	15%	1	LS		$ 107,000
	Construction Total					**$ 820,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 99,000	$ 99,000
27	Construction Administration	8%	1	LS	$ 66,000	$ 66,000
28	Material Testing		1	LS	$ 4,000	$ 4,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 173,000**
	TOTAL					**$ 1,000,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #14
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 68,500	$ 68,500
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		0	LF	$ 52	$ -
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		960	LF	$ 115	$ 110,400
8	Install 36" HDPE Dual Wall Storm Pipe		780	LF	$ 140	$ 109,200
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		0	EA	$ 3,500	$ -
12	Install 60" Manhole		12	EA	$ 5,000	$ 60,000
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		2	EA	$ 15,000	$ 30,000
22	UDOT Crossing (36" Bore)		1	EA	$ 500,000	$ 500,000
23	Connection to Adjacent Storm System		2	EA	$ 10,000	$ 20,000
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 924,000**
25	Contingency	15%	1	LS		$ 139,000
	Construction Total					**$ 1,063,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 128,000	$ 128,000
27	Construction Administration	8%	1	LS	$ 86,000	$ 86,000
28	Material Testing		1	LS	$ 1,000	$ 1,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		1	LS	$ 10,000	$ 10,000
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 235,000**
	TOTAL					**$ 1,300,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #15
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 67,400	$ 67,400
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		0	LF	$ 52	$ -
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		950	LF	$ 115	$ 109,300
8	Install 36" HDPE Dual Wall Storm Pipe		690	LF	$ 140	$ 96,600
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		0	EA	$ 3,500	$ -
12	Install 60" Manhole		12	EA	$ 5,000	$ 60,000
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		2	EA	$ 15,000	$ 30,000
22	UDOT Crossing (36" Bore)		1	EA	$ 500,000	$ 500,000
23	Connection to Adjacent Storm System		2	EA	$ 10,000	$ 20,000
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 910,000**
25	Contingency	15%	1	LS		$ 137,000
	Construction Total					**$ 1,047,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 126,000	$ 126,000
27	Construction Administration	8%	1	LS	$ 84,000	$ 84,000
28	Material Testing		1	LS	$ 1,000	$ 1,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		1	LS	$ 10,000	$ 10,000
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 231,000**
	TOTAL					**$ 1,280,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #16
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 102,100	$ 102,100
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		0	LF	$ 52	$ -
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		690	LF	$ 115	$ 79,400
8	Install 36" HDPE Dual Wall Storm Pipe		690	LF	$ 140	$ 96,600
9	Install 42" HDPE Dual Wall Storm Pipe		670	LF	$ 175	$ 117,300
10	Install 48" HDPE Dual Wall Storm Pipe		615	LF	$ 220	$ 135,300
11	Install 3'x3' Catch Basin		0	EA	$ 3,500	$ -
12	Install 60" Manhole		18	EA	$ 5,000	$ 90,000
13	Install 72" Manhole		3	EA	$ 6,000	$ 18,000
14	Pavement Sawing (Asphalt)		240	LF	$ 3	$ 800
15	Removal of Asphalt & Subgrade		50	SY	$ 15	$ 800
16	Install 4" Hot Plant Mix Bituminous Surfacing		50	SY	$ 35	$ 1,800
17	Install 4" UTBC		50	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		50	SY	$ 40	$ 2,000
19	Repair Gravel Road		45	SY	$ 20	$ 1,000
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		0	EA	$ 15,000	$ -
22	UDOT Crossing (48" Bore)		1	EA	$ 667,000	$ 667,000
23	Connection to Adjacent Storm System		4	EA	$ 10,000	$ 40,000
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,379,000**
25	Contingency	15%	1	LS		$ 207,000
	Construction Total					**$ 1,586,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 191,000	$ 191,000
27	Construction Administration	8%	1	LS	$ 127,000	$ 127,000
28	Material Testing		1	LS	$ 2,000	$ 2,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		1	LS	$ 10,000	$ 10,000
31	Irrigation Permitting		0	LS	$ 4,000	$ -
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 336,000**
	TOTAL					**$ 1,930,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #1 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 91,600	$ 91,600
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		14700	LF	$ 52	$ 764,400
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		72	EA	$ 3,500	$ 252,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		360	LF	$ 3	$ 1,100
15	Removal of Asphalt & Subgrade		53	SY	$ 15	$ 800
16	Install 4" Hot Plant Mix Bituminous Surfacing		54	SY	$ 35	$ 1,900
17	Install 4" UTBC		54	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		54	SY	$ 40	$ 2,200
19	Repair Gravel Road		51	SY	$ 20	$ 1,100
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,237,000**
25	Contingency	15%	1	LS		$ 186,000
	Construction Total					**$ 1,423,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 171,000	$ 171,000
27	Construction Administration	8%	1	LS	$ 114,000	$ 114,000
28	Material Testing		1	LS	$ 8,000	$ 8,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 333,000**
	TOTAL					**$ 1,760,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #2 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 85,200	$ 85,200
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		13550	LF	$ 52	$ 704,600
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		66	EA	$ 3,500	$ 231,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		360	LF	$ 3	$ 1,100
15	Removal of Asphalt & Subgrade		55	SY	$ 15	$ 900
16	Install 4" Hot Plant Mix Bituminous Surfacing		55	SY	$ 35	$ 2,000
17	Install 4" UTBC		55	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		55	SY	$ 40	$ 2,200
19	Repair Gravel Road		51	SY	$ 20	$ 1,100
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,150,000**
25	Contingency	15%	1	LS		$ 173,000
	Construction Total					**$ 1,323,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 159,000	$ 159,000
27	Construction Administration	8%	1	LS	$ 106,000	$ 106,000
28	Material Testing		1	LS	$ 7,000	$ 7,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 312,000**
	TOTAL					**$ 1,640,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #3 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 87,600	$ 87,600
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		14120	LF	$ 52	$ 734,300
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		66	EA	$ 3,500	$ 231,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		360	LF	$ 3	$ 1,100
15	Removal of Asphalt & Subgrade		55	SY	$ 15	$ 900
16	Install 4" Hot Plant Mix Bituminous Surfacing		55	SY	$ 35	$ 2,000
17	Install 4" UTBC		55	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		55	SY	$ 40	$ 2,200
19	Repair Gravel Road		51	SY	$ 20	$ 1,100
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,182,000**
25	Contingency	15%	1	LS		$ 178,000
	Construction Total					**$ 1,360,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 164,000	$ 164,000
27	Construction Administration	8%	1	LS	$ 109,000	$ 109,000
28	Material Testing		1	LS	$ 8,000	$ 8,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 321,000**
	TOTAL					**$ 1,690,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #4 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 86,100	$ 86,100
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		13770	LF	$ 52	$ 716,100
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		66	EA	$ 3,500	$ 231,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		360	LF	$ 3	$ 1,100
15	Removal of Asphalt & Subgrade		56	SY	$ 15	$ 900
16	Install 4" Hot Plant Mix Bituminous Surfacing		56	SY	$ 35	$ 2,000
17	Install 4" UTBC		56	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		56	SY	$ 40	$ 2,300
19	Repair Gravel Road		53	SY	$ 20	$ 1,100
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,162,000**
25	Contingency	15%	1	LS		$ 175,000
	Construction Total					**$ 1,337,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 161,000	$ 161,000
27	Construction Administration	8%	1	LS	$ 107,000	$ 107,000
28	Material Testing		1	LS	$ 7,000	$ 7,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 315,000**
	TOTAL					**$ 1,660,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #5 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 79,100	$ 79,100
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		12540	LF	$ 52	$ 652,100
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		60	EA	$ 3,500	$ 210,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		240	LF	$ 3	$ 800
15	Removal of Asphalt & Subgrade		36	SY	$ 15	$ 600
16	Install 4" Hot Plant Mix Bituminous Surfacing		36	SY	$ 35	$ 1,300
17	Install 4" UTBC		36	SY	$ 7	$ 300
18	Install 3" Subbase Granular Fill (3" Minus)		36	SY	$ 40	$ 1,500
19	Repair Gravel Road		34	SY	$ 20	$ 700
20	Rail Road Crossing (15" Bore)		1	EA	$ 80,000	$ 80,000
21	Canal Crossing (Open Cut)		1	EA	$ 15,000	$ 15,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,068,000**
25	Contingency	15%	1	LS		$ 161,000
	Construction Total					**$ 1,229,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 148,000	$ 148,000
27	Construction Administration	8%	1	LS	$ 99,000	$ 99,000
28	Material Testing		1	LS	$ 7,000	$ 7,000
29	Rail Road Permitting		1	LS	$ 30,000	$ 30,000
30	UDOT Permitting		0	LS	$ 10,000	$ 10,000
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 304,000**
	TOTAL					**$ 1,540,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #6 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 80,300	$ 80,300
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		13720	LF	$ 52	$ 713,500
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		66	EA	$ 3,500	$ 231,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		120	LF	$ 3	$ 400
15	Removal of Asphalt & Subgrade		18	SY	$ 15	$ 300
16	Install 4" Hot Plant Mix Bituminous Surfacing		18	SY	$ 35	$ 700
17	Install 4" UTBC		18	SY	$ 7	$ 200
18	Install 3" Subbase Granular Fill (3" Minus)		18	SY	$ 40	$ 800
19	Repair Gravel Road		17	SY	$ 20	$ 400
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		2	EA	$ 15,000	$ 30,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 1,084,000**
25	Contingency	15%	1	LS		$ 163,000
	Construction Total					**$ 1,247,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 150,000	$ 150,000
27	Construction Administration	8%	1	LS	$ 100,000	$ 100,000
28	Material Testing		1	LS	$ 7,000	$ 7,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 261,000**
	TOTAL					**$ 1,510,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #7 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 61,100	$ 61,100
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		10360	LF	$ 52	$ 538,800
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		48	EA	$ 3,500	$ 168,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		2	EA	$ 15,000	$ 30,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 824,000**
25	Contingency	15%	1	LS		$ 124,000
	Construction Total					**$ 948,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 114,000	$ 114,000
27	Construction Administration	8%	1	LS	$ 76,000	$ 76,000
28	Material Testing		1	LS	$ 6,000	$ 6,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 200,000**
	TOTAL					**$ 1,150,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #8 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 60,900	$ 60,900
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		10040	LF	$ 52	$ 522,100
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		48	EA	$ 3,500	$ 168,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		3	EA	$ 15,000	$ 45,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 822,000**
25	Contingency	15%	1	LS		$ 124,000
	Construction Total					**$ 946,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 114,000	$ 114,000
27	Construction Administration	8%	1	LS	$ 76,000	$ 76,000
28	Material Testing		1	LS	$ 6,000	$ 6,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 200,000**
	TOTAL					**$ 1,150,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #9 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 62,500	$ 62,500
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		10420	LF	$ 52	$ 541,900
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		48	EA	$ 3,500	$ 168,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		3	EA	$ 15,000	$ 45,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 844,000**
25	Contingency	15%	1	LS		$ 127,000
	Construction Total					**$ 971,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 117,000	$ 117,000
27	Construction Administration	8%	1	LS	$ 78,000	$ 78,000
28	Material Testing		1	LS	$ 6,000	$ 6,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 205,000**
	TOTAL					**$ 1,180,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #10 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 66,200	$ 66,200
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		10620	LF	$ 52	$ 552,300
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		54	EA	$ 3,500	$ 189,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		4	EA	$ 15,000	$ 60,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 894,000**
25	Contingency	15%	1	LS		$ 135,000
	Construction Total					**$ 1,029,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 124,000	$ 124,000
27	Construction Administration	8%	1	LS	$ 83,000	$ 83,000
28	Material Testing		1	LS	$ 6,000	$ 6,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 217,000**
	TOTAL					**$ 1,250,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #11 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 56,900	$ 56,900
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		9180	LF	$ 52	$ 477,400
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		42	EA	$ 3,500	$ 147,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		4	EA	$ 15,000	$ 60,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 768,000**
25	Contingency	15%	1	LS		$ 116,000
	Construction Total					**$ 884,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 107,000	$ 107,000
27	Construction Administration	8%	1	LS	$ 71,000	$ 71,000
28	Material Testing		1	LS	$ 5,000	$ 5,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 187,000**
	TOTAL					**$ 1,080,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #12 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 56,700	$ 56,700
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		8270	LF	$ 52	$ 430,100
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		42	EA	$ 3,500	$ 147,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		7	EA	$ 15,000	$ 105,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 765,000**
25	Contingency	15%	1	LS		$ 115,000
	Construction Total					**$ 880,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 106,000	$ 106,000
27	Construction Administration	8%	1	LS	$ 71,000	$ 71,000
28	Material Testing		1	LS	$ 5,000	$ 5,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 186,000**
	TOTAL					**$ 1,070,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #13 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 48,400	$ 48,400
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		6960	LF	$ 52	$ 362,000
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		36	EA	$ 3,500	$ 126,000
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		6	EA	$ 15,000	$ 90,000
22	UDOT Crossing (#" Bore)		0	EA	$ 500,000	$ -
23	Connection to Adjacent Storm System		0	EA	$ 10,000	$ -
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 653,000**
25	Contingency	15%	1	LS		$ 98,000
	Construction Total					**$ 751,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 91,000	$ 91,000
27	Construction Administration	8%	1	LS	$ 61,000	$ 61,000
28	Material Testing		1	LS	$ 4,000	$ 4,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		0	LS	$ 10,000	$ -
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		0	LS	$ 6,000	$ -
	Professional Services Total					**$ 160,000**
	TOTAL					**$ 920,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #14 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 55,900	$ 55,900
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		1740	LF	$ 52	$ 90,500
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		9	EA	$ 3,500	$ 31,500
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		2	EA	$ 15,000	$ 30,000
22	UDOT Crossing (36" Bore)		1	EA	$ 500,000	$ 500,000
23	Connection to Adjacent Storm System		2	EA	$ 10,000	$ 20,000
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 754,000**
25	Contingency	15%	1	LS		$ 114,000
	Construction Total					**$ 868,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 105,000	$ 105,000
27	Construction Administration	8%	1	LS	$ 70,000	$ 70,000
28	Material Testing		1	LS	$ 1,000	$ 1,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		1	LS	$ 10,000	$ 10,000
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 196,000**
	TOTAL					**$ 1,070,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #15 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 55,500	$ 55,500
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		1640	LF	$ 52	$ 85,300
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		9	EA	$ 3,500	$ 31,500
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		0	LF	$ 3	$ -
15	Removal of Asphalt & Subgrade		0	SY	$ 15	$ -
16	Install 4" Hot Plant Mix Bituminous Surfacing		0	SY	$ 35	$ -
17	Install 4" UTBC		0	SY	$ 7	$ -
18	Install 3" Subbase Granular Fill (3" Minus)		0	SY	$ 40	$ -
19	Repair Gravel Road		0	SY	$ 20	$ -
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		2	EA	$ 15,000	$ 30,000
22	UDOT Crossing (36" Bore)		1	EA	$ 500,000	$ 500,000
23	Connection to Adjacent Storm System		2	EA	$ 10,000	$ 20,000
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 749,000**
25	Contingency	15%	1	LS		$ 113,000
	Construction Total					**$ 862,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 104,000	$ 104,000
27	Construction Administration	8%	1	LS	$ 69,000	$ 69,000
28	Material Testing		1	LS	$ 1,000	$ 1,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		1	LS	$ 10,000	$ 10,000
31	Irrigation Permitting		1	LS	$ 4,000	$ 4,000
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 194,000**
	TOTAL					**$ 1,060,000**

SUNRISE ENGINEERING, INC.

CONSULTING ENGINEERS AND SURVEYORS

Engineer's Opinion of Costs

Project: Trunk Line #16 Developer
Southern Annexation Area
Collective Conveyance Network

Owner: Nibley City

Date: 4/1/2025

By: M.M.

ITEM NO.	ITEM		QUANTITY	UNIT	UNIT PRICE	TOTAL PROJECT AMOUNT
	Construction					
1	Mobilization	8.0%	1	LS	$ 61,100	$ 61,100
2	Traffic Control		1	LS	$ 10,000	$ 10,000
3	Subsurface Investigation		4	HR	$ 200	$ 800
4	Install 15" HDPE Dual Wall Storm Pipe		2665	LF	$ 52	$ 138,600
5	Install 18" HDPE Dual Wall Storm Pipe		0	LF	$ 65	$ -
6	Install 24" HDPE Dual Wall Storm Pipe		0	LF	$ 90	$ -
7	Install 30" HDPE Dual Wall Storm Pipe		0	LF	$ 115	$ -
8	Install 36" HDPE Dual Wall Storm Pipe		0	LF	$ 140	$ -
9	Install 42" HDPE Dual Wall Storm Pipe		0	LF	$ 175	$ -
10	Install 48" HDPE Dual Wall Storm Pipe		0	LF	$ 220	$ -
11	Install 3'x3' Catch Basin		15	EA	$ 3,500	$ 52,500
12	Install 60" Manhole		0	EA	$ 5,000	$ -
13	Install 72" Manhole		0	EA	$ 6,000	$ -
14	Pavement Sawing (Asphalt)		240	LF	$ 3	$ 800
15	Removal of Asphalt & Subgrade		50	SY	$ 15	$ 800
16	Install 4" Hot Plant Mix Bituminous Surfacing		50	SY	$ 35	$ 1,800
17	Install 4" UTBC		50	SY	$ 7	$ 400
18	Install 3" Subbase Granular Fill (3" Minus)		50	SY	$ 40	$ 2,000
19	Repair Gravel Road		45	SY	$ 20	$ 1,000
20	Rail Road Crossing (#" Bore)		0	EA	$ 80,000	$ -
21	Canal Crossing (Open Cut)		0	EA	$ 15,000	$ -
22	UDOT Crossing (48" Bore)		1	EA	$ 500,000	$ 500,000
23	Connection to Adjacent Storm System		4	EA	$ 10,000	$ 40,000
24	Install Discharge Structure		1	LS	$ 15,000	$ 15,000
	Construction Subtotal					**$ 825,000**
25	Contingency	15%	1	LS		$ 124,000
	Construction Total					**$ 949,000**
	Professional Services & Project Incidentals					
26	Engineering	12%	1	LS	$ 114,000	$ 114,000
27	Construction Administration	8%	1	LS	$ 76,000	$ 76,000
28	Material Testing		1	LS	$ 2,000	$ 2,000
29	Rail Road Permitting		0	LS	$ 30,000	$ -
30	UDOT Permitting		1	LS	$ 10,000	$ 10,000
31	Irrigation Permitting		0	LS	$ 4,000	$ -
32	Army Corp Permitting		1	LS	$ 6,000	$ 6,000
	Professional Services Total					**$ 208,000**
	TOTAL					**$ 1,160,000**

Agenda Item #8

Description	**Discussion and Consideration:** Ordinance 26-01: Adoption of the Nibley City General Plan (Second Reading)
Presenter	Justin Maughan, City Manager
Staff Recommendation	Approval of Ordinance 26-01: Adoption of the Nibley City General Plan
Planning Commission Recommendation	Approval of Ordinance 26-01: Adoption of the Nibley City General Plan
Reviewed By	Larry Jacobsen, Mayor Justin Maughan, City Manager Tom Dickinson, City Engineer Levi Roberts, City Planner General Plan Steering Committee Planning Commission

New Background for 19 Feb 2026:

In our last meeting, the Council considered dividing the draft plan into sections and creating a workplan to consider each section. The Council asked Larry (Mayor) to propose such a workplan. After reviewing the draft, Larry suggests focusing on the sections that might require the least amount of effort first. Towards that goal, that means putting off the Land Use and Housing sections until later and considering the Introduction, Public Engagement, Transportation, Parks Recreation and Open Space, Public Facilities, Water Conservation and Preservation, and Economic Development first, and in that order. While this is a rather long list for this meeting, some of these sections are driven by recently adopted plans, and discussion could go rather quickly. If we start down this list and don't get to the end during this meeting, we can pick it up where we left off in the next meeting.

In our last meeting, Larry mentioned a potential replacement for Nibley's Mission Statement currently shown on page 6. At the Council's request, Larry proposes the following for consideration. A motion to amend the current version of the Plan is required for this to be discussed by the Council.

We will efficiently provide services that Nibley residents cannot easily provide for themselves, we will equitably find the balance between individual property rights and the rights of our community, and we will help our citizens be proud to live in Nibley.

After reading the Economic Development section, and if we get to this point in this meeting, the Council might consider this paragraph as an introduction to that section.

This section on economic development focuses on the financial impact to Nibley citizens, specifically as an opportunity to broaden and diversify Nibley's tax base. In addition, economic development can strengthen a community in ways that go beyond dollars and cents. Commercial centers with shops and restaurants can bring neighbors together and create a shared sense of place. A vibrant town center can preserve and promote Nibley's identity and boost community pride. Developing employment opportunities within Nibley can limit traffic congestion and promote active transportation by decreasing travel distances between home and work. Many of the community benefits considered in other sections of this plan are enhanced by the economic development discussed here.

While we might not get to the Housing section in this meeting, the Council might consider the following as an introduction to that section.

This plan considers how we will grow housing opportunities in the coming years. An equally important question, and one that was discussed while writing this plan, is if Nibley should grow by increasing housing opportunities. As shown by the citizen outreach, many of us value our small-town heritage and wish for the Nibley that we were either born in or moved to. Because we value the Nibley of today, we resist changing the Nibley of tomorrow, even if our moving here changed the Nibley of yesterday.

Utah and Cache County are in the middle of a housing crisis, and lack of affordable housing puts home ownership beyond reach for many of our children and grandchildren. Should our community help solve that housing crisis? If not, then who will? Each year, the State Legislature shows an increased willingness to make land-use decisions that were previously reserved for local municipalities. Most of us could not afford the houses we currently own if we had to re-purchase them at today's prices. That seems to imply that maintaining the status quo cannot solve the housing problem.

This plan tries to balance individual property rights with the rights of our community. We desire open space, including agricultural fields. However, it is a struggle to buy that open space outright or to buy the development rights of that open space. Cache County and the State of Utah embrace a "right to farm". If a farmer decides to stop farming or a farmer's heirs don't want to farm, does that family have the "right not to farm" and sell their land?

Changes are difficult. It can be even more difficult if we ignore it and allow somebody else to shape that change. Nibley has already been impacted by development on our northern border by a neighboring city. The same possibility exists on our southern border.

For these reasons, this plan admits to the inevitable pressure for growth. It attempts to honor and preserve our heritage while managing change to create a Nibley we can continue to be proud of.

Councilmembers are encouraged to bring their thoughts, opinions, enthusiasm for discussion, and other proposed changes.

Background:

The City has been working with Wall Consultant Group (WCG) throughout the course of 2025 to update the General Plan. The General Plan was last updated in 2016. UCA 10-20-401 requires that all municipalities prepare and adopt a "comprehensive, long-range general plan for present and future needs of the municipality growth and development of all or any part of the land within the municipality." The General Plan provides guidance for the implementation and coordination of land use, transportation, housing, parks and open space, water resources and municipal services. The process has been informed by extensive public engagement to formulate the community's vision and a thorough analysis of existing and needed community resources to improve quality of life as the community grows. The Plan provides actionable strategies to guide the City's formulation of its ordinances, zoning and capital projects.

A project steering committee provided direction on the process and development of the plan throughout its inception and was made up of the following individuals:

Larry Jacobsen, Mayor
Nathan Laursen, City Council
Garrett Mansell, City Council
Nick Kenzcka, Planning Commission
Clair Schenk, Planning Commission
Justin Maughan, City Manager
Tom Dickinson, City Engineer
Levi Roberts, City Planner

The proposed General Plan includes the following elements:

- **Introduction** which provides the City's Mission Statements, History, Projected Growth, the community's values and general vision.
- **Public Engagement** summary, including findings from a community survey, the USU Wellbeing survey, stakeholder interviews, a growth scenarios workshop, future land use open house.
- **Land Use** element, which describes the principles and direction for the City's future land use pattern, a description of land use designations, an update the Future Land Use Map and recommended implementation items.
- **Transportation** element, which provides policy direction for the City's transportation system to support the updated Land Use element, including recommended implementation items.

- **Housing** element, which provides an updated analysis on the City's housing needs, a Moderate-Income Housing Element, including direction on updated strategies.
- **Parks, Recreation & Open Space** element**,** which supports the recently adopted Parks, Recreation & Open Space Master Plan and provides additional direction for park access and distribution and implementation items.
- **Public Facilities** element which refers to ongoing master planning efforts of the City's public facilities, including water, sewer, stormwater, natural gas, electric power, police, fire and first responders.
- **Water Conservation & Preservation** element that analyses the City's water supply needs, provides an analysis about how the City's land use plans will impact water needs and provides recommendations for reducing water demand for future development. This element is required by State statute for communities that are greater than 10,000 in population. Although Nibley has not reached this threshold, this was included in the scope of work so that this requirement would be met if/when we grow to 10,000 population.
- **Economic Development** element**,** which provides an analysis of the City's current and projected market conditions, supportable zoning framework, a SWOT (strengths, weaknesses, opportunities and threats) analysis, and recommended implementation items.

ORDINANCE 26-01

ADOPTION OF THE NIBLEY CITY GENERAL PLAN

WHEREAS, Utah Code 10-20-401 requires all municipalities in the State of Utah to adopt a comprehensive, long-range general plan for present and future needs of the municipality and growth and development of all or any part of the land within the municipality.

WHEREAS, the General Plan sets forth Nibley City's vision, community-wide goals, while acting as a decision-making guide for development and a framework for more specific planning.

NOW, THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF NIBLEY CITY, STATE OF UTAH, AS FOLLOWS:

1. That the attached Nibley City General Plan is adopted by the Nibley City Council. This document, including the Future Land Use Map, stands as an update to the previously adopted General Plan.

Dated this ____ day of _____ 2026

_____
Larry Jacobsen, Mayor

ATTEST

_____
Cheryl Bodily, City Recorder

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NIBLEY

GENERAL PLAN UPDATE
NIBLEY FORWARD
LIVE WORK PLAY

Nibley City
GENERAL PLAN

December 2025





photo | gallowayus.com

LRB PUBLIC FINANCE ADVISORS
LEWIS | ROBERTSON | BURNINGHAM

WCG
WALL CONSULTANT GROUP

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ACKNOWLEDGMENTS

Special Thanks

Special thanks go to all community members who attended General Plan meetings and events, completed surveys, and shared their feedback throughout the planning process. Your involvement helped shape the future vision for Nibley.

Planning Commission

Nick Kenczka
Clair Schenk
Bret Swenson
Tyler Obray
Troy Ribao
Karina Brown

Mayor & City Council

Larry Jacobsen, Mayor
Erin Mann
Garrett Mansell
Kay Sweeten
Nathan Laursen
Norm Larsen

City Staff

Justin Maughan, City Manager
Levi Roberts, City Planner
Tom Dickinson, City Engineer

Bear River Association of Governments (BRAG)

Shawn Milne

Other Key Stakeholders

Russ Holley (Logan City)
Skarlett Bankhead (Providence City)
Katie Haslam, Jordy Guth (Utah State University)
Aaron Robertson, Blaine Hamblin (Heritage Land Development)
Dan Larsen (Kartchner Homes)
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I. INTRODUCTION

> "Nibley is a great place to live! We moved here over 30 years ago when it was quiet, peaceful, and farm ground."
>
> — General Plan Survey Response

I. INTRODUCTION

Nibley is located at the southern end of Cache Valley and is bordered by Logan to the north, Hyrum to the south and Millville to the east. Nibley has become one of the fastest-growing cities in the region, having increased from a population of 5,438 in 2010 to approximately 9,000 in 2025, an estimated 65% increase.

The rapid growth Nibley is experiencing calls for a renewed examination of current conditions, community values, and a reaffirmed or revised direction for the future of the City. This General Plan serves as a guiding framework to help the City respond thoughtfully to change by identifying what residents value most while finding opportunities to adapt and plan for a sustainable, connected, and vibrant future. The Nibley City General Plan was last updated in 2016.

Nibley City History

Nibley was incorporated in 1935, driven by community concerns over future water supply. Originally part of the Millville Ward, the area west of the Blacksmith Fork River became Nibley Ward in 1920 and a separate political precinct in 1925, named after early Church of Jesus Christ of Latter-day Saints leader and settler Charles Wilson Nibley. When federal funding for water improvements was denied to private companies, residents voted to incorporate in order to qualify. Nibley's favorable conditions for agriculture, proximity to job centers, businesses, and Utah State University in Logan and Highway 89 have attracted growth and development.

Why Plan?

Planning helps Nibley grow in a way that makes sense for the community. With more people moving in and new development happening, it's important to have a clear vision for how the city should change over time. The General Plan guides decisions about where homes, parks, roads, and businesses should go, and how to keep Nibley a safe, connected, and welcoming place to live. It also helps protect the things residents care about—like open space, mountain views, and a strong sense of community—while making room for the future.

THE **GENERAL PLAN IS**:

- ✓ A Statement of Vision
- ✓ A Set of Community-Wide Goals
- ✓ A Decision-Making Guide for Development
- ✓ A Framework for More Specific Planning

THE **GENERAL PLAN IS NOT**:

- ✗ A Zoning Ordinance
- ✗ A Rigid/Static Document
- ✗ A City Budget
- ✗ A Parcel-Specific Policy Statement

City Mission Statement

The mission of Nibley City is to make life better for its citizens by fostering community cooperation so residents, businesses, and government work together to develop the City in harmony with its natural environment, historical surroundings, and in accordance with the values and vision of the community as set forth in the General Plan. The City will provide fiscally sound municipal services for a safe, attractive, creative, and viable community.

Nibley's Values and Vision

The General Plan process included extensive public involvement through interviews, surveys, and three public events to gather input on community needs, values, and vision. A Steering Committee, the City Council, and Planning and Zoning Commission also played key roles in shaping the process. The 2024-2025 Nibley City Budget outlines a recent effort to identify core values and formulate goals surrounding city issues.

> Nibley values fiscally sound municipal services for a safe, attractive, creative and viable community.

Land Use/ Growth - Nibley will be a healthy and sustainable place, where protecting and highlighting natural assets, such as the view of the Wellsville Mountains, the Blacksmith Fork River, key wildlife corridors and open spaces are prioritized. Nibley provides places that create a strong sense of community and a high standard of living for residents that respects and preserves the City's heritage and property values.

Residential Development and Housing - While retaining the character and form of established neighborhoods, residential development in Nibley will prioritize the inclusion of open space and incorporate a variety of housing forms. Future growth will balance the rights of property owners to develop with the community's desire to maintain the overall character and identity of the city.[1]

Commercial and Economic Development - Nibley's commercial development will be ~~compact~~ and economically sustainable, focused in identified centers, balanced with residential growth, and will promote the area's character and charm.

Transportation and Mobility - Nibley supports an efficient circulation system that will allow traffic flow on major streets and create a safe atmosphere that encourages pedestrians and bicyclists. Trails are a critical part of the transportation system.

Parks, Trails, and Open Space - Nibley will have a park system interconnected by trails, community facilities, and cultural features, which are connected to neighboring systems and communities.

Utilities and Municipal Services - Nibley will continue to strategically plan and implement improvements to utilities and public infrastructure to ensure necessary facilities and services are provided to the community and occur in advance of significant growth. Nibley will pursue opportunities to develop information infrastructure to support technology business development.

Previous Plans

This General Plan updates the 2016 Nibley City General Plan, and incorporates data, analyses and recommendations from previous planning efforts relevant to this general plan update. Exceptions to this general statement are noted in the text, but the intent of this General Plan is to update information and consolidate and reconcile the visions statements, goals and policies of all the City's planning efforts to date.

These previous plans can be found on the Nibley City website, and include:

- Moderate Income Housing Annual Report - 2024
- Active Transportation Plan - 2024
- Parks, Recreation, and Open Space Master Plan - 2024
- Moderate Income Housing Plan - 2023
- Future Land Use Map - 2022
- Street Master Plan - 2021
- Sewer Master Plan - 2021
- Water Master Plan - 2020
- Transportation Master Plan - 2019
- Emergency Operations Plan - 2018
- Stormwater Master Plan - 2015
- Economic Development Strategic Plan - 2013



[1] The values and vision for the residential development and housing section was updated as a part of this general plan update.

Population Growth

Population growth estimates for Nibley were developed using a combination of historic and forecasted data from multiple sources. Historic growth trends were derived from U.S. Census data and local building permit records to establish a baseline of how the city has grown over time. Future projections were then informed by county-level demographic forecasts and the Utah Unified Transportation Plan (informed by the Cache MPO), which provides regionally coordinated population and employment projections. Each of these sources was evaluated for consistency with Nibley's updated Future Land Use Map, recent development patterns, and remaining land capacity. Through this process, a set of population projections was developed for the future planning year 2050 that reflects both the community's historic growth and the realistic potential for future development within the city's future land use plan. It is important to note that Nibley retains significant greenfield areas within its annexation boundary, where a single large development could generate population growth at a rate higher than projected.

TABLE 1: HISTORIC AND FUTURE POPULATION PROJECTIONS

Year	1990	2000	2010	2020	2025	2030	2040	2050
Population	1,220	2,111	5,564	7,168	9,000	10,300	13,600	17,600

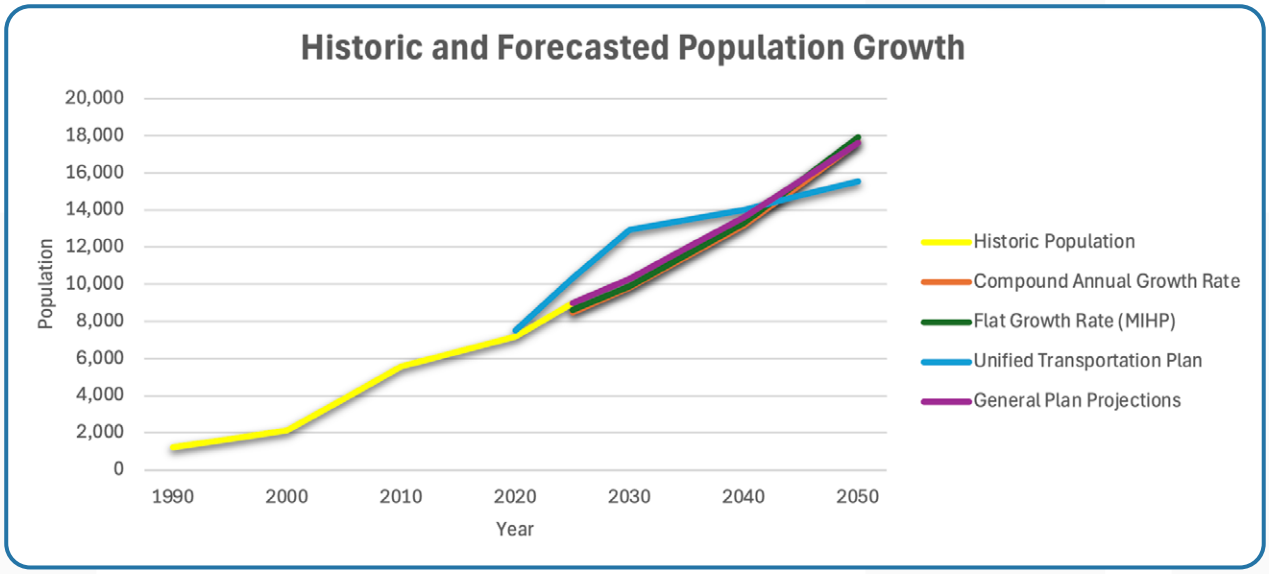


FIGURE 1: Historic and Future Population Projections



II. PUBLIC ENGAGEMENT

> **I love living in Nibley! Open minded growth and continued community involvement are keys for me.**
>
> — General Plan Survey Response

II. PUBLIC ENGAGEMENT

Introduction

The General Plan process was shaped by extensive public input gathered through one-on-one interviews, a city-wide survey, interactive online website, a growth scenarios community workshop and booth at Nibley Heritage Days, and a future land use open house.

Interactive Website

An interactive website was launched to inform the public about the project and gather community input. It featured educational content, a survey, and an open comment map where residents could share feedback on topics such as housing, economic development, open space, transportation, infrastructure, and a potential town center. Between May 1st and October 31st the site attracted over 500 visits and helped generate comments and survey responses.

Survey

Over 440 residents participated in the Nibley General Plan community survey, providing clear and actionable feedback to guide the city's long-term vision and policy direction. The responses represent a strong cross-section of the community, with 98% of respondents living in Nibley, 9% working locally, and 3% owning a business in the city. The following is a summary of survey results, the complete survey results can be found in **Appendix C.**

Top Priorities for Nibley's Future

Residents expressed a clear consensus on what matters most for Nibley's future. The top five priorities ranked were:

1. Preserving the small-town feel
2. Managing growth and development
3. Expanding parks, open space, and recreation opportunities
4. Improving roads and traffic flow
5. Supporting local businesses and economic growth

These results highlight a shared community desire to balance growth with preservation, ensuring that Nibley continues to feel like home while enhancing quality of life through open space, recreation, and thoughtful development.

When asked to rank Nibley's future priorities (1 = most important, 5 = least important), residents clearly emphasized outdoor recreation and preservation of agricultural roots and heritage:

- **#1 Trails, Parks & Recreation** – Average score **2.02**; ranked first by **36%**
- **#2 Agricultural Roots & Heritage** – Average score **2.23**; ranked first by **38%**
- **Lower priorities:** Economic Growth & Local Business **(3.12)** and Housing & Affordability **(3.39)**

Overall, feedback highlights a strong desire to maintain Nibley's small-town feel and outdoor-oriented identity.



Growth Vision

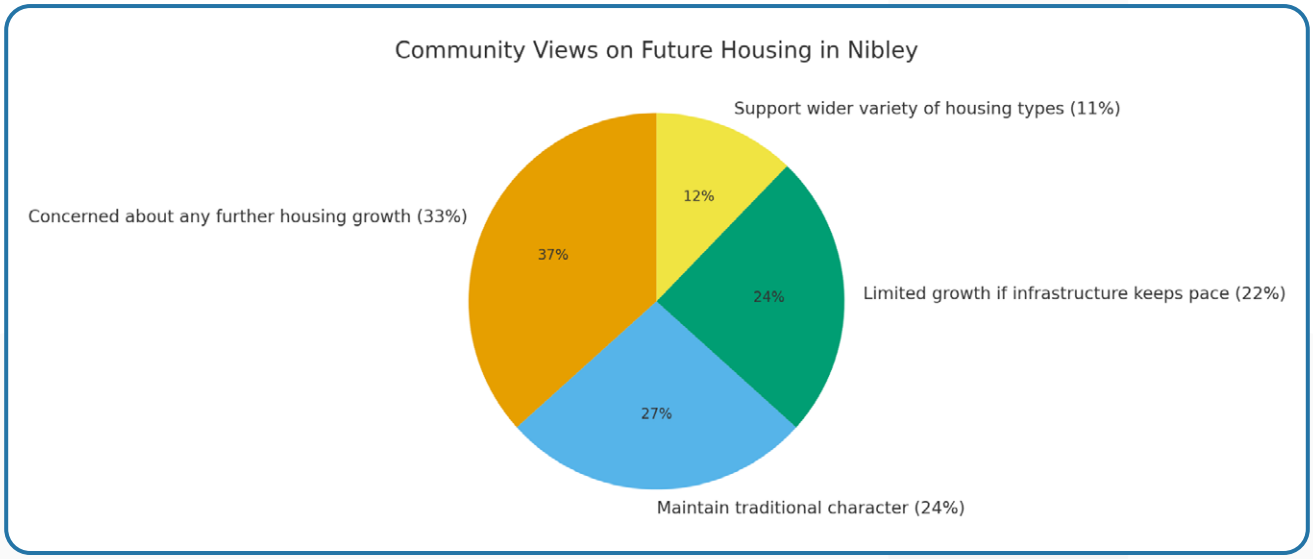
When asked about their preferred approach to future growth:

- The top-rated preference was "Low Growth" (average score: 2.06 of 5), emphasizing limits on new development to preserve Nibley's existing character.
- The next most supported vision was "Growth through Connected and Active Neighborhoods" (average score: 2.14 of 5), suggesting residents favor walkable, community-centered growth that integrates parks, trails, and local gathering spaces.

Together, these findings reflect a strong preference for measured, intentional growth that complements existing neighborhoods and supports active and connected communities.

Housing Perspectives

Housing affordability and growth management emerged as major themes. When asked which of the following statements best reflects your view on future housing in Nibley, residents responded as follows:



Survey results show that residents value preserving Nibley's traditional, owner occupied character while considering limited, well-planned efforts to improve housing affordability. The community values quality over quantity in housing, preferring development that aligns with infrastructure capacity and the city's established character while still offering flexibility for future needs.

Economic Development

When asked which of the following approaches to economic development do you most support for our community, **61% of respondents selected "a balanced approach that allows for some commercial development while preserving key aspects of the community's rural character."**



Which of the following approaches to economic development do you most support for our community?

Maintain rural character without pursuing significant development, by increasing taxes if needed to fund services and infrastructure.	89 (20.27%)
Pursue more commercial development to broaden the tax base, with the goal of potentially lowering property taxes over time.	54 (12.3%)
A balanced approach that allows for some commercial development while preserving key aspects of the community's rural character.	271 (61.73%)
None of the above / Unsure	25 (5.69%)

Economic development preferences highlight a strong community desire for amenities that enhance quality of life while maintaining Nibley's small-town feel. Overall residents expressed strong support for recreation, dining, and retail options that serve the local community but limited enthusiasm for large-scale or industrial development.

Town Center

The planned town center would serve as a community hub for local commerce, gatherings, and seasonal activities. Residents showed strong support for creating a town center centered around small, locally grown businesses with 59% strongly supporting or supporting this concept and 10% of residents opposing or strongly opposing the concept.

Residents envision the town center as an active, family-friendly space with their most desired activities:

- 78% want farmers markets
- 75% want kids and family activities
- 74% support holiday or seasonal festivities
- 51% favor outdoor concerts or movies and food truck nights
- 42% support art fairs or craft markets
- 41% would like fitness or wellness events such as yoga in the park

While residents welcome community activity, they are more cautious about higher-density housing near the town center. The concept of adding townhomes or apartments was strongly opposed or opposed by 49% of residents while 23% support or strongly support the idea.

Overall, residents strongly favor a vibrant, locally focused town center with community events but are cautious about introducing higher-density housing nearby.



Open Space

Community feedback shows mixed opinions on what types of open space should be prioritized in Nibley. When asked which types of open space should be prioritized in Nibley (1 = most important, 5 = least important), residents responded as follows:

- Agricultural preservation ranked as the highest priority (average 2.70), with 26% of respondents selecting it as their top choice.
- Undisturbed natural areas and conservation lands followed closely (average 2.91, 22% ranked #1).
- Developed recreation areas such as playgrounds, parks, and sports fields were also valued (average 2.95, 21% ranked #1)
- Trial corridors for walking and biking (average 3.07) and scenic open lands and view corridors (average 3.38) ranked lower but still showed consistent community interest.

While agricultural preservation received the highest average ranking and scenic open lands or view corridors were ranked lower, the results suggest there is a desire for a diversity of open spaces.



Transportation & Mobility

Transportation feedback reinforces the need for infrastructure investment and connectivity:

- Pedestrian and bike safety was cited by 22% of respondents as the top concern.
- Traffic congestion (16%) and road maintenance (14%) followed closely.
- Public transit options were mentioned less frequently but present a future opportunity.

Residents want Nibley to remain safe, accessible, and family-friendly, with clear interest in improving traffic flow, walkability, and trail connections across the city.

Key Takeaways for the General Plan

- **Growth Strategy:** Residents want development that protects the City's character while supporting connected, walkable neighborhoods.
- **Parks and Recreation:** Trails, parks, and outdoor recreation remain top community priorities, reflecting a shared love of Nibley's natural setting and outdoor-oriented identity.
- **Housing:** Focus on preserving Nibley's charm while planning for targeted, infrastructure-supported housing diversity.
- **Economic Development:** Support for a balanced, locally focused approach by encouraging small businesses, local dining, and retail that serve residents without sacrificing city character.
- **Open Space:** Indicated a desire for diverse, balanced open space that protects the city character and enhances access to nature.
- **Transportation:** Address pedestrian safety, traffic flow, and connectivity through targeted design and infrastructure improvements.

Stakeholder Interviews

Several key Nibley stakeholders were individually interviewed from April 2025 through October 2025. Individuals with a variety of backgrounds were selected, ranging from developers and residents, to community leaders and City officials including:

- Shawn Milne (BRAG)
- Russ Holley (Logan City)
- Skarlett Bankhead (Providence City)
- Katie Haslam, Jordy Guth (Utah State University)
- Aaron Robertson, Blaine Hamblin (Heritage Land Development)
- Dan Larsen (Kartchner Homes)
- Travis Taylor (Westates)

Interviews with local stakeholders, developers, and city representatives revealed broad agreement on the need for Nibley to define a clearer long-term vision for growth, land use, and community character. Participants emphasized the importance of moving from reactive to proactive planning - particularly through well-defined zoning, density expectations, and design guidelines to reduce uncertainty in the development process. Many expressed support for diverse housing options, including higher-density and smaller-lot developments, to improve affordability and meet the needs of younger residents.

There was consensus that future growth should balance residential, commercial, and employment uses, with intentionally planned nodes of mixed-use and commercial activity to strengthen Nibley's economic base and reduce reliance on neighboring cities. Stakeholders also encouraged the City to pursue strategic economic development through targeted recruitment, branding, and coordination with regional partners.

Nibley Forward Growth Scenarios Workshop

A growth scenarios public workshop was held the evening of June 17th, 2025 from 6:00pm to 8:00pm at the Nibley City Offices. A booth was also set up at Nibley Heritage Days Saturday, June 21st to gather additional public participation and input. The purpose of the workshop was to engage community members in shaping Nibley's future by exploring a range of potential growth scenarios: Growth As-Is, Compact / Centered Growth, Low Intensity Growth, and Connected and Active Communities. Through a combination of presentation, discussion, and visual preference exercises, participants were invited to consider how different approaches to growth could affect housing, transportation, open space, and the overall character of the city. The workshop aimed to gather feedback on community values, priorities, and preferences to inform the development of the city's General Plan and ensure future decisions reflect the needs and aspirations of residents. The workshop had approximately 15-20 attendees including facilitators and the Heritage Days booth had about 30 residents engage in the exercise. Results from the exercise are shown below, and indicate a desire for connected and active communities and compact / centered growth with some preferring low intensity growth.

The information presented for each of these growth scenarios can be found in **Appendix A**.

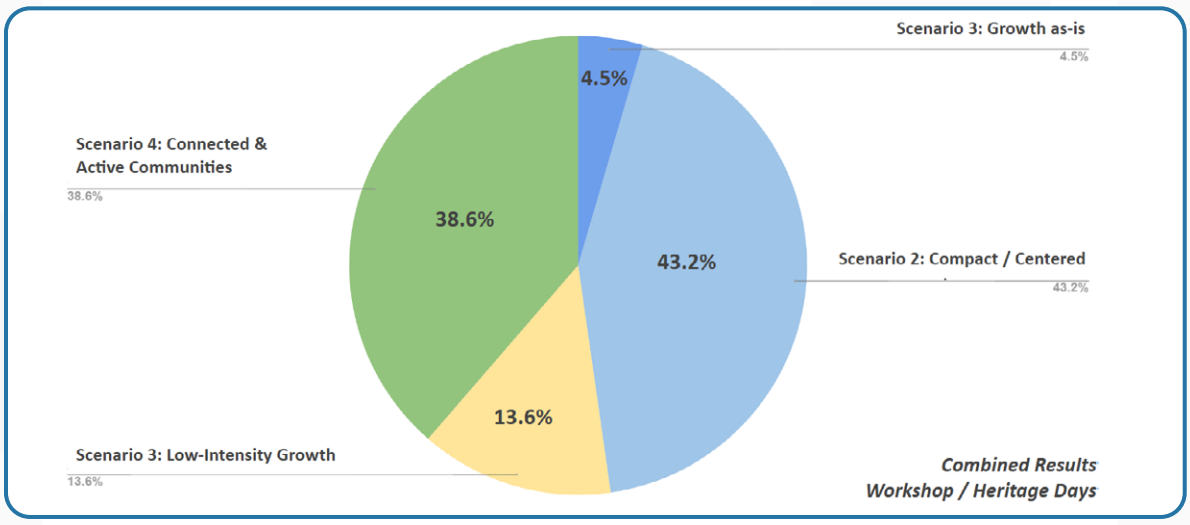


FIGURE 2: Growth Scenarios Exercise Results

Additional key takeaways from the exercise include:

- Support for increased housing density in targeted areas to preserve open spaces in other parts of the city
- Desire to maintain intergenerational opportunities, allowing families to stay and grow in Nibley
- Interest in the preservation of farmland in the southern part of town
- Desire for a balanced dispersion of parks and passive recreation areas integrated into neighborhoods
- Desire for neighborhood commercial nodes at key intersections (e.g. 3200 S. & Main , US-89 & 2600 S.)
- Support for “third places” like small cafes and gathering spots
- Interest in a “multi-nodal” approach - not just one commercial core
- Desire for a balance of preservation and development - protect agriculture land on edges while accommodating future targeted residential and commercial growth
- Support for a connected network of multi-use paths - e.g. 640 West
- Interest in safer bike infrastructure along major roads
- Desire for improved pedestrian and bike connectivity across railroad and highways







Future Land Use Open House

On November 13, 2025, the City hosted a Future Land Use Map Open House to share information about the General Plan update and present the future land use map. During the event, staff presented an overview of the planning process, key data findings, and a summary of public involvement efforts completed to date. Attendees had the opportunity to review and provide feedback on the draft Future Land Use Map, ask questions about proposed land use categories, and offer additional comments through an online comment application. The event was well-attended with approximately 40 residents from the community. A wide variety of concerns and opinions were expressed. Some were concerned with the impacts of additional growth, including traffic and retaining community identity. Others expressed the need to provide a variety of housing options to a diverse, growing community. Some expressed the need to focus on good design to create an attractive town center with increased commercial opportunities.

2024 Nibley Wellbeing Survey

The 2024 Utah Wellbeing Survey provides meaningful insight into how Nibley residents perceive their quality of life, the strengths of their community, and the issues that most affect their wellbeing. Conducted in partnership with Utah State University, the survey gathered responses from 319 residents (about seven percent of Nibley's adult population) offering a snapshot of local sentiment and priorities.

Overall, Nibley residents report a high level of personal wellbeing, with most rating their quality of life as "good" or "excellent." Family life, safety, and living standards emerged as the city's greatest strengths, reflecting the family-oriented and secure environment that continues to draw residents to Nibley. Physical health scored somewhat lower in satisfaction, suggesting a need for continued investment in recreation opportunities, access to open spaces, and community health resources.

Resident participation in local life is relatively high. Most citizens reported walking or biking in their neighborhoods, gardening at home, visiting parks, or attending community events. This level of engagement underscores the importance of maintaining accessible public spaces, recreational amenities, and walkable infrastructure that support active lifestyles and social connection.

The survey reveals growing concerns about the pace of development and its effects on community character and resources. A large majority of respondents (over 80 percent) believe Nibley is growing too quickly. Commonly cited issues include loss of open space, traffic, public safety, and water supply. These issues directly inform the city's land use, transportation, and infrastructure planning strategies.



What Respondents Value Most in Nibley



III. LAND USE

> A big concern for Nibley and our state is having attainable housing for our children to live in. If we don't address this issue then Utah and Nibley will not have vibrant thriving communities with people in all stages of life.
>
> — General Plan Survey Response

III. LAND USE

Introduction & Background

As Nibley prepares for a future that could see its population double in the coming decades, decisions about how and where to grow will shape everything from housing opportunities and economic development to infrastructure investments and the careful management of open space.

This section provides a framework for managing future land use decisions within the city in a way that reflects the Nibley community's values and ensures that infrastructure and city services can keep pace. It is informed by community input, an understanding of existing conditions, and projected needs looking towards the future. The land use framework in this section offers guidance for future zoning, annexation, and development review decisions in a fashion that steers the city closer to its established vision.

Nibley's land use pattern today reflects its history as a settlement surrounded by farmland and early industry. Over time, development has transitioned toward a more suburban form, with newer subdivisions emerging alongside traditional agricultural parcels and undeveloped land. Today, the city faces the challenge - and opportunity - of guiding this change in a manner that preserves Nibley's small-town identity while accommodating current demands for housing, jobs, parks, and increased mobility options.

In the following sections, you will find:

- A snapshot of existing land use and development patterns
- Key trends and issues that were documented throughout the General Plan Update process
- A Future Land Use Map illustrating the desired long-term development pattern
- Land use categories and descriptions to guide decisions

Best Practices

- Direct growth to areas with existing or planned infrastructure to reduce costs and ensure long-term serviceability
- Focus higher-intensity and mixed-use developments near key corridors and future nodes, such as along US-89, Highway 165 and potential town center areas
- Integrate parks, trails, and greenways within all areas of the city, providing recreational amenities within walking distance of homes
- Plan for logical future annexation areas, ensuring consistent development standards and thoughtful integration into the city
- Preserve existing parks and open spaces by encouraging compact development forms and clustering where appropriate

Principles

Throughout the public engagement process, several key themes and ideas emerged. Feedback from the growth scenarios workshop found the following:

- Support for increased housing density in targeted areas to preserve open spaces and the look and feel of other parts of the city
- Desire to maintain intergenerational opportunities, allowing families to stay and grow in Nibley
- Interest in the preservation of farmland in the southern part of town
- Desire for a balanced dispersion of parks and passive recreation areas integrated into neighborhoods
- Desire for neighborhood commercial nodes at key intersections (e.g. 3200 S. & Main , US-89 & 2600 S.)
- Support for "third places" like small cafes and gathering spots
- Interest in a "multi-nodal" approach - not just one neighborhood commercial core
- Desire for a balance of preservation and development - protect desirable open spaces while accommodating future targeted residential and commercial growth
- Support for a connected network of multi-use paths - e.g. 640 West
- Interest in safer bike infrastructure along major roads
- Desire for improved pedestrian and bike connectivity across railroad and highways

Element

The general land use vision from residents was to guide future growth in an intentional and connected manner. Some in the community expressed concern about the pace and intensity of new development - particularly high-density housing - and emphasized the importance of maintaining some of the cherished open spaces and preserving a strong system of parks and trails. Many acknowledged the inevitability of growth and the overwhelming sentiment was that affordability and a family-supportive environment that Nibley has historically provided is key to preserve in the future.

Residents supported the idea of neighborhood-scaled commercial areas and a modest town center that could house local businesses, gathering spaces, and community amenities—so long as it is thoughtfully planned for and doesn't drastically alter Nibley's existing character. Several comments pointed to a desire for a well balanced dispersion of park access across the city and a focus on bike and pedestrian safety as future development occurs. Taken together, these perspectives point to a land use approach that prioritizes smart growth that respects the character of existing neighborhoods, accommodates affordability - particularly for young families, and is aligned with Nibley's capacity for growth.

Future Land Use Definitions

Civic / Institutional

This designation identifies areas used for schools, government facilities, churches, libraries, and other public institutions that provide essential services, education, cultural opportunities, or community gathering spaces. These uses play a vital role in supporting the social, educational, and civic life of the community. While not typically intended for private commercial activity, civic and institutional areas are important anchors within neighborhoods and the city as a whole, often serving as community landmarks and centers of activity.

Related Zoning: Park/School (P/S)

Commercial

This designation identifies areas for community-wide retail, services, dining, and office uses that meet the needs of residents, employees, and visitors. These areas tend to be larger community destinations and attract customers from a broader area. These areas are mostly located along US-89 and State Highway 165, providing destinations that support community life and complement nearby residential and employment districts.

Related Zoning: Commercial (C)

Neighborhood Commercial

This designation supports small-scale commercial areas that serve the daily needs of surrounding neighborhoods. Typical uses include cafés, small shops, personal services, offices, and other neighborhood-supportive businesses, designed to be compatible in scale with adjacent residential areas. Flexibility is provided for incorporating residential uses, either in a horizontal format (on adjacent sites) or vertical format (above ground-floor commercial). These areas are intended to support community destinations and gathering places that provide convenient access to goods and services in neighborhoods.

Related Zoning: Neighborhood Commercial (CN)

Employment

This land use is intended to plan for employment-supportive commercial uses such as professional offices, corporate campuses, research and development, and flex/light industrial spaces. Areas depicted on the map as Employment areas are oriented toward sustaining and attracting businesses that bring long-term economic benefits to the community.

Related Zoning: Commercial (C), Neighborhood Commercial (C-N), Industrial (I)

Industrial

This land use provides suitable areas that will accommodate the need for manufacturing and industrial-related goods and services.

Related Zoning: Industrial (I)

Open Space

This land use enables the city to preserve natural open spaces and other lands that are conserved for agricultural use only. This designation also provides for the protection of wetlands and other environmentally sensitive areas where development is limited,unfeasible, or prohibited. Several of these open space areas may be suitable for recreation uses such as trails and trailheads.

Related Zoning: Agriculture (A), TDR, Floodplain Overlay zone

Parks

This designation encompasses the community's system of parks, recreational facilities, and key trail corridors. It includes everything from small neighborhood parks and playgrounds to large community and regional parks that host sports fields, gathering spaces, and natural areas. Parks and recreation areas provide opportunities for play, fitness, and social connection, while also contributing to the community's identity. While the Park/School zone is generally provided for many of these uses, several uses, including churches and schools are allowed and integrated in neighborhoods across the City and may not be specifically noted on the Future Land Use Map.

Related Zoning: Park/School (P/S)

Detached Residential

This designation accommodates a variety of single-family housing types with a range of lot sizes, generally ¾ acre or smaller. Detached residential units do not share walls with neighboring homes, offering more private living environments and maintaining neighborhood character.

Related Zoning: Residential (R-2), (R-2A), Residential Planned Unit Development Overlay Zone (R-PUD)

Attached Residential

This designation accommodates a variety of housing types where units share at least one common wall, such as duplexes, townhomes, condominiums, and apartments. Attached residential areas provide opportunities for a broader range of household types and income levels, supporting both housing affordability and neighborhood diversity. These developments are often located near commercial centers or community centers to promote high access to daily needs.

Related Zoning: Residential -Mixed (R-M), Residential Planned Unit Development Overlay Zone (R-PUD)

Mixed Residential

This designation accommodates a blend of detached and attached housing types within the same neighborhood. Mixed residential areas are intended to provide greater housing variety, affordability, and choice while maintaining a cohesive community character. Typical housing types may include single-family homes on lot sizes ½ acre or smaller, duplexes, townhomes,, and low- to medium-density multifamily buildings.

Related Zoning: Residential (R-2A), Residential -Mixed (R-M), Residential Planned Unit Development Overlay Zone (R-PUD)

Detached Residential - Large Lot

This designation applies to areas with single-family homes on lot sizes generally larger than ¾ acre. Large-lot residential areas provide a lower-density living environment, often characterized by more open space, larger yards, and a semi-rural or estate-like character.

Related Zoning: : Rural Estate (R-E), Residential (R-1), (R-1A)

Mixed-Use (Commercial, Neighborhood Commercial and Employment)

The mixed-use designation is intended to allow for a well-integrated mix of residential and commercial and employment development with the primary use being the underlying land use shown on the Future Land Use Map. This land use category aims to enhance residential access to small goods and services and cultivate community gathering places at key neighborhood nodes.

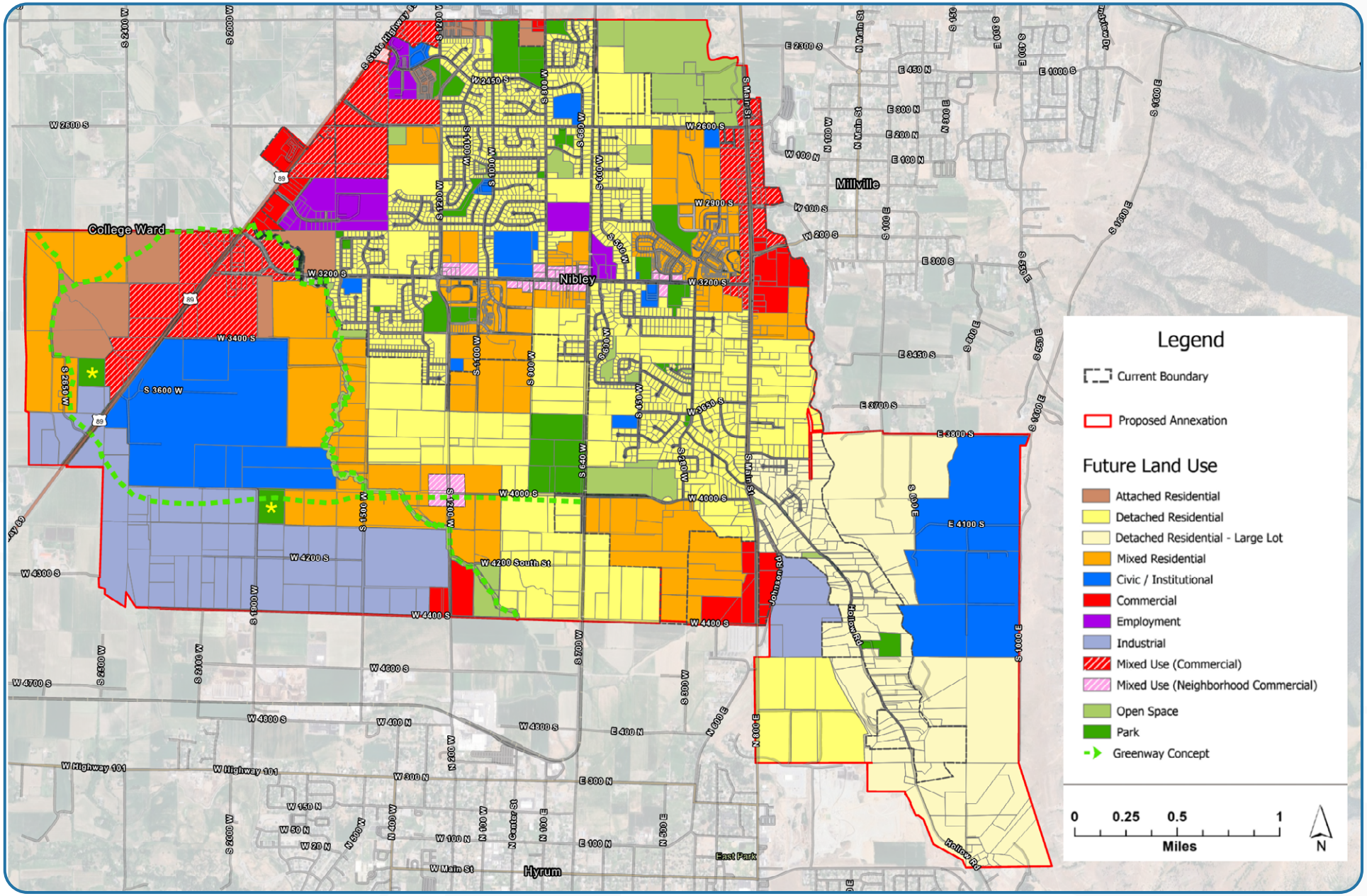
Related Zoning: Mixed Residential (R-M), Residential Planned Unit Development Overlay Zone (R-PUD), Commercial (C), Neighborhood Commercial (C-N)

Future Land Use Map

The land uses depicted on the Future Land Use Map reflect the general development type envisioned for different areas of the city and suggest a corresponding zoning designation that fits within Nibley's zoning ordinance. These land use categories are intended for planning reference and do not grant property owners an automatic right to rezone their property to any of the associated zones that fit with the land uses shown on the map. Any rezoning must first be reviewed and approved by the Planning Commission and City Council.

City Boundary Adjustments

The area east of 2800 West and south of 2200 South to the existing Nibley City border is identified as a potential expansion of the city's current annexation declaration. This particular area has strong economic potential as it is situated along US-89/91 and contains crucial economic development nodes at the intersections of 2600 South and 3200 South / 2000 West, the latter of which will serve as a regional arterial roadway. This area can further be supported by future residential development that supports the city's moderate income housing goals. Nibley is well positioned to efficiently serve this area's future development potential with its utility network, making it a key aspect of the future land use vision.



* This is an approximate location for a future park and is subject to change.

FIGURE 3: Nibley City Future Land Use Map

Implementation

The following steps should be taken upon approval of the Nibley City General Plan Update:

1. **Adjust Zoning as indicated on the Future Land Use Map**
    a. Several locations on the map have been identified that would ~~modify~~ the existing zoning of the land. These changes may occur in the near term or as new development or redevelopment takes place. Areas where zoning intensity is increased may help the City meet specific State requirements related to moderate-income housing.

2. **Update City Zoning Code to accommodate the proposed mixed use overlay areas shown on the Future Land Use Map**
    a. Several mixed use commercial and neighborhood commercial overlay areas were created on the future land use map. These areas should be added to the City Zoning Code and Zoning Map following approval of the General Plan Update to clearly define the intent, allowable uses, and desired form of mixed use developments.
    b. The zoning provisions shall require a meaningful mix of commercial and residential uses—ensuring that commercial components are constructed as part of the initial phases of development. A requirement to include commercial uses as a part of a development proposal may be guaranteed through development agreements and clearly defined phasing plans.

3. **Update City zoning code to accommodate open space designated areas shown on the Future Land Use Map that don't fit in the agricultural zone or floodplain overlay zone**
    a. Several open space areas are shown on the future land use map that do not function as an agricultural use. These areas should be added to the City Zoning Ordinance and Map following approval of the General Plan Update to reflect the long-term intended use either as a natural open space or for resource conservation.
    b. ~~Explore opportunities to expand~~ the City's open space preservation tools ~~beyond~~ the existing Open Space Subdivision provision. Consider expanding density bonus programs to incentivize developers to conserve priority open space areas—such as natural features and trail corridors —in exchange for increased development potential on the remainder of the property.

4. **Encourage a wider range of residential uses, specifically in attached residential and mixed-use designated areas to accommodate future population growth**
    a. Update the City's zoning code to establish a framework with clearly defined residential land use categories that align with the community's vision, market realities, and evolving household needs. This framework should encourage innovative and desirable residential development types.
    b. Product types to consider providing an updating definition and intent for may include townhomes, duplexes, cottage courts, accessory dwelling units (ADUs) on smaller lots, condos and apartments in mixed-use areas. Aspects to consider include a reevaluation of the existing minimum and maximum densities for each zone, building height, lot size/ coverage, setback requirements, building form and design, parking requirements, and transitions/ adjacent land use compatibility.

5. **Encourage the establishment of a "Nibley Gateway" at 3200 South as the "heart of the community"**
    a. Integrated with the future town center, emphasize the creation of additional gathering places for residents, practical neighborhood services in a small business environment, and a pedestrian/bicycle friendly streetscape.
    b. Consider completing a Small Area Plan for the 3200 South / US-89 node that defines a cohesive vision for land use, transportation access, design elements, infrastructure requirements, and funding strategies. This effort should proactively explore strategies to attract and support commercial investment, coordinate transportation improvements, and establish urban design standards that create a distinctive, high-quality gateway experience for Nibley residents and visitors.

6. **Pursue increased commercial development along major thoroughfares and key nodes in the city**
    a. Encourage regional and community-serving commercial development along highway corridors US-89 and US-165 where visibility and traffic volumes support uses such as retail, dining, employment, and hospitality.
    b. Coordinate with UDOT to identify access management improvements, intersection enhancements, and gateway treatments that balance traffic flow with commercial viability.
    c. Explore potential targeted incentives for development projects that will deliver desired uses like retail, dining, employment, or hospitality services

7. **Encourage more convenient access to goods and services for residents citywide.**
    a. Support the creation of small scale, neighborhood-serving commercial nodes along 3200 South and 4000 South that provide convenient daily services and local gathering spaces within walking or biking distance of nearby neighborhoods.

8. **Revise the Nibley City boundary**
    a. Update the city's annexation declaration to include land to the northwest of the current city boundary (east of 2800 West and south of 2200 South to the existing Nibley City border). Including the northwest expansion area within the City's annexation declaration positions the city to accommodate future economic development. The area's visibility and direct access to US-89 make it ideal for highway-adjacent commercial, employment, and residential uses to support, capturing sales-tax leakage and diversifying the tax base.



IV. TRANSPORTATION

> **Continued growth in Nibley requires substantial upgrading of the infrastructure (roads, sewers, water, etc). Improvements to the transportation grid and increasing public transportation opportunities are essential.**
>
> — General Plan Survey Response

IV. TRANSPORTATION

Introduction & Background

Nibley is surrounded by several regional transportation corridors, including US-89/91 to the west and SR-165 to the east. These corridors serve as key connections between Nibley and employment, education, and other services in the greater Cache Valley area. As Nibley continues to experience growth, the City faces the challenge of developing a safe and efficient transportation network that enhances livability. This transportation element supports Nibley's vision by identifying strategies to maintain and improve a multimodal transportation network that meets the needs of current and future residents, with a focus on safety, connectivity, and quality of life by:

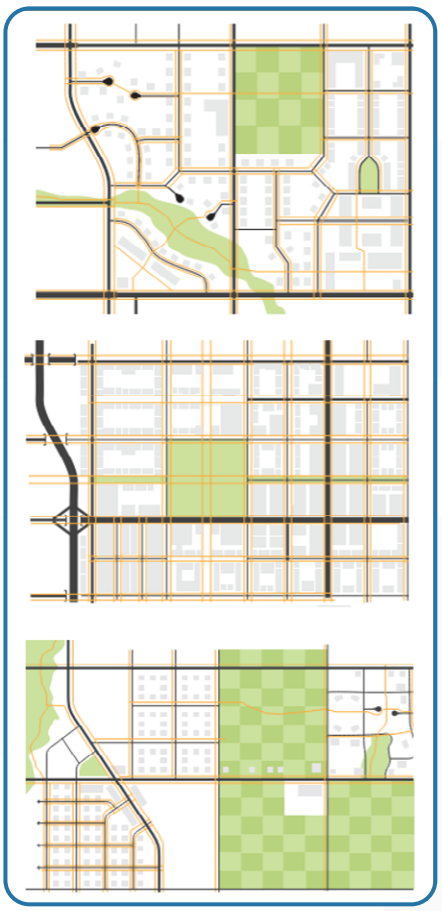
- Improving mobility and accessibility by ensuring all users can travel safely and efficiently, with equitable access to a connected transportation network.
- Promoting multimodal transportation through the development of infrastructure that supports walking, biking, and transit.
- Improving transportation safety by reducing traffic-related injuries and fatalities through safer street designs.
- Supporting economic vitality by improving access to jobs, goods movement, industrial areas, and business districts through an efficient transportation system.

Best Practices

Connectivity

A roadway system with excellent connectivity allows people multiple options when traveling between points within a City. Strong collector and arterial road connectivity distributes traffic between corridors, and a well-connected local street network allows short-trips to be completed on local roadways rather than relying on regional collectors and arterials. A connected road network improves access and reduces travel times for all users and can reduce the need for future roadway widening. Good network connectivity also improves emergency access and response times, and allows multiple exit routes in the event of emergencies.

It is recommended that the use of cul-de-sacs be minimized where possible and that infill projects connect to all possible stub roads. Disconnected streets, which oftentimes include cul-de-sacs and dead ends, are a major factor in increasing auto dependency and traffic on collectors and arterials.



Traffic Calming

The 2019 Nibley Transportation Master Plan states that "Nibley City's policy is to utilize traffic calming as its default method of addressing compliance with posted speed limits and desired driver behavior. In design, engineers will design roadways with this as their guiding principle". Traffic calming includes features added to the design of a street to improve safety and livability of the neighborhood by reducing speeds and cut-through traffic. These features usually directly reduce speed through physical changes in the alignment of the road that require or encourage a vehicle to slow down, visual features causing drivers to voluntarily slow down, or completely blocking access to a street from a certain direction. Major categories include:

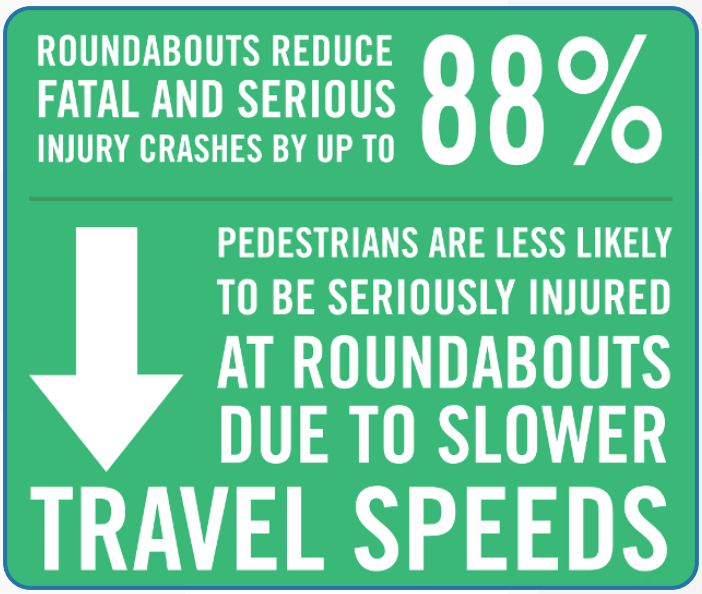
- Horizontal and Vertical Deflection: Examples included lateral shifts, medians and roundabouts
- Narrowing: Examples include bulb-outs and medians
- Restricting Access

Several potential traffic calming measures were reviewed by city staff and the following measures were determined to be feasible for use in Nibley City. Additional detail for each measure is included in the 2019 Nibley Transportation Master Plan:

- Bulb-outs (Curb extensions)
- Mid-block Pedestrian Crossing
- Lateral Shifts
- Roundabouts

Roundabouts

At unsignalized intersections expected to perform poorly, the City should consider roundabouts as a preferred solution over installing traffic signals. According to the Federal Highway Administration (FHWA), numerous international studies show that roundabouts significantly improve overall safety. In particular, single-lane roundabouts are safer than two-way stop-controlled intersections, with fewer crashes and less severe injuries.



UDOT Safety Countermeasure Fact Sheets (February 2021)

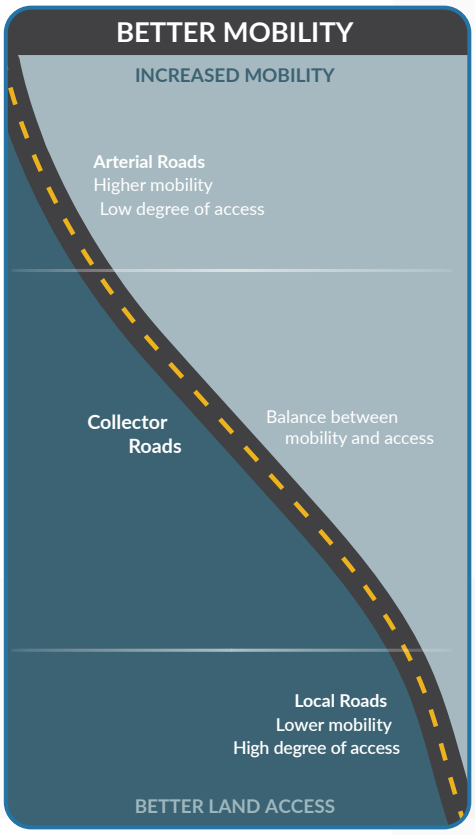
Roundabouts excel in areas where traffic is evenly dispersed in all directions due to their design, which promotes a continuous flow of vehicles without the need for traffic signals or stop signs. When traffic is evenly distributed, vehicles can enter and exit the roundabout smoothly, minimizing congestion and delays. However, if one direction experiences significantly higher traffic volume than the others, it can overwhelm the roundabout, disrupting the flow and causing congestion. This occurs because vehicles from the high-traffic direction need more time to enter and exit the roundabout, leading to longer queues and delays for other directions. As a result, the efficiency of the roundabout diminishes, and traffic may come to a standstill, resulting in failure.

Mini-roundabouts AKA traffic circles are a type of roundabout characterized by a small diameter and traversable islands (central island and splitter islands). Mini-roundabouts offer most of the benefits of regular roundabouts with the added benefit of a smaller footprint. As with roundabouts, mini-roundabouts are a type of intersection rather than merely a traffic calming measure, although they may produce some traffic calming effects. They are best suited to environments where speeds are already low and environmental constraints would preclude the use of a larger roundabout with a raised central island.

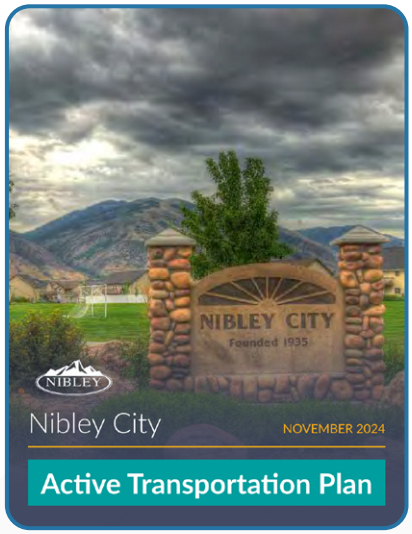
Element

Street Master Plan

The roadway functional classification system has a hierarchy based on roadway attributes such as speed and access. The higher a street classification, the more mobility it provides with limited access. Lower street classifications have less mobility, but more access. The functional classification of a roadway indicates the road's function within the transportation system, which in turn helps determine when increased travel demand or change in the road's use could lead to negative impacts on its intended function in terms of speed, capacity, and relationship to existing and future land use (FHWA, 2013).



The Nibley Street Master Plan, last updated on March 25, 2021, identifies the city's existing and future functional street classifications as well as existing and proposed intersection controls, providing a framework for coordinated roadway improvements and long-term transportation planning. Opportunities exist to improve upon the existing Master Street Plan future roadway networks to improve connectivity by designing a well-spaced grid system, with arterial streets spaced approximately 0.5 to 1 mile apart and collector streets spaced 0.25 to 0.5 miles apart, in accordance with ITE guidelines. This approach promotes efficient traffic distribution, multiple route options, and enhanced access for all users.



Active Transportation

Active transportation includes any way people move under human power, including walking, running, riding a bicycle or scooter, or using a wheelchair. Research from the National Association of Realtors shows that an increasing number of Americans would like to live in walkable and bikeable communities, and that there is a positive correlation between those who perceive their community as walkable and increased satisfaction with one's quality of life.

Adopted in 2024, Nibley's first Active Transportation Plan establishes a vision for a safe, connected, and convenient network for walking and cycling throughout the community. Building on the city's Parks, Trails, Recreation and Open Space Master Plan and the bicycle and pedestrian elements of the Transportation Master Plan, this plan outlines strategies to enhance safety, accessibility, and connectivity for all users. It emphasizes safe routes linking neighborhoods with schools, parks, and key destinations, promotes a culture of walking and biking, and guides future development toward a more integrated and sustainable transportation network.

Transit

Public transit provides shared transportation options that connect residents to key destinations without relying on private vehicles. In Nibley, transit service is provided by Connect Transit, which currently operates Route 11, a fixed-route service running between Nibley and Logan every 60 minutes during weekdays and Saturdays, with no service on Sundays. In addition, Route 12 offers 30 minute service along Main St, which connects Hyrum the Logan Transit Center via Nibley. The figure illustrates proposed future transit expansions identified by the Cache MPO, including three additional transit lines—two of which remain unfunded—as well as the introduction of microtransit service that will provide flexible, on-demand transit access to portions of the city.

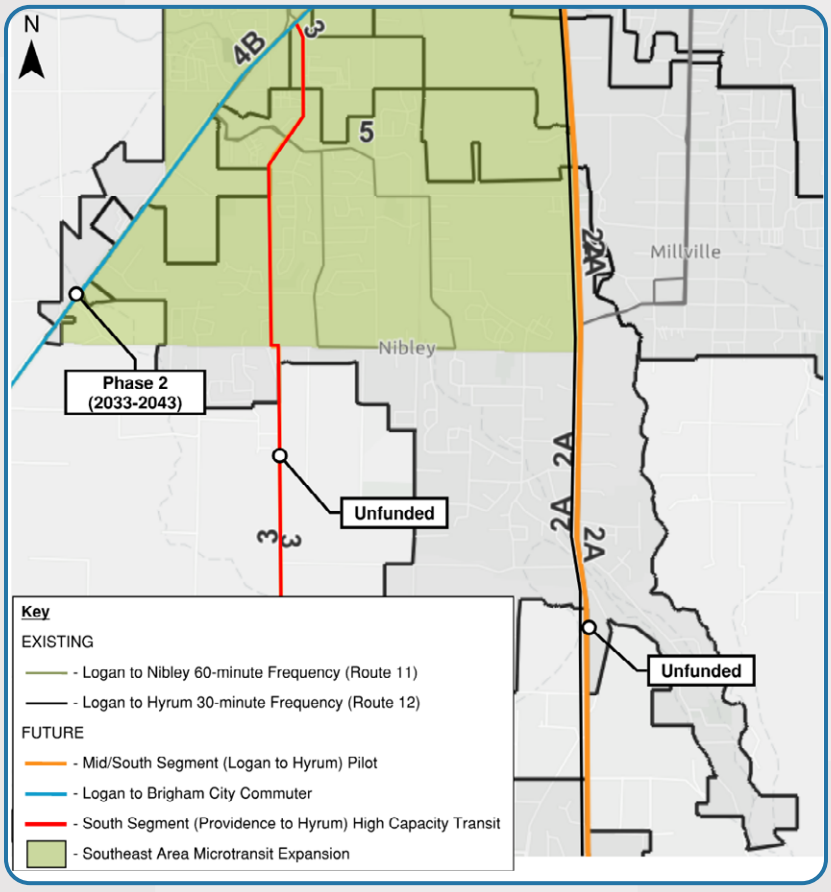


FIGURE 4: Nibley City Existing and Future Transit

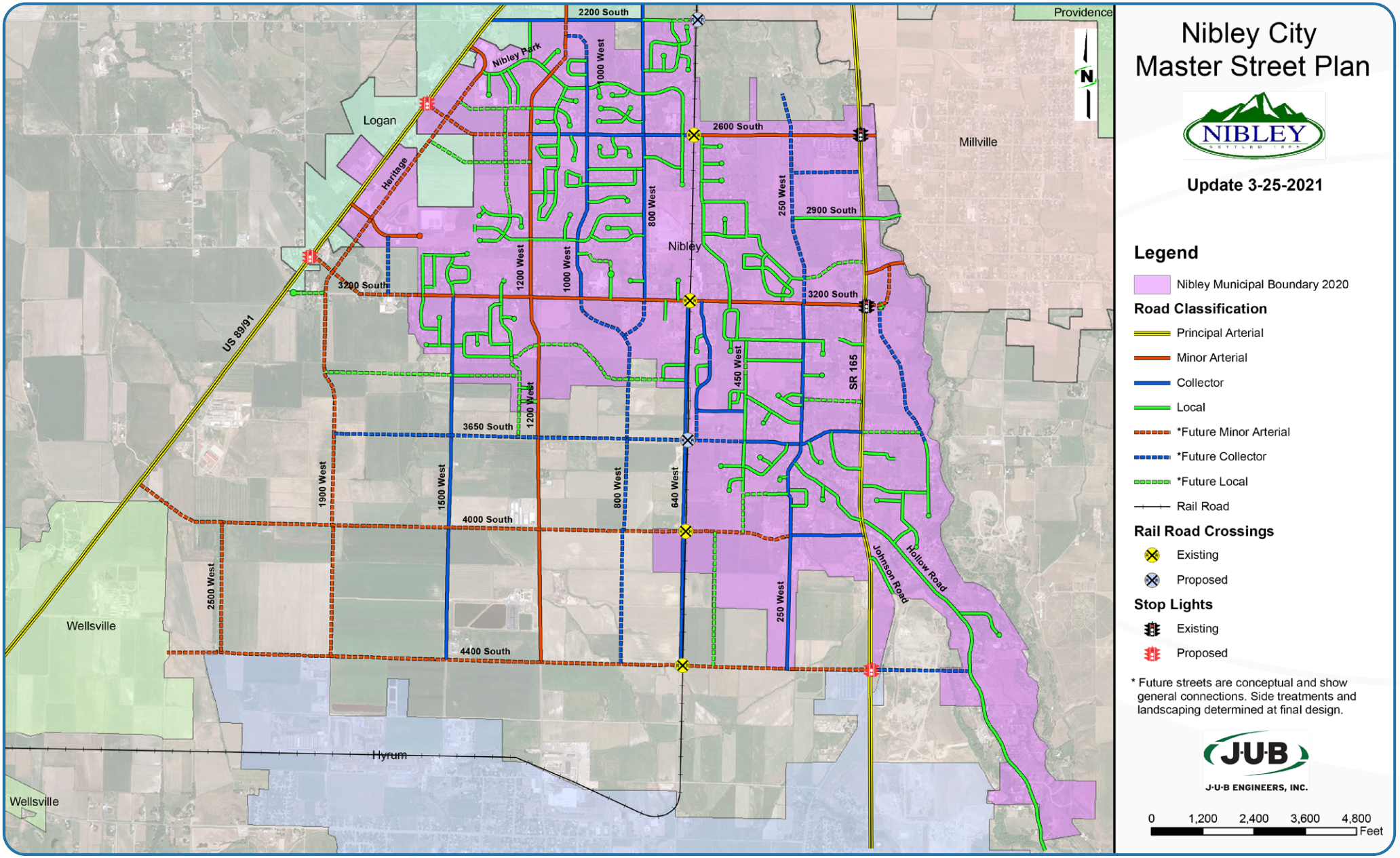


FIGURE 5: Nibley City Street Master Plan

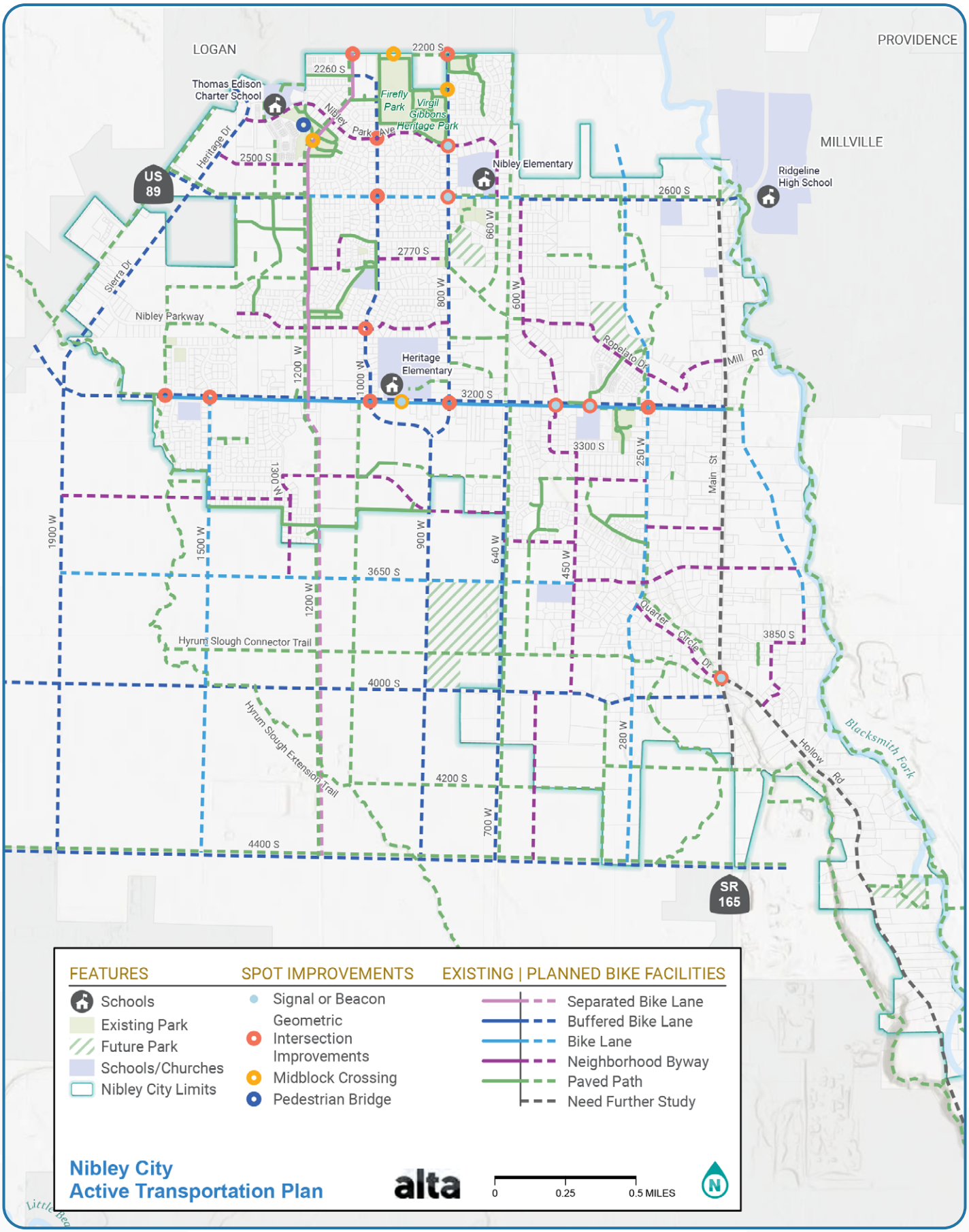


FIGURE 6: Nibley City Active Transportation Plan

Traffic Circulation and Senate Bill 195

Senate Bill 195 requires that cities in MPO boundaries update their general plan transportation and traffic circulation element to identify priority connections to remedy physical transportation circulation impediments (including canals) to significant destinations (schools, employment centers, etc.) and to determine the cost estimate, potential funding sources, and impediments to constructing the connections. Significant physical transportation impediments in Nibley include US-89/91, SR-165, the union pacific rail line, the Hyrum Slough canal, and the Blacksmith Fork River. Possible projects to remedy these physical transportation impediments are listed in the table below. As there aren't many impediments to vehicular transport, the solutions suggested in this plan emphasize active transportation impediments.

TABLE 2: TRAFFIC CIRCULATION SENATE BILL 195

Project Location	Improvement Description	Physical Impediment	Significant Destination	Cost Estimate, Potential Funding	Impediments to Construction
2600 South & SR-165	Undermast Lighting, Leading Pedestrian Interval	SR-165	Ridgeline High School	~$5k, UDOT Safe Routes to School	Coordination with UDOT
Union Pacific Rail Line Crossings	Pedestrian Crossing Improvements (Improved Signing)	Rail Line	Various	$10k - $25k, UPRR / FRA Section 130 Railway-Highway Crossings program	Cost, Coordination with Union Pacific
Blacksmith Fork River	Active Transportation Crossings	Blacksmith Fork	Various	$750k - $2.0M , UDOT Active Transportation Fund or CMAQ	Cost, Coordination with UDOT, Environmentally Sensitive Area
3200 South / 2000 West & US-89/91 Hyrum Slough	Pedestrian Underpass	US-89/91	Future Employment / Commercial Center	$5.0M – $10.0M, UDOT Active Transportation Fund or CMAQ	Cost, Implementation, Coordination with UDOT
4000 South & US-89/91	Above / Below Grade Crossing	US-89/91	Future Employment / Commercial Center	$5.0M – $10.0M, UDOT Active Transportation Fund or CMAQ	Cost, Implementation, Coordination with UDOT

$ = <20k dollars, $$ = 20k to 1 million dollars, $$$ = > 1 million dollars

Nibley supports an efficient circulation system that will allow traffic flow on major streets and create a safe atmosphere that encourages pedestrians and bicyclists.



Implementation

The following implementation items help translate Nibley City's transportation goals into specific, actionable steps by focusing on improving safety, connectivity, and multimodal access.

Transportation Policy

1. Adopt a Zero Fatalities policy as the City's guiding principle for roadway planning and design, prioritizing roadway safety in all designs.
2. Require the installation of curb extensions (bulb-outs) at all local street intersections to enhance pedestrian safety and reduce vehicle speeds.
3. Encourage or require new residential subdivisions to incorporate alley-loaded lot designs, where garages and service access are located off alleys rather than the street, to reduce driveway interruptions, enhance pedestrian safety, and create more walkable, connected streetscapes.

Street Connectivity

1. Update the City's Transportation Master Plan to include clear connectivity standards for new developments. Require developments to align streets with adjacent parcels, provide pedestrian and bicycle connections, and ensure new local streets integrate with the City's long-term roadway grid.
2. Plan future roadway networks to improve connectivity by designing a well-spaced grid system, with arterial streets spaced approximately 0.5 to 1 mile apart and collector streets spaced 0.25 to 0.5 miles apart that supports the future land use plan.
3. Encourage grid-like or modified-grid street layouts in new developments to enhance connectivity and reduce pressure on major corridors.
4. Minimize the use of cul-de-sacs and ensure infill projects connect to existing stub streets whenever possible.
5. Require new subdivisions to provide multiple access points for emergency and neighborhood circulation.
6. Address major physical barriers such as US-89/91, SR-165, the Union Pacific Rail Line, the Blacksmith Fork River, and the Hyrum Slough through targeted crossing improvements as listed in **Table 2** above and according to Senate Bill 195.

Street Master Plan

1. Regularly update the functional classification map to reflect built conditions, planned developments, and Cache MPO projects.
2. Use roundabouts or mini-roundabouts as the preferred intersection control at unsignalized intersections expected to experience safety or delay concerns, especially where traffic volumes are balanced among approaches.

Active Transportation and Transit

1. Incorporate pedestrian and bicycle facilities into all new roadway and development projects in coordination with the 2024 Active Transportation Plan.
2. Work with Connect Transit to improve pedestrian access and amenities near existing and future transit stops, including sidewalks, crossings, shelters, and lighting, including recommended projects of the CVTD First and Last Mile Study.
3. Support continued partnership with Connect Transit to maintain and expand route service and future microtransit (Pool) service in areas of the community that are under-served by fixed-route service.

V. HOUSING

> I don't see myself being able to afford a home in Nibley soon, but I love the character, family feel, and spacing that Nibley provides.
>
> — General Plan Survey Response

Demographics Analysis

Historic Population

The US Census Bureau ACS Population Estimates report Nibley City has experienced an average annual growth rate ("AAGR") in population of 3.03 percent from 2010 through 2020. This growth is higher than Cache County's growth at 1.69 percent and higher than the State of Utah's at 1.7 percent. Nibley's growth represents about 9.2 percent of the total growth within Cache County. The table below shows a comparison of neighboring communities.

TABLE 3: COMPARISON CITY HISTORIC POPULATION & AAGR

	ACS															DEC		
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	10 YR. AAGR	2021	2022	2023	2010	2020	10 YR. AAGR
Hyrum	7,284	7,435	7,579	7,663	7,751	7,820	7,866	7,926	8,065	8,224	8415	1.45%	9,330	9,680	10,022	7,609	9,362	2.09%
Logan	46,408	47,275	47,970	48,565	48,933	49,400	49,539	49,957	50,478	50,863	51,266	1.00%	52,420	53,246	53,923	48,174	52,778	0.92%
Millville	1,475	1,495	1,756	2,014	1,888	2,080	2,014	1,912	1,911	2,054	1,895	2.54%	1,844	1,827	1,820	1,829	2,326	2.43%
Nibley	4,763	5,064	5,392	5,641	5,866	6,060	6,256	6,438	6,655	6,819	6,993	3.92%	7,160	7,373	7,651	5,438	7,328	3.03%
North Logan	7,765	7,994	8,248	8,635	9,007	9,380	9,820	10,140	10,457	10,711	10,978	3.52%	10,705	10,981	11,228	8,269	10,986	2.88%
Providence	6,502	6,773	6,941	7,009	7,026	7,043	7,122	7,173	7,300	7,407	7,732	1.75%	8,199	8,418	8,675	7,075	8,218	1.51%
Smithfield	8,957	9,209	9,508	9,879	10,233	10,413	10,629	10,832	11,102	11,373	11,670	2.68%	13,263	13,658	14,033	9,495	13,571	3.64%
Wellsville	3,265	3,342	3,409	3,453	3,557	3,593	3,612	3,641	3,698	3,757	3,847	1.65%	4,036	4,078	4,120	3,432	4,060	1.69%
Cache	107,078	109,752	112,095	114,181	115,954	117,449	118,824	120,288	122,336	124,165	126,336	1.67%	131,703	134,428	137,031	112,656	133,154	1.69%
Utah	2,657,236	2,715,379	2,766,233	2,813,673	2,858,111	2,903,379	2,948,427	2,993,941	3,045,350	3,096,848	3,151,239	1.72%	3,231,370	3,283,809	3,331,187	2,763,885	3,271,616	1.70%

Source: US Census Bureau, 2010 and 2020 Census Redistricting Data (PL 94-171)
US Census Bureau, American Community Survey 5-Year Estimates (DP05)
US Census Bureau, Population Estimates Program (PEP)

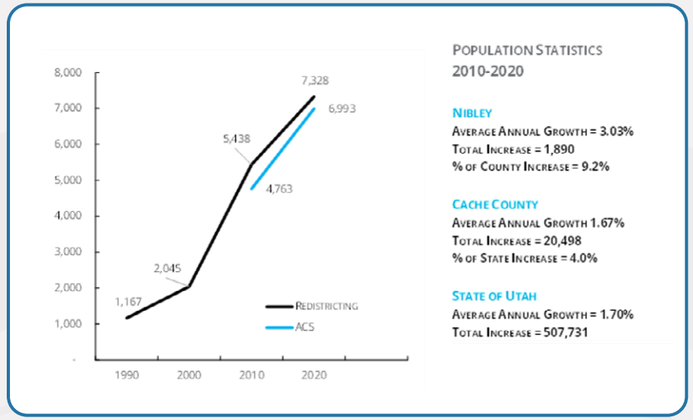


FIGURE 7: Nibley City Historic Population Growth

Based on the historic Census Bureau AAGR, the 2025 population estimate is 8,779. An analysis of the Traffic Area Zone data compiled by the Wasatch Front Regional Council results in a 2025 population estimate of 10,308. The TAZ projections start higher than the Census and Master Plan estimate, however the AAGR utilized in the Census and Master Plan data is notably higher than the TAZ AAGR. In 2030, the population estimates from the Census Bureau and the TAZ data diverge by 2,728 residents as shown in **Table 4**.

The City's population is projected to continue to increase through 2050, reaching approximately 17,600 people per Master Plan estimates. The population in Cache County will continue to grow with the increase in population largely occurring at and around the areas that are already more developed.

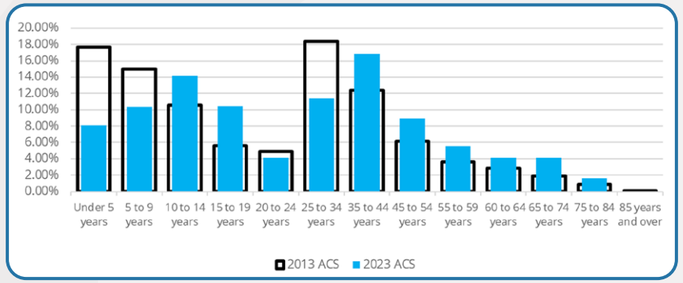


FIGURE 8: Age Distribution

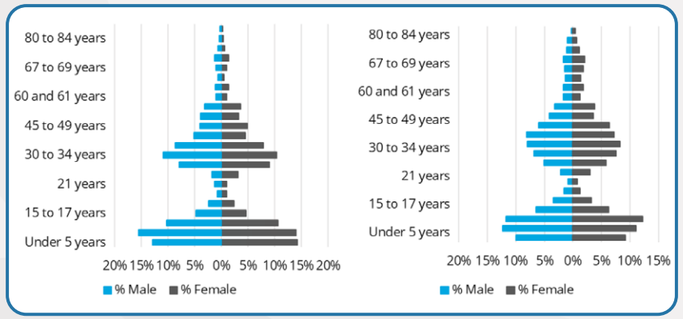


FIGURE 9: Age Distribution by Sex (2020 Left, 2010 Right)

Age

Between 2013 and 2023, the City's population has aged, with age concentrations shifting from younger groups (0–9 and 25–34) to older cohorts (10–19 and 35+). The City now has a slightly older median age than the County but remains younger than the state overall.

TABLE 4: POPULATION PROJECTIONS

	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	AAGR	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	AAGR	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	AAGR
Census Bureau	7,529	7,925	8,271	8,521	8,779	9,045	9,319	9,601	9,892	10,192	3.03%	10,500	10,818	11,146	11,483	11,831	12,189	12,558	12,938	13,330	13,734	3.03%	14,150	14,578	15,019	15,474	15,943	16,425	16,923	17,435	17,963	18,507	3.03%
TAZ	8,070	8,620	9,182	9,747	10,308	10,859	11,397	11,920	12,427	12,920	4.81%	13,023	13,127	13,235	13,346	13,455	13,564	13,673	13,781	13,887	13,994	0.80%	14,162	14,328	14,490	14,648	14,803	14,956	15,107	15,254	15,398	15,538	1.04%
Master Plan					**9,000**					**10,300**	**2.74%**										**13,600**	**2.82%**										**17,600**	**2.61%**

Source: WFRC TAZ, Census ACS, Unified Transportation Master Plan

Households

The total number of households in Nibley as of the 2023 American Community Survey is 2,113. Of the total housing units, 97.9 percent are occupied with 2.1 percent unoccupied. Cache County has approximately 94.9 percent housing occupancy rate, which is higher than the State at 91.8 percent.

Building Permits

The building permit data was compiled and provided by city officials. Nibley's permit activity has generally increased over the past ten years with a sharp increase after 2020. 2024 shows a significant decrease in single family residential building permit activity with an increase in condo and townhomes permits. After recent efforts to ease ADU restrictions, a small number of units were added in 2024, though overall growth remains limited. There is very little non-residential building activity.

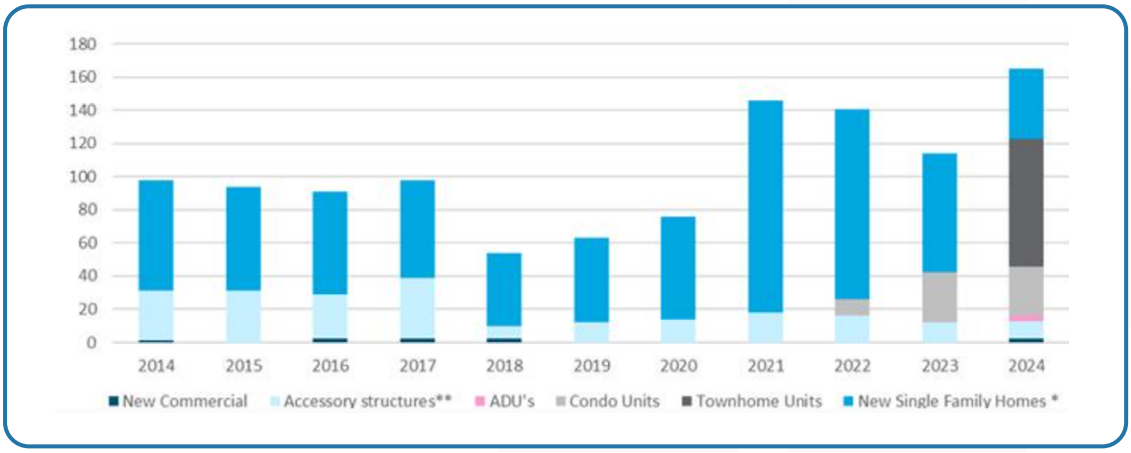


FIGURE 10: Building Permits Issues

Income

Utah median adjusted gross income (MAGI) represents an individual's total gross income minus specific tax deductions. MAGI in Nibley is higher than both the County and State average. A comparison of 2022 data shows that Nibley ranks slightly above the median of all cities in the state.

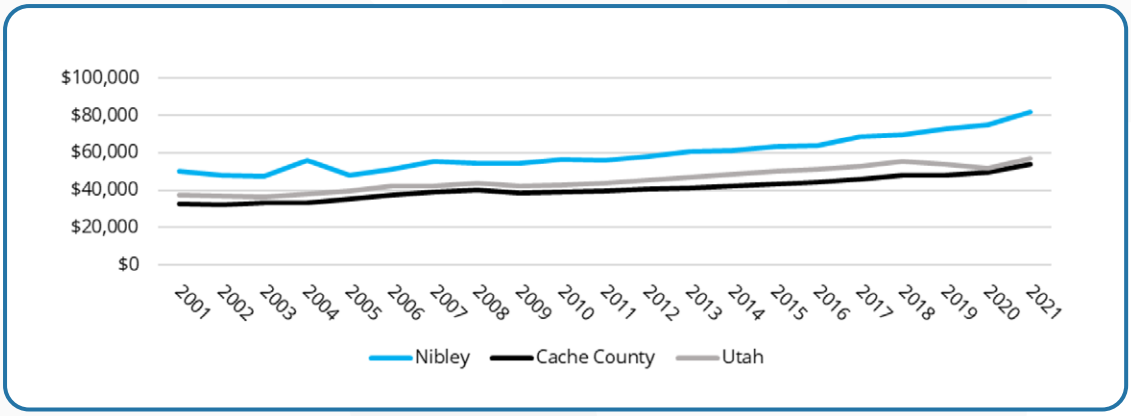


FIGURE 11: Median Adjusted Gross Income

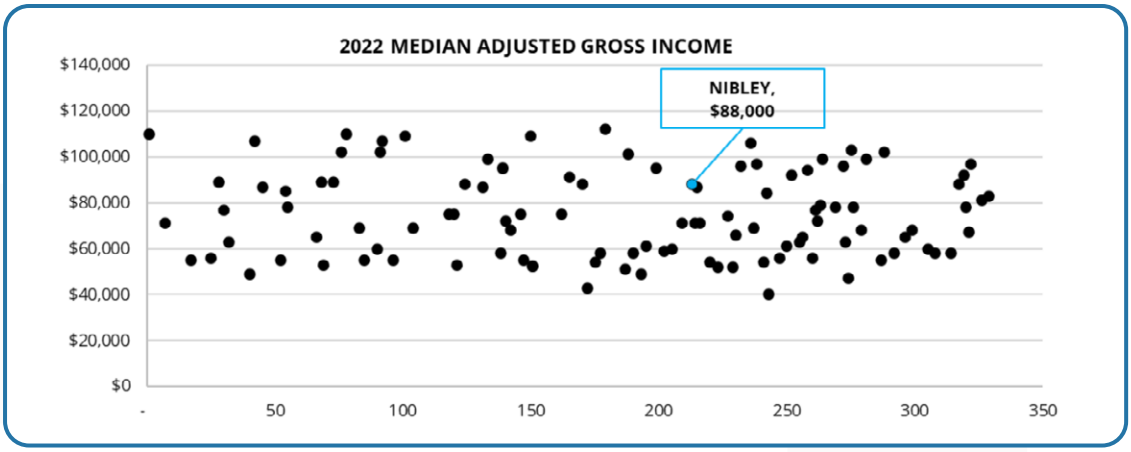


FIGURE 12: Utah Cities Median Adjusted Gross Income [2]

Education

According to the US Census 2023 ACS five-year estimates, approximately 49 percent of Nibley's population has an associate degree or higher similar to the Cache County average with 50 percent and the State of Utah at 48 percent.

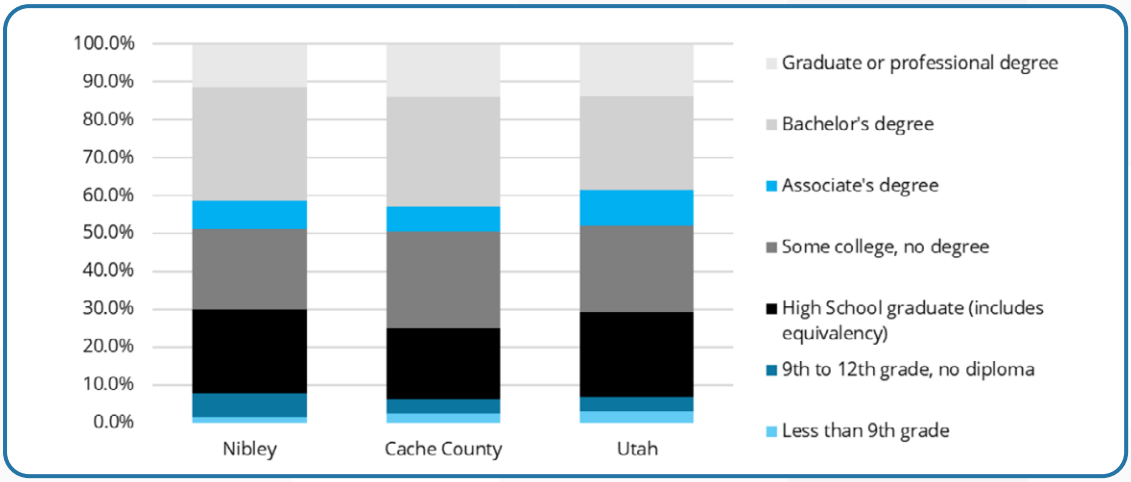


FIGURE 13: Educational Attainment as a % of Total

Employment

As of June 2025, the unemployment rate in Cache County was 2.9 percent, as shown in **Figure 14**. This is notably lower than the national average of 4.1 percent and slightly below the State of Utah's rate of 3.2 percent.

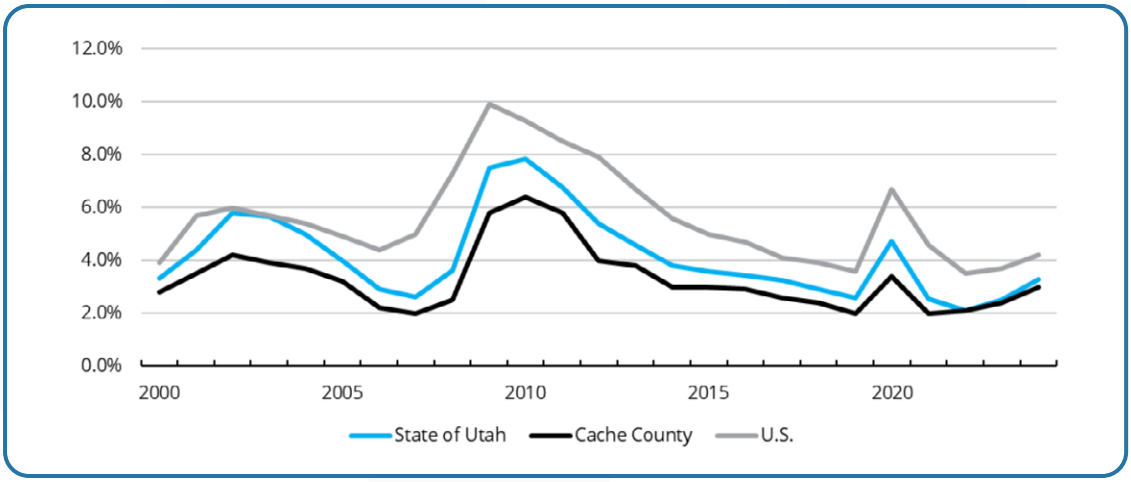


FIGURE 14: Historic Unemployment

[2] Utah cities are displayed alphabetically with arbitrary numeric values assigned to prevent the data points from overlapping on the graph.

Housing Analysis

Under Utah Code 10-9a-403 (2)(b)(iii) municipalities are required to include a moderate income housing plan as a component of the General Plan. This housing plan includes an overview of existing conditions and a realistic set of strategies to meet the needed housing demand. The "focus is to facilitate a reasonable opportunity for a variety of housing, including moderate income housing… to meet the needs of people of various income levels, living, working, or desiring to live or work in the community". An additional objective is to allow residents at different income levels to participate in the community.

Existing Housing Stock

The 2023 US Census Bureau ACS reports that the City has 2,113 housing units in total, of which 2,069 are occupied units. There are more homeowners than renters in Nibley, with 89.4 percent of all homes owner-occupied. This is due to a higher amount of single-family homes than multi-family housing units. As of 2023, the City has 1,890 owner occupied units and 179 renter occupied units. Occupied housing has grown at an AAGR of 4.07 percent from 2013 through 2023, with owner-occupied housing units growing at 4.2 percent and renter-occupied units growing at 2.79 percent. The average household size as of 2023 is 3.1.

TABLE 5: NIBLEY EXISTING HOUSING UNITS

	2013	2023	AAGR
Total Housing Units	1,431	2,113	3.97%
Occupied Housing Units	1,389	2,069	4.07%
Owner-occupied Units	1,253	1,890	4.20%
Renter-occupied Units	136	179	2.79%

Source: US Census Bureau, American Community Survey 5-Year Estimates (B25001, B25032)

As shown in **Table 6**, 99.4 percent of Nibley's housing stock is single family with 0.6 percent multi-family, mobile home, and other housing types. This distribution is based on the most recent Census data from 2023, and the recent townhome and condo building permits indicate that the share of multifamily housing has increased from 0 percent.

TABLE 6: NIBLEY OCCUPIED HOUSING UNITS

Type	Owner Occupied		Renter Occupied		Total	% of Total
Single Family	1,878	99.4%	155	86.6%	2,033	98.3%
2 to 4 Units	-	0.0%	-	0.0%	0	0.0%
5 to 9 Units	-	0.0%	-	0.0%	0	0.0%
10 or more Units	-	0.0%	-	0.0%	0	0.0%
Mobile Home & Other	12	0.6%	24	13.4%	36	1.7%
Total Units	**1,890**	**91.3%**	**179**	**8.7%**	**2069**	**100.0%**

Source: US Census Bureau, American Community Survey 5-Year Estimates (B25032)

The City has issued building permits for 849 units over the last 10 years. These include 698 single-family units and 147 condominiums or townhomes. With the exception of one townhome development in 2011, condominiums or townhomes have only been constructed in the past 3 years, with a high of 107 in 2024, and may be an important high density residential option to address moderate income housing needs within the City. **Table 7** provides an annual breakdown of City residential building units from 2014-2024.

TABLE 7: NIBLEY CITY RESIDENTIAL BUILDING PERMITS

Year	Single Family Units	Condominiums	Townhome Units	Other Residential Units	Total Constructed Units
2014	67	-	-	-	67
2015	63	-	-	-	63
2016	62	-	-	-	62
2017	59	-	-	-	59
2018	44	-	-	-	44
2019	51	-	-	-	51
2020	62	-	-	-	62
2021	128	-	-	-	128
2022	115	10	-	-	125
2023	72	30	-	-	102
2024	42	30	77	3	152
Total	**698**	**70**	**77**	**3**	**849**

Source: City Provided Building Permits

Housing Cost Burden

The median adjusted household gross income in Nibley is $88,000. The median adjusted household gross income has grown at an AAGR of 3.8 percent from 2012 through 2022. The Nibley owner-occupied income (unadjusted) in 2023 was $107,957 while renter-occupied income was $49,523.

The average monthly housing costs for all owner-occupied housing in Nibley is $1,185. Monthly costs for owner-occupied housing units with a mortgage is $1,839 while those without a mortgage is $541. The median gross rent in the City is $1,472. The ratio of the City's median rent to renter income is 35.7 percent as seen in **Table 8**. This high rent to renter income ratio could be attributed to the limited availability of rental and high-density housing, leaving fewer, larger, and units with higher rent on the market. The ratio of the City's median mortgage to median household owner income is 20.4 percent. Ratios greater than 30 percent indicate the average renter or household owner is burdened by housing costs. Ratios greater than 50 percent suggest a severe burden. Currently, the overall renter income to rent ratio in Nibley is considered a burden. The housing cost burden ratios in Nibley are rising, and may continue to rise, due to the current housing crisis throughout the State of Utah.

TABLE 8: HOUSING COST BURDEN RATIO (2022)			
	Nibley City	Cache County	Utah
Median Adjusted Gross Income*	$88,000	$60,000	$61,172
Median Income	$105,726	$78,292	$91,750
Owner-occupied Median Income	$107,957	$100,246	$109,588
Renter-occupied Median Income	$49,523	$48,541	$58,038
Median Gross Rent	$1,472	$1,137	$1,405
Median Owner-occupied w/ Mortgage Cost	$1,839		$1,978
Median Owner-occupied w/o Mortgage Cost	$541		$561
Median Rent to Renter Income	35.7%		29.0%
Median Mortgage to Owner Income	20.4%		21.7%

*Utah State Tax Commission, 2023 Statistics of Income

Source: US Census Bureau, American Community 2023 5-Year Estimates (B25119, B25064, B25088)

The U.S. Department of Housing and Urban Development annually reviews fair market rents to determine a standard for various housing programs to publish HOME Investment Partnership Program (HOME) rent limits. The rent limits for the Logan Metro Area for 2025 are found in **Table 9**. The Fair Market Rent shows what people are paying in the market, while the High HOME Rent Limit is based on what low to moderate income households can afford. Since the HOME limit is lower, it shows that market rent is higher than what is considered affordable.

TABLE 9: LOGAN, UT-ID MSA HUD METRO RENT LIMITS					
Program	Efficiency	1 Bedroom	2 Bedrooms	3 Bedrooms	4 Bedrooms
Low HOME Rent Limit	$905	$920	$1,163	$1,344	$1,500
High HOME Rent Limit	$914	$920	$1,169	$1,638	$1,893
Fair Market Rent	$914	$920	$1,169	$1,638	$1,963
50% Rent Limit	$905	$970	$1,163	$1,344	$1,500
65% Rent Limit	$1156	$1,241	$1,491	$1,714	$1,893

Source: U.S. Department of Housing and Urban Development, HOME Rent Limits - Utah

Moderate-Income Housing Element

Utah Code 10-9a-403 requires that municipalities include within their General Plan a Moderate-Income Housing element. Nibley City completed a Moderate Income Housing Plan in 2023, the strategies from that document are summarized here. When drafting the moderate-income housing element, the planning commission should facilitate a reasonable opportunity for a variety of housing, including moderate income housing to meet the needs of people of various income levels living, working, or desiring to live or work in the community; and to allow people with various incomes to benefit from and fully participate in all aspects of neighborhood and community life.

Housing Strategies and Recommendations

To qualify for State transportation funding, the State requires municipalities to select three housing affordability strategies to implement in their community. In addition, the legislature is giving priority funding designation to those communities that adopt two additional strategies. Nibley City has selected the following strategies for implementing moderate-income housing in the community.

1. Rezone for densities necessary to facilitate the production of moderate-income housing (Strategy A).
2. Create or allow for, and reduce regulations related to, internal or detached accessory dwelling units in residential zones (Strategy E)
3. Zone or rezone for higher density or moderate-income residential development in commercial or mixed-use zones near major transit investment corridors, commercial centers, or employment centers (Strategy F).
4. Implement zoning incentives for moderate income units in new developments (Strategy J).
5. Apply for or partner with an entity that applies for state or federal funds or tax incentives to promote the construction of moderate income housing, an entity that applies for programs offered by the Utah Housing Corporation within that agency's funding capacity, an entity that applies for affordable housing programs administered by the Department of Workforce Services, an entity that applies for affordable housing programs administered by an association of governments established by an interlocal agreement under Title 11, Chapter 13, Interlocal Cooperation Act, an entity that applies for services provided by a public housing authority to preserve and create moderate income housing, or any other entity that applies for programs or services that promote the construction or preservation of moderate income housing (Strategy O).
6. Demonstrate utilization of moderate-income housing set aside from a community reinvestment agency, redevelopment agency, or community development and renewal agency to create or subsidize moderate income housing (Strategy P).
7. Eliminate impact fees for any accessory dwelling unit that is not an internal accessory dwelling unit as defined in Section 10-9a-530 (Strategy Q).

Strategy 1: Rezone for Necessary Densities

Nibley has collaborated with developers and property owners to reduce barriers and implement appropriate rezones that support R-PUD developments (Strategy A).

IMPLEMENTATION

- Continued collaboration with developers (ongoing)
- Transfer of Development Rights (TDR) which allows higher density in exchange for transferring development rights (ongoing)
- Residential Planned Unit Development (R-PUD) amendment was approved for Nibley Meadows, density increased by 8% (2023)
- Proposed annexation area has potential for a major R-PUD (future)

Strategy 2: Create or Allow For, and Reduce Regulations Related to Internal or Detached Dwelling Units

Nibley will monitor and record the number of ADUs constructed and identify barriers that limit ADU development. Research on these barriers was completed in 2023 and amendments to ordinances are open to consideration (Strategy E).

IMPLEMENTATION

- Researched barriers to building ADUs (2023)
- Reduced regulations and potential for reduced impact fees already adopted (2024)
- Continue to track number of ADU building permits (2023, ongoing)
- Pending ordinance adoption that would reduce cost of ADUs with additional parking (2025)

Strategy 3: Zone or Rezone for high density in commercial or mixed-use zones

The City is planning for optimal residential uses near planned employment centers to promote a balanced mix of land uses. Planning efforts will focus on developing a comprehensive plan for the future 4400 South Industrial Corridor (Strategy F).

IMPLEMENTATION

- Updated General Plan with new land use map allowing for mixed-use areas (2025)
- Planning efforts focus on the future 4400 S industrial corridor (2025, ongoing)
- Evaluating residential units near the corridor to support future growth (2025, ongoing)

Strategy 4: Implement Zoning for Incentives for Developing Moderate Income Units

Nibley will continue to assess appropriate density bonuses and incentive thresholds for the R-PUD and other applicable zones. Based on the results of current P-RUD, potential ordinances establishing zoning incentives for moderate-income housing will be prepared for consideration.

IMPLEMENTATION

- Amendment to the R-PUD for Nibley Meadows allowed 22 additional housing units, requiring that 50% be priced at or below 80% of Area Median Income (AMI) (2023)
- Potential incentives to be implemented elsewhere based on success of Nibley Meadows projects (2025, ongoing)

Strategy 5: Partner with BRAG and HUD for funds and incentives

The City will meet annually with representatives from the Neighborhood Nonprofit Housing Corporation to identify opportunities for affordable housing development. Staff will also be trained to refer residents to housing assistance programs offered by BRAG and HUD, and information about these programs will be actively publicized (Strategy O).

IMPLEMENTATION

- The City has met with BRAG to increase awareness of available opportunities and increase utilization of resources (2023)
- Active communication taking place with Neighborhood Non-profit Housing Corporation (2023, ongoing)

Strategy 6: agency to create or subsidize Moderate income Housing

The City has an established Community Reinvestment Project area that is expected to generate money in tax increment financing over 15 years. (Strategy P). Funds from this project can be allocated by the city, potentially through partnerships to develop moderate-income housing.

IMPLEMENTATION

- 10% of Malouf Community Reinvestment Project Area is allocated for affordable housing (2023 – 2038)

Strategy 7: Eliminate Impact Fees For Accessory Dwelling Unit

Nibley allows attached, internal, and detached ADUs. Recent coding has reduced regulations to reduce barriers for ADU construction. The City has eliminated impact fees for detached ADUs to encourage production (Strategy Q).

IMPLEMENTATION

- The City has implemented this strategy, limited applicability with limited ADU building permits (2024, ongoing)



Additional State Support

The City could benefit from additional training related to MIHR requirements and data collection. An example of this is the Land Use Academy of Utah's (LUAU) Missing Middle Housing (MMH) Toolkit. This service helps communities in Utah learn about, consider, plan for, and implement more housing options tailored to their city or town. In addition to this resource, training related to the 24 identified strategies and how to implement these strategies could be beneficial.

Potential Additional Housing Strategies

In addition to the moderate-income housing strategies already in place, the following list highlights additional strategies that are currently being explored or may be valuable for future implementation. Additional housing development and analysis resources can be found in the **Appendix**.

Reduce parking requirements

- Amend land use regulations to eliminate or reduce parking requirements for residential development where a resident is less likely to rely on the resident's own vehicle such as senior living or near major transit. (Strategy H).
- The City has recently updated the Parking Code.

Amend land use regulations to allow for single room occupancy developments.

- Requirements regarding how many unrelated people can live in one house could be further explored to increase housing affordability (Strategy I).
- May lack market applicability or may not be worth the time.

Incentives and deed restrictions

- Support and maintain moderate-income and subsidized housing by offering landlord incentives, providing deed-restricted units through grants, or creating a housing loss mitigation fund (Strategy K).
- Nibley could serve as an active participant in supporting deed restriction. For example, a partner organization assists in building affordable units, and the City could participate in deed restriction and enforcement.

Impact Fee Reduction

- Reduce, waive, or eliminate impact fees related to moderate income housing (Strategy L) Already Implemented with ADUs that are moderate income
- Create a Program to Transfer Development Rights
- Create a program to transfer development rights for moderate income housing (Strategy R).
- The city has TDR ordinance for density and could shift it to cover moderate income housing.

Zone for Walkable Mixed Use

- Create or allow multifamily housing that is compatible in scale with single-family homes and located in walkable communities with residential or mixed-use zones (Strategy V).
- This strategy would pair well with the development of a town center.

Implement Programs or Strategies to Assist Low Income

- Specific programs or strategies to assist residents earning less than 80% of the area median income, such as dedicating local funds or requiring a portion of new residential developments to be moderate income housing. (Strategy W).
- This strategy is in line with the moderate income requirement in the Nibley Meadows development.

VI. PARKS, RECREATION, & OPEN SPACE

> I would love to see some more parks and playgrounds in Nibley! Especially walking distance for the west side of town!
>
> — General Plan Survey Response

VI. PARKS, RECREATION, & OPEN SPACE

Introduction & Background

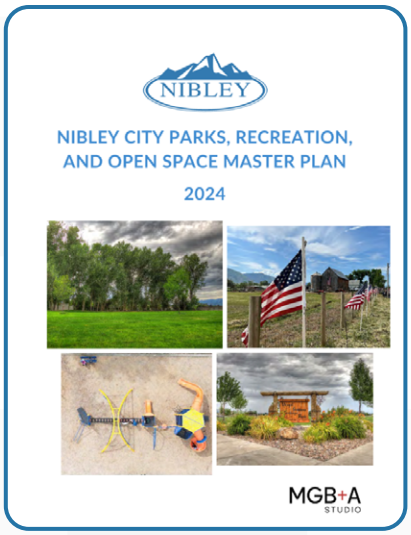
Parks, open space, and recreation are central to Nibley's community identity and quality of life. The community places a strong emphasis on access to recreation, preserving natural open spaces, and using parks as a catalyst for bringing residents together and fostering a sense of belonging.

Nibley has long recognized the value of a park and trail system that supports daily life, strengthens community identity, and connects residents with the City's natural landscapes. Residents consistently demonstrate their appreciation for the many paths and trails that offer opportunities for alternative transportation and recreation. Nibley's vision for a coordinated system of parks, trails, community facilities, and culture destinations linking neighborhoods internally and outward to regional networks remains central to Nibley's identity today. The continued evolution of the park and trail system, informed by updated data, refined community priorities, and national best practices will ensure the network grows alongside the City and continues to serve as a defining asset that enhances quality of life.

2024 Parks, Recreation, and Open Space Master Plan

In 2024, Nibley adopted an updated Parks, Recreation, and Open Space Master Plan that builds on the City's 2017 plan and reflects extensive community participation. The Master Plan was built on robust public engagement - nearly 1,800 total responses or approximately a quarter of the population of Nibley participated in the online survey. Residents voiced a strong desire to preserve the unique ecological and cultural features of Nibley (such as the Firefly Park and Morgan Farm), while also expanding opportunities for youth sports, trails, and indoor recreation. Importantly, the community emphasized that maintaining and upgrading existing parks should be prioritized before building new facilities.

The 2024 Master Plan serves as a comprehensive foundation for establishing detailed inventories, level-of-service standards, capital improvement strategies, and funding options. The General Plan offers a high-level policy framework informed by the Master Plan's findings and robust community input.



Through the Master Plan's process, Nibley identified a clear vision: to motivate, inspire, and guide the development of recreational and open spaces that provide leisure and a high quality of life for residents. **Supporting goals include the following:**

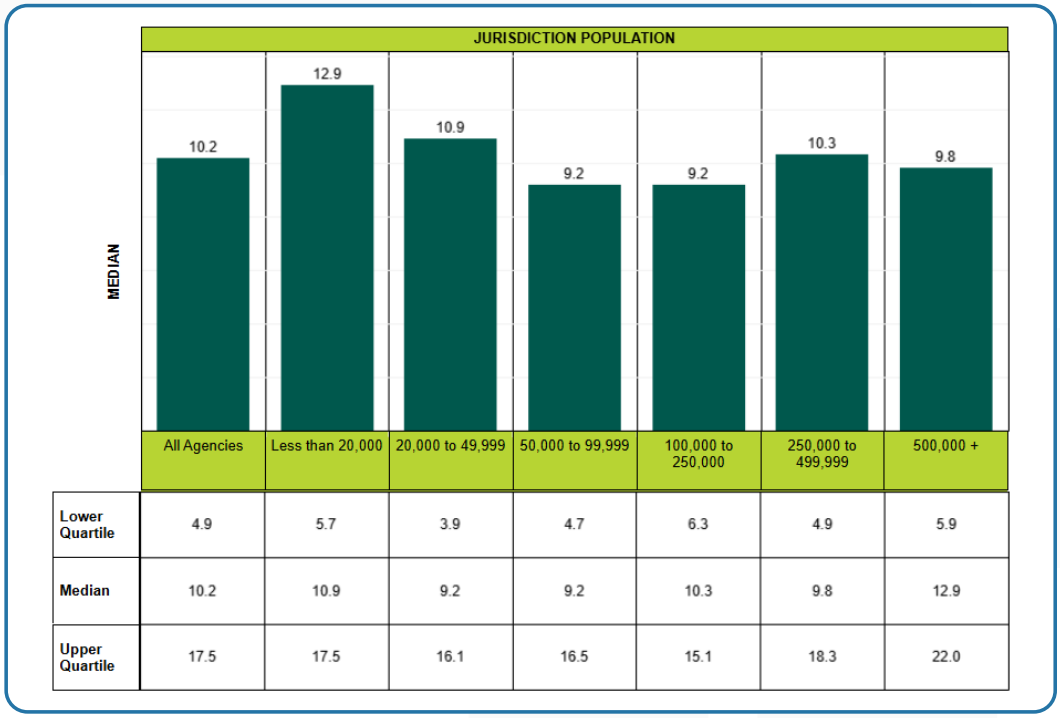
- Plan for projected increase & growth
- Provide high-quality recreation amenities
- Coordinate with regional goals
- Preserve critical natural and cultural resources
- Promote responsible financial, maintenance, and management practices
- Match community interests
- Sustain a high quality of life for Nibley's residents

The plan provides a coordinated roadmap for delivering a high quality parks and recreation system and new investments that reflect Nibley's identity. The plan identified specific amenity needs at existing park facilities as a part of the capital improvement inventory process. Overall, Nibley's parks system performs well in terms of the number of individual parks available to residents, currently exceeding the national median for "residents per park" and projected to remain above that threshold even as the community grows.



FIGURE 15: Parks and Recreation Master Plan

While Nibley's 10.6 acres of parkland currently exceeds national medians, the range of amenities fall short of national benchmarks and are projected to decline further without strategic investments as the community grows. Additional parkland, trails, and recreation features will be needed to sustain high-quality access and meet future demand. Findings in the 2024 Master Plan provide a clear foundation for identifying the future areas of improvement and how to invest in the city's parks, trails, and open space system strategically.



	All Agencies	Less than 20,000	20,000 to 49,999	50,000 to 99,999	100,000 to 250,000	250,000 to 499,999	500,000 +
Lower Quartile	4.9	5.7	3.9	4.7	6.3	4.9	5.9
Median	10.2	10.9	9.2	9.2	10.3	9.8	12.9
Upper Quartile	17.5	17.5	16.1	16.5	15.1	18.3	22.0

FIGURE 16: NRPA National Averages

Best Practices and Recommendations

The following principles reflect best practices in creating an inclusive, connected, and high-quality network of parks, open space, and recreation opportunities:

- Ensure that parks, trails, and natural areas are planned alongside neighborhoods and mixed-use areas early in the development process rather than added after the fact
- Maintain up-to-date records of all public and private open spaces categorized by purpose and available amenities
- Strive to locate parks within a short walking distance of most homes (approximately ¼ mile) to maximize daily use and community benefit
- Orient park facilities toward public streets and ensure good lighting and multiple access points ensuring usability and safety
- Incorporate local history, community heritage, waterways, and natural features into park and open space design to strengthen Nibley's identity and character
- Tailor park and open space enhancements to the needs of nearby neighborhoods, informed by direct resident feedback
- Balance active uses such as sports fields with passive options like natural trails and pathways, landscaped areas, and scenic rest areas
- Anticipate the needs of Nibley's future population—families, youth, older adults— by reserving and programming open spaces accordingly
- Whenever possible, provide separated multi-use paths and natural corridors that minimize conflicts with vehicle traffic and enhance connectivity between neighborhoods

Together, these principles help guide the continued evolution of Nibley's parks and recreation system as the community grows and priorities shift over time. As growth occurs, taking action on these best practices and recommendations will help preserve access, expand opportunities, and maintain the strong sense of community that Nibley residents value. The City's continued commitments to supporting high-quality public spaces will be essential to supporting health, social connectivity, and community resilience.

Element

Building on community priorities and national best practices, the following recommendations represent key opportunities to elevate Nibley's park, open space, and recreation network as the city grows. Each focuses on enhancing daily access to recreation, bolstering the community's outdoor identity, and embedding nature amenities into the lived experience of Nibley's neighborhoods.

Connected Greenway

A cornerstone of Nibley's long term parks and open space vision is to have a park system interconnected by trails, community facilities, and cultural features, which are connected to neighboring systems and communities. Greenways provide more than a route from point A to point B, they function as linear corridors that offer daily access to nature, physical activity, stress reduction and a comfortable route for walking and biking. A concept of the proposed location of the greenway is shown in the Future Land Use Map, and the network could be extended beyond what is shown to include future trails in the latest Active Transportation Plan.

Building off the existing network of trails and parks, the City envisions a transformative greenway loop that connects through frequent trails and pathways, park spaces, and comfortable biking and walking routes throughout the existing core of Nibley and extends into future annexation areas. This greenway facility can capitalize on existing corridors, waterways, and canals such as the Hyrum Slough and 1200 West trail as potential connections to begin shaping the Greenway.

Strategically aligning a potential greenway with future areas that are likely to accommodate additional residential, commercial, and mixed-use development ensures that Nibley as a whole maintains high access to nature amenities, alternative mobility options, and desirable public spaces. With intentional design and integration, a greenway becomes the social spine of the city. By tying the city together through a health-supportive, environment-supportive, and community-supportive network, a Nibley Greenway Loop will serve as both a signature element and vital connector, ensuring that as Nibley grows, the community preserves its identifiable features.

Multi Functional Corridor

The greenway should be designed with the intention to support multiple community benefits.

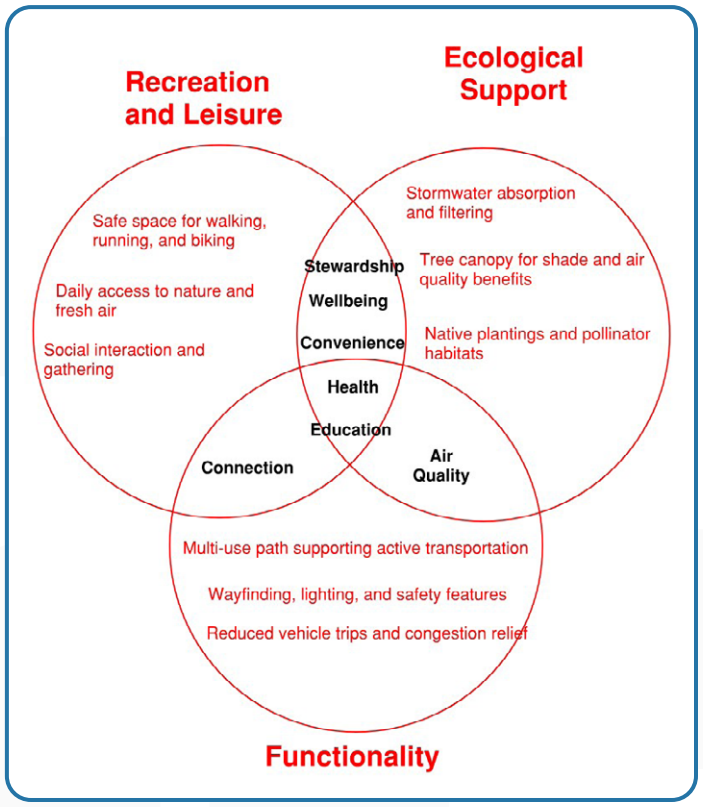


FIGURE 17: Greenway Benefits

Design Elements

To ensure a connected greenway fulfills its function as a vibrant community space, the following design elements should guide its development and integration into Nibley's existing fabric:

Total Corridor Width (50-100 feet)

A recommended total width of 50-100 feet allows ample space for planting, seating, habitat areas, and other features that support activated spaces and enhance the overall experience. A 30 foot corridor is the minimal width, however 50 plus feet of corridor width will ensure it becomes an amenity.

Multi-Use Path (10-14 feet)

The path itself should be no less than 10 feet in width. A comfortable path should serve as the core function of this corridor and support travel for walkers, runners, and cyclists of all ages and abilities.

Active Building Frontage

Whenever possible, homes and businesses should face the greenway to maximize synergy between various types of community activities. Orienting building frontages toward the greenway helps create lively shared spaces, strengthen the community's everyday interaction with the corridor, and solidifies a social spine at the heart of the city.



Neighborhood Park Access and Distribution

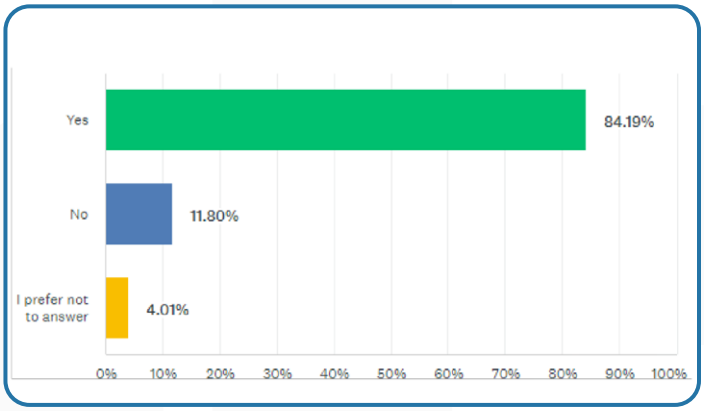
Proximity to parks plays a significant role in community health, livability, and resident satisfaction. National data from the National Recreation and Park Association's (NRPA) 2023 Engagement with Parks Report shows that 71 percent of U.S. residents live within walking distance of a park, playground, open space, or recreation center. This data also highlights a growing emphasis on park proximity, with nearly one-third of ~~American~~ rating close access to a nearby park or recreation area as extremely important when choosing where to live, a figure that has steadily increased in recent years.

As shown in the Existing and Potential Future Parks map in the Masterplan, Nibley is planning for future parks distributed throughout the City. As development occurs in future annexation areas, the city's park and open space distribution will need to be evaluated every few years to ensure that the planned park facilities are accessible and highly utilized by the community.

In alignment with national best practices, Nibley City should strive to ensure each resident has robust access to a park, trail, or open space amenity — ideally within a ¼ mile — or roughly five-minute walk. Maintaining this standard reflects the community's vision for daily, convenient access to recreation and nature while supporting public health, sustainability initiatives, and neighborhood cohesion.

Indoor Recreation

Indoor recreation plays a vital role in supporting year-round health, social connection, and community life in Nibley. While parks and trails provide extensive outdoor opportunities, community feedback shows strong support for an indoor recreation center. A growing need exists for spaces that offer recreation, gathering, and wellness programming regardless of weather or season. As a part of the 2024 Parks, Recreation, and Open Space Master Plan Survey, when asked if they support an Indoor Recreation Center, 84% of residents indicated yes.



2024 Parks, Recreation, and Open Space Master Plan Survey

A future indoor recreation center in Nibley could serve a broader regional role. Surrounding communities such as Hyrum, Millville, and Wellsville face many of the same needs for year-round recreation opportunities. A shared regional facility would allow the broader area to benefit from a centrally located resource while also distributing costs including development, operations, and maintenance among multiple partners rather than Nibley alone.



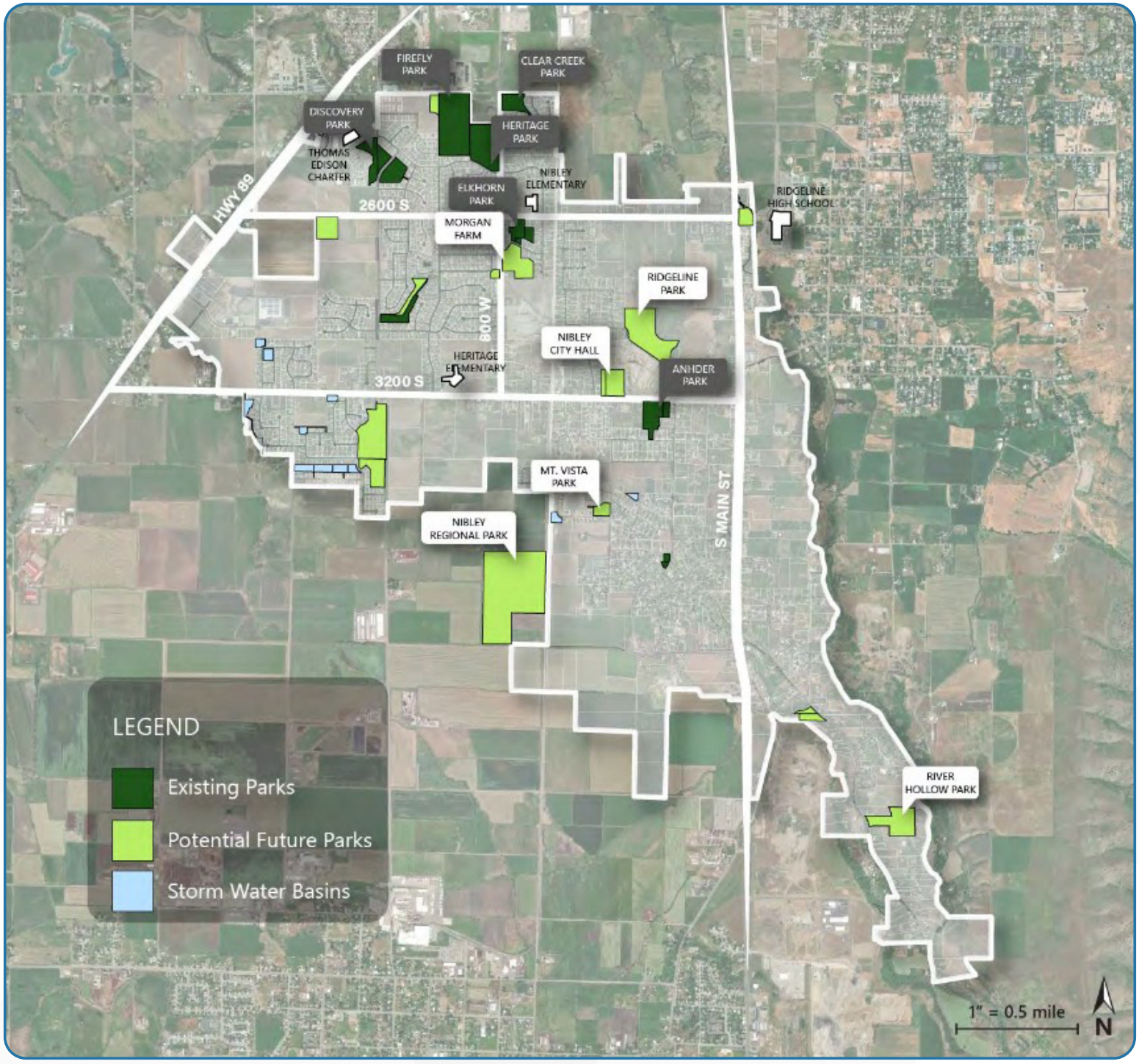


FIGURE 18: Nibley City Existing and Future Parks

Implementation

The following implementation items help translate Nibley City's Parks, Recreation, and Open Space goals into specific, actionable steps by focusing on coordinating investment, maximizing access, and facilitating long-term stewardship of the community's assets. These implementation actions emphasize maintaining a high quality of service, expanding connectivity through trails and greenways, preserving priority open spaces and supporting programs that align with the city's vision.

1. **Follow the direction established in the 2024 Nibley City Parks, Recreation, and Open Space Master Plan**
    a. Use the adopted Master Plan—and its supporting components including the Maintenance Strategy, Parks Facilities Management Plan, Recreation Plan, Trails Plan, Open Space Strategic Plan, Funding Strategy, and Action Plan—as the guiding framework for prioritizing investments in park development, open spaces, and trail connectivity. Implement these components through coordinated capital improvement planning, partnership development, and pursuit of grants and other funding sources to ensure a well-maintained, accessible, and financially sustainable parks and recreation system.

2. **Maintain and enhance the City's level of service for parks and recreation amenities**
    a. Use the National Recreation and Parks Association (NRPA) benchmarks to evaluate the quantity, quality, and diversity of park and recreation amenities.
    b. Complete a regular inventory and performance review against NRPA standards to identify park or recreation amenity gaps.

3. **Promote and utilize open space subdivision to incentivize open space preservation within newly developed subdivisions**
    a. Refine open space and R-PUD subdivision design standards to ensure newly dedicated open space reflects community values and long-term sustainability.

4. **Promote Transfer of Development Rights (TDR) ordinance as a tool to preserve planned open space land**
    a. Educate property owners and developers about TDR options

5. **Prioritize park development in underserved areas**
    a. Seek to provide or secure additional park space for residents in areas outside the ¼ mile radius of an existing facility
    b. When new parks are planned, identify strategic locations to help facilitate equitable parks and open space access in areas that are currently underserved in terms of proximity.

6. **Provide an accessible and connected trail system of open space, natural areas, parks, recreation facilities, trails, and greenbelts.**
    a. Preserve planned trail, multi-use path, and bike corridors and natural open space and greenways as established by the Nibley City Active Transportation Plan
    b. Utilize appropriate opportunities to develop public access along rivers, irrigation canals, and drainage corridors in order to provide additional trail linkages throughout the community. Design trail corridors to include wildlife buffer zones, particularly along streams and rivers.

7. **Protect and expand public facilities and programmed events in Nibley that promote and enhance the quality of life.**
    a. Establish a location for a community recreation center. Partner with neighboring communities on the south side of Cache Valley for a Special Service District to provide a community amenity with broader benefits.
    b. Strengthen organizations that sponsor and support public activities, business, and social networks. Support new programmed events, such as Heritage Days, nature/science education programs, fairs, festivals, markets, and performing arts events in the City.

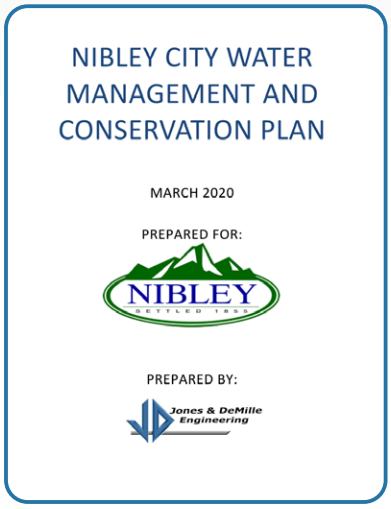
VII. PUBLIC FACILITIES

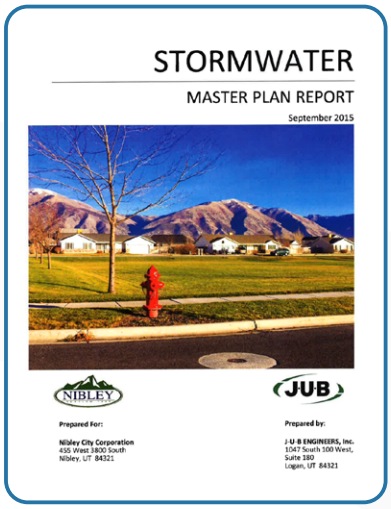
> **Nibley needs to increase the tax base and relieve the pressure on residents. Eventually Nibley needs to be self-supporting with utilities, waste management etc.**
>
> — General Plan Survey Response

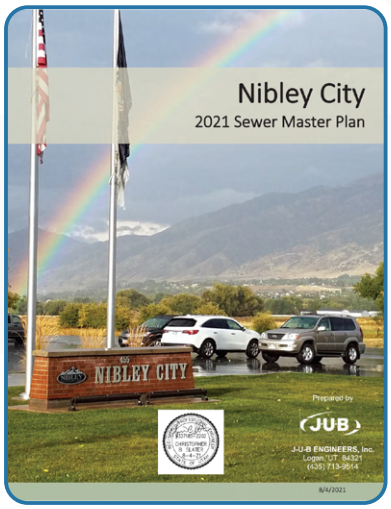
PUBLIC FACILITIES

Introduction & Background

The Public Facilities section catalogs existing facilities and outlines future plans for infrastructure and services that support the community's quality of life.







Element

Water

Nibley City's Water Management and Conservation Plan was adopted in March of 2020 and provides a current assessment of water use, projects future demand, and outlines five-year recommendations to meet the requirements of the Utah Water Conservation Plan Act. The plan guides the expansion and upgrading of the City's culinary water system, which is supplied by three wells and supported by three storage tanks with a combined capacity of 3.35 million gallons. The distribution system includes 6" to 18" pipes of varying materials.

The Water Conservation Plan sets a goal of reducing water loss in the system by 10%, which is achievable without impacting revenue since it targets unaccounted water rather than residential use. Lower water loss will also reduce system operating costs. To further support conservation, the plan recommends adopting incentive-based (tiered) water rates that increase with higher consumption, encouraging more efficient water use.

The plan also recommends expanding public education on water conservation through classroom visits, city information booths, mailers, and digital outreach, with simple messaging such as watering lawns outside peak heat hours and turning off sprinklers during rain. It also calls for system water audits, leak detection, and repair to address the City's higher-than-average water loss, beginning with a field water loss study. Based on findings, Nibley may implement a pipeline replacement program to address aging or faulty infrastructure, particularly older steel and PVC pipes prone to leaks.

Stormwater/Flood Control

Nibley City adopted their Storm Water Master Plan in September of 2015 which evaluated the existing collection system and identified improvements needed to support projected growth. An update to this plan is currently in development. The plan mapped the system using GIS, modeled current and future storm events, and sized future pipes and detention ponds to ensure adequate capacity at build-out.

Sewer

Nibley City completed a Sewer System Master Plan update in 2021 to address rapid growth, higher land-use densities, and the need to revise sewer impact fees. The plan identified deficiencies, outlined capital facility projects needed before 2031 and through build-out, updated the trunk line system for undeveloped areas, and prepared an updated Impact Fee Facility Plan. At the time of adoption, the sewer system had adequate capacity with no modeled deficiencies, but continued inspection for infiltration and inflow is recommended. Existing lines can serve roughly 400 additional Equivalent Residential Units (ERUs), and new developments should submit projected flows so the City can verify capacity before permitting. Regular updates to the master plan and impact fees every 5–7 years are recommended to prevent deficiencies.

Solid Waste Removal

As part of the Cache Waste Consortium, Nibley City contracts with Waste Management for solid waste removal as of November 2025. Recycling pickup happens once every two weeks. Green waste is an optional service and is offered between April 1st and October 31st.

Natural Gas

Enbridge Energy supplies natural gas to individual homeowners in Nibley City. According to the State of Utah, natural gas coverage is available in every part of the City.

Electric Power

Rocky Mountain Power provides electricity to all areas of Nibley City, according to the State of Utah Broadband Project. To preserve existing viewsheds, future electric infrastructure should be placed underground where feasible. Rocky Mountain Power plans to construct a major transmission line across southern Cache Valley, which may pass through Nibley. The City should collaborate with the utility to route the line in a way that minimizes impacts on residents while potentially supporting future commercial or industrial development. Additionally, the City should explore the possibility of creating a trail along the transmission line corridor.

Police, Fire, and First Responders

The police force in Nibley is contracted with the Cache County Sheriff's Office. The contract pays the equivalent of one full-time position for animal control and patrol services. Nibley City has a contract with the Hyrum Fire Department. There is an organized group of volunteer first responders, known as the Nibley-Millville First Responders, for medical and emergency services. Staffed with Utah State-Certified Emergency Medical Technicians, the squad is trained and ready to serve the community. Each member of the squad is a volunteer, who's dedicated to the service they provide with the skills and training they have acquired. All 911 emergency medical calls that take place within the two cities are paged to the Nibley-Millville First Responders, as well as the Cache County EMS, which provides ambulance transport. In addition to the benefits Nibley receives from enforcement, Nibley will seek to integrate the Cache County Sheriff's Office into the life of the community.



VIII. WATER CONSERVATION & PRESERVATION

> **Support agriculture and local businesses and the natural beauty of Nibley. Thank you!**
>
> — General Plan Survey Response

VIII. WATER CONSERVATION & PRESERVATION

Introduction & Background

As the second driest state in the nation, Utah faces frequent periods of drought and water insecurity. It is imperative that public agencies develop robust plans to address water challenges and prepare for the future; to this end, the State adopted S.B. 110: Water as Part of the General Plan in 2022. This legislation requires municipalities to amend their general plan to consider how land use planning impacts water use (Utah Code Annotated §10-9a-408). The Water Conservation and Preservation element of the Nibley General Plan meets legislative requirements by:

- Documenting regional goals for water conservation
- Examining the City's current policies and practices relating to water conservation and recommending additional policies
- Examining how the proposed land use plans from this general plan will impact water needs in the city.

This element of the general plan will not constitute a comprehensive plan, but will instead serve as a foundation for the City's upcoming update to its Water Conservation Plan. The updated document will reexamine the facilities plan to reflect current and future needs.

Nibley City Water Profile

Water Supply and Needs

By law, water of the state belongs to the public and the permission from the state to divert and beneficially use a certain amount of water is granted to parties through the allocation of water rights. Nibley City's water rights are currently classified under the "Interim Cache Valley Ground-Water Management Plan" for Area 25 (Bear River/Cache Valley) created by the Utah Division of Water Rights (DWR). Nibley City's water comes from three active sources: the 4000 South Well, Nelson Well, and the 640 West Well.

The 2020 Update to the Culinary Water Master Plan documented the state of the City's water system at the time. Nibley City had three storage tanks with a combined capacity of 3.35 million gallons, which was projected to become deficient in 2023. The maximum combined safe yield of all wells was about 7,600 gallons per minute (gpm). The culinary water master plan identified several priority concerns for the City:

- It was estimated that by 2025 an additional 1,000 gpm of yield would be required for the system. The city is currently drilling a new well that will provide at least 2,000 gpm of safe yield. It should be online by the end of 2026.
- By 2030 the City will need additional source water. The new well mentioned above will address this concern.
- It was estimated that more wet water rights would need to be acquired by 2025. In addition to acquiring them through development, it was proposed that the City shift water rights from the Yeates well—which has contamination concerns—to other wells. The City recently combined water rights into an "any and all" status for the majority of its water rights. Other rights that were contested in the past were reconfirmed and proven to be of beneficial use. The City is maintaining Yeates Spring as a potential source, but it is registered with the State as inactive.
- It was recommended that the City consider conducting a feasibility study for installing a secondary water system. Such a study is not planned for the near future.
- It was recommended that a new culinary storage tank be studied and installed by 2022. Such a tank has been evaluated, and through extensive rate study and financial forecasts, the new storage tank is being budgeted for construction in approximately 2035.
- It was recommended that 10% water conservation be achieved by 2025. The per-capita consumption in the City has dropped by about 20% since 2020.

Pursuant to the legislative requirement, the Project team met with the Division of Water Resources (DNR) to discuss regional water consumption goals and how implementation of the land use element and the water use and preservation element may affect the Great Salt Lake on Monday, July 7th 2025. The DNR has set the following per-capita consumption reduction goals for Cache County in future years, measured from the baseline year of 2015:

- **2030:** 18% reduction - 176 GPD (gallons per day) in Nibley
- **2040:** 24% reduction - 163 GPD in Nibley
- **2065:** 28% reduction - 155 GPD in Nibley

Growth of Water Demand

Between 2000 and 2020, Nibley grew in population from 2,085 to 7,328 (U.S. Census), and the estimated population is 8,615 as of 2024 (U.S. Census). As illustrated in Figure 1, the City's population is expected to reach approximately 17,600 by 2050, which represents an increase of 104 percent relative to the 2024 population. Ensuring that the water supply is sufficient to meet existing and future demand is an essential function of the City.

Water needs vary across land use types and intensities. The gallons per capita per day (GPCD) for an area represents system losses plus the average amount of water delivered daily by the system to each person who works or lives there, whether it's for washing, the production of goods, landscape cultivation, or for recreation. GPCD is calculated by dividing the total annual water use by the resident population and then averaging that amount to a daily value. The Division of Water Rights records data about culinary and secondary water use as reported by each utility company in the state. **Figure 19** plots the total and per-capita water consumption in Nibley City from 2016 to 2024. Both the amount of water diverted at the source and metered deliveries to customers are represented.

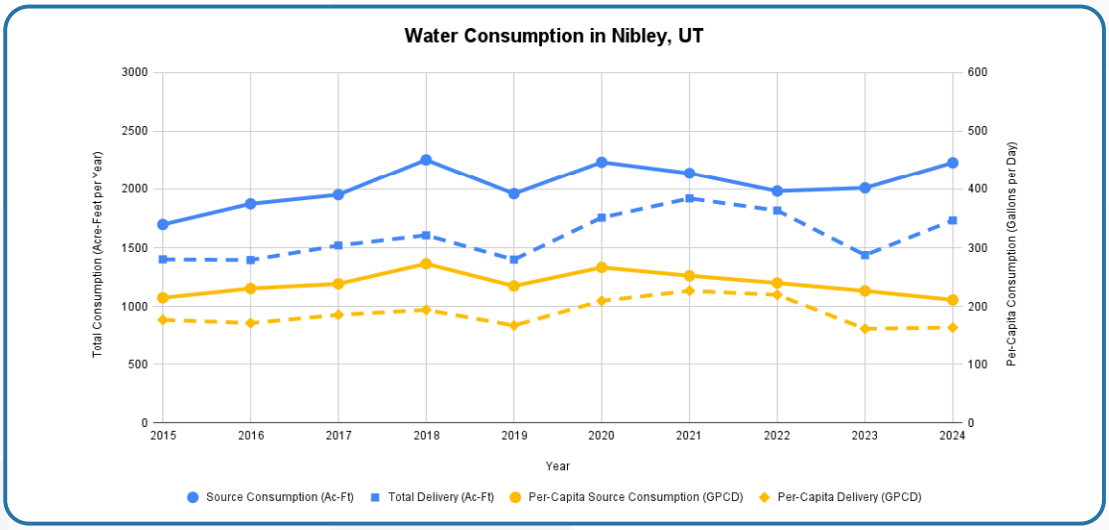


FIGURE 19: 2016 to 2024 Water Consumption

By comparing water diverted at the source to the amount of water actually delivered to customers, the City can monitor system losses that occur during transmission to end users. Some of these losses are due to unmetered, but authorized, use, including use for fire hydrants, maintenance flushing of the system, cleaning water tanks and reservoirs, etc.; other losses occur due to leakage, theft, or meter inaccuracies. The City has a particular interest in minimizing the latter, as system losses drive up costs for both the utility and consumers, as well as increasing the difficulty of meeting water consumption goals.

As shown above, the City has seen a small decline in per-capita consumption since 2015, with some increase up to the year 2020, and then a steady decrease since ~~them~~. With current water use already below the DNR's 2030 goal for the county of 233 GPCD, if the City can continue its current trend it will comfortably meet the goal of reducing consumption to 204 GPCD by 2065.

Secondary Water System

Outdoor watering accounts for up to, and possibly more than 50% of the system use. Water used for outdoor purposes does not need to meet the same treatment standards as water used for human consumption, so a secondary water system can save the City and its customers money by providing water for outdoor use that has been screened, but not treated. This allows the more expensive water that has undergone the full treatment process to be reserved for culinary purposes.

The 2020 Culinary Water Master Plan discussed the potential benefits of installing a secondary water system, but observed that the significant up-front capital investment required for installation in an established community may negate cost savings for the end user. A feasibility study was recommended to weigh the costs and benefits associated with installing such a system.

Some properties in the city have access to secondary water supplied by irrigation canals. Secondary water use is not currently measured and reported to the state database. All users should be aware if their outdoor water is from a secondary source, as this water can be hazardous for human consumption and it is important to avoid ingestion by children or cross-contamination with culinary water.

Effect of Permitted Development On Water Demand and Infrastructure

Each proposed land use in the City is expected to consume a certain amount of water. The amount consumed varies by land use type and intensity. To safeguard the sustainability of the water supply, the City needs to understand how much water is required to support development before it is permitted. As part of this General Plan, a forecast has been developed to project the growth that is likely to occur by 2050.

To support long-term housing needs and responsible water use, the General Plan encourages a variety of lot sizes and housing types in select locations that make efficient use of land and resources. Allowing some flexibility in how new neighborhoods are designed can help reduce the amount of irrigated landscape per household, lowering overall water demand while maintaining green space. As discussed above, the City is already making strong progress on meeting regional per-capita consumption goals, and structuring future residential development in this way will allow that trend to continue.

Water-Use Projections Based on Land Use

For this General Plan, future water demand projections were developed based on historic growth patterns and planned future land use. Research consistently shows that smaller lot sizes and higher housing densities result in lower per-capita water use. This reduction is largely due to less landscaped area and greater infrastructure efficiency. A study by Envision Utah found that per-capita water use declines as residential density increases, with the most significant reduction occurring between 2 and 5 housing units per acre. **Figure 20** illustrates this relationship as documented by Envision Utah.

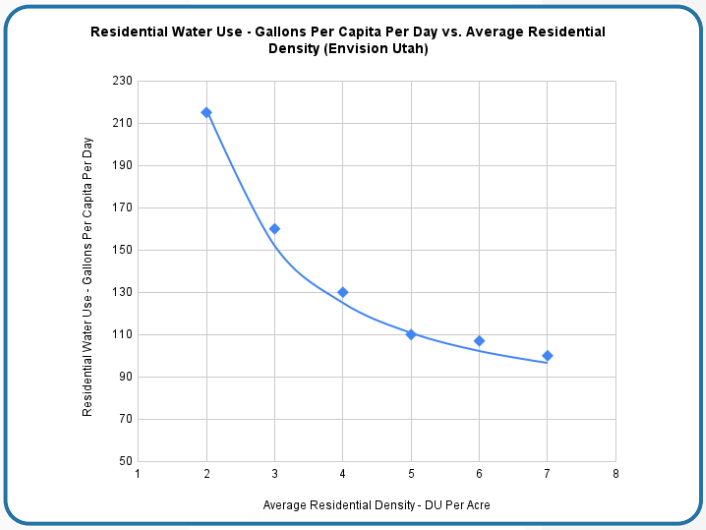


FIGURE 20: Per-Capita Water Use as a Function of Residential Density (Source: Envision Utah, 2003)

Included in the figure is a trendline fit to the data observed by Envision Utah. Although the true shape of this curve will vary from community to community, this served as a starting point to estimate how the per-capita residential water use would change under different development scenarios. A deeper level of analysis will be conducted as part of the development of the new Water Conservation Plan.

To project future water use in the City, historic consumption rates were separated into residential uses, which comprised between 80 and 90 percent of all deliveries, and other uses (including commercial, industrial, etc.). The regression curve for estimating per-capita residential use as a function of the average units per acre was adjusted upward to intersect the observed consumption rate in 2024 (145 GPCD), paired with the current average units per acre (4.6). This produced the curve depicted in **Figure 21**.

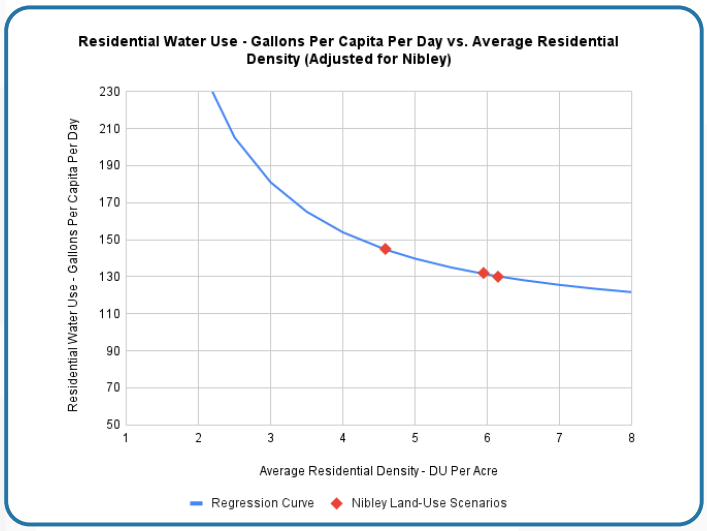


FIGURE 21: Per-Capita Water Use as a Function of Residential Density - Adjusted for Observed Nibley Trend



Using this curve, annual water deliveries were projected through 2050 for a number of scenarios. Each scenario assumes that a total of 1800 acres in the City will be occupied by residential development in 2050. The scenarios are as follows:

- The Historic Residential Mix scenario assumes that per-capita residential water use remains at its current level of 145 GPCD, with all new development matching the current average density of 4.6 units per acre.
- The Compact and Centered Growth Scenario assumes that more development is composed of attached units, or a mixture of attached and detached units. The composition of densities examined produced an average of 6.2 units per acre, resulting in a residential use rate of 130 GPCD by 2050.
- The Connected and Active Communities Scenario assumes 2050 average density of 6 units per acre, which falls between the two other scenarios. This results in a residential use rate of 132 GPCD by 2050.
- The DWR Goal scenario shows the projected deliveries based on population if DWR-defined targets are to be met in 2030, 2040, and 2065.

Table 10 includes the projected breakdown of residential units in the City under each density scenario. This is based on the permitted density of 4 units per gross acre for detached dwellings, 18 units per gross acre for detached dwellings, and an average of 9 units per gross acre for mixed-density areas.

TABLE 10: PROJECTED DWELLING UNITS FOR EACH DENSITY SCENARIO

Total Dwelling Units				
Land-Use Type	Existing 2025	2050 Scenarios		
		Historic Residential Mix	Compact and Centered Growth	Connected and Active Communities
Detached	1,970	4,020	3,350	3,127
Attached	114	45	447	223
Mixed Detached and Attached	-	402	670	1,117
Total Units	2,084		4467	

Additionally, the historical average of 30 GPCD consumed by non-residential uses was added onto all scenarios to obtain a total consumption rate in 2050. This assumes that total commercial use will increase at the same rate as the population, which may not be the case, but this assumption was determined to be sufficient for this high-level analysis. The projected 2050 use rates were paired with population estimates for 2025, 2050, and years between to project the total deliveries in each year. Although it's inaccurate to assume that development-driven reductions in per-capita use will be realized immediately, it was found that interpolating intermediate rates between now and 2050 produced only a marginal difference in the projections, so this was ignored for simplicity. The Water Conservation Plan will include a more detailed analysis. **Figure 22** plots all scenarios.

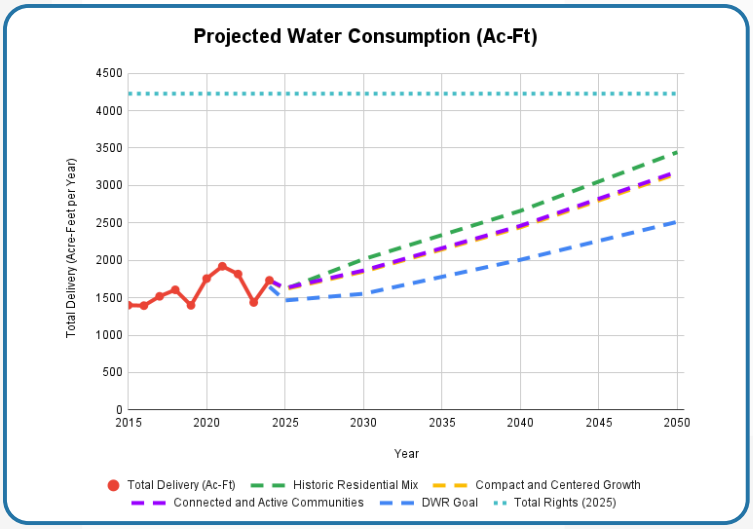


FIGURE 22: Water Consumption Projections (Based on Land Use)

Based on these projections, it is expected that the City's water system will require between **3900** and **4250 acre-feet** of available water per year by 2050 (after adjusting for system losses). The 2020 Culinary Water Master Plan conducted by the City projected that the City would have the following water rights available:

- 682.44 Acre-Feet per year collected from Development
- 5,368 Acre-Feet per year owned by the City.

These amounts were included in **Figure 22**, both adjusted downward using the average historical loss rate in the system (21%) to reflect the water that could be delivered to customers under the current conditions. **As shown, the City's policies for acquiring water rights will ensure that enough water is available to meet projected demand through 2050, provided that water rights are developed sufficiently. However, the City's current trajectory places it above the targets the DWR has set. Implementing additional measures for water conservation as discussed later in this report will be necessary to meet these goals and defer costly supply expansions.** It should be noted that these projections are high-level, and they will be explored in more detail in the City's upcoming Water Conservation Plan update.

Water-Use Projections Based on Population

A series of high-level projections were developed to predict future water demand based on expected population growth alone, in addition to the land-use-based projections discussed earlier. Total water use was projected in each analysis year using the following scenarios for per-capita consumption:

- Assuming per-capita use remains constant at 2024 levels (164 GPCD).
- Assuming per-capita use returns to the level seen in the baseline year of 2015 (177 GPCD) and remains there. This is the most conservative (highest) projection.
- Assuming per-capita use is reduced from 2015 levels to meet the target set by the DWR for Cache County (145 GPCD from 2025 to 2030, 135 GPCD by 2040 and 132 GPCD by 2050–a value obtained through interpolation between the goals for 2040 and 2065).

Given the above scenarios, the projected growth in water consumption through 2050 is as shown in **Figure 23**.

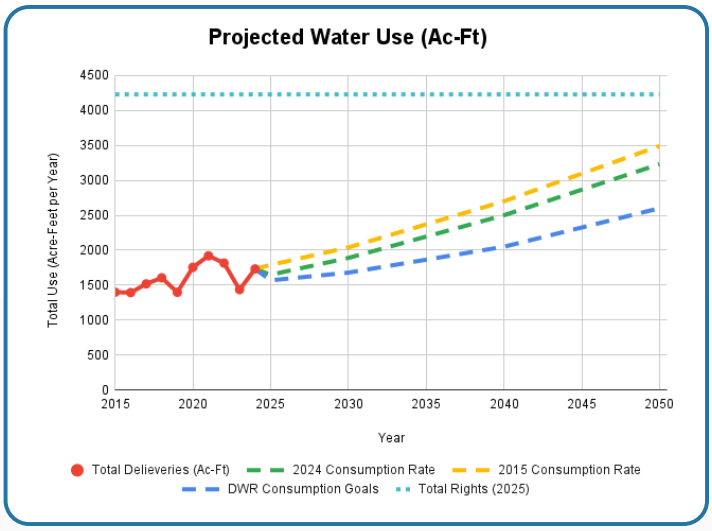


FIGURE 23: Water Consumption Projections (Based on Population)

Based on these projections, it is expected that the City's water system will require between **3900** and **4300 acre-feet** of available water per year by 2050 (after adjusting for system losses). **As shown in Figure 23, the available water rights in the City should be sufficient for the City's needs through 2050; however, this analysis confirms that conservation measures are needed to meet the consumption goals set by the DWR**.

Reducing Water Demand and Per-Capita Consumption for Future Development

Indoor Water Use

New development presents an opportunity to move towards water efficiency as the standard for construction in the city. Water-efficient shower heads, toilets, and other plumbing fixtures save residents money and reliably conserve water without requiring additional effort from users. When combined with good habits (discussed below), water-efficient construction standards can move the needle on water conservation in the City. It is recommended that the City continue to adopt requirements for water-efficient plumbing and infrastructure in its building code.

Outdoor Water Use and Sustainable Landscapes

In Utah, outdoor residential water use is the largest single category of municipal water use, averaging 45-percent of statewide municipal use. Approximately 65-percent of culinary water is applied, often inefficiently, to landscapes. For this reason, many communities are focused on promoting water-efficient and sustainable landscaping to help conserve water.

Reducing outdoor water use has been at the center of the City's own conservation efforts; to this end, the City has adopted a number of programs and policies to encourage the cultivation of greenspace that is attractive and water-efficient. Foremost among these are the landscaping requirements defined in the City Code section 19.24.170. These include minimum requirements for landscape coverage on residential and commercial lots, while capping the proportion of landscaping that can be used for turf grass, outside of that with an active recreational use. Turf grass is prohibited in park strips, and the City is participating in a turf buyback program to provide rebates to property owners who replace park strip turf with trees and other landscaping. All of these policies will help ensure that new development adopts water-wise practices from the beginning.

Reducing Water Demand and Per-Capita Consumption for Existing Development

For developments that already exist, the primary mechanism to decrease water use is through public education and financial incentives to change behaviors and retrofit inefficient systems.

Indoor Water Use, Incentives, and Public Education

Public education and incentive structures are important elements of a water conservation program. Many members of the public may be concerned about inefficient water use, and providing educational materials can help them learn new habits that can have a positive impact for very little effort. The following principles should be shared with the public:

1. **Do not use the toilet as a wastebasket** - Put all items such as tissues, wrappers, diapers, and cigarette butts in the trash can.
2. **Check the toilet for leaks** - Is the water level too high? Put a few drops of food coloring in the tank. If the bowl water becomes colored without flushing, there is a leak.
3. **In the absence of a low-water flush toilet, put a plastic bottle full of sand and water to reduce the amount of water used per flush.**
    a. However, be careful not to over conserve to the point of having to flush twice to make the toilet work. Also, be sure the containers used do not interfere with the flushing mechanism.
4. **Take short showers with the water turned up only as much as necessary -** Turn the shower off while soaping up or shampooing.
5. **Install low flow showerheads and/or other flow restriction devices.**
6. **Do not let the water run while shaving or brushing teeth** - Fill the sink or a glass instead.
7. **When doing laundry, make sure you always wash a full load or adjust the water level appropriately if possible** - Most machines use 40 gallons or more for each load, whether it is two socks or a week's worth of clothes.
8. **Repair any leak within the household** - Even a minor slow drip can waste up to 15 to 20 gallons of water a day.
9. **Know where the main shutoff valve is and make sure that it works** - Shutting the water off immediately when a pipe breaks or a leak occurs will not only save water, but also eliminate or minimize damage to personal property.
10. **Keep a jar of water in the refrigerator for a cold drink instead of running water from the tap until it gets cold** - This avoids the need to put several glasses of water down the drain for one cold drink.
11. **Plug the sink when rinsing vegetables, dishes, or anything else** - use only a sink full of water instead of continually running water down the drain.

Further, aligning incentive structures with conservation best practices can help encourage more efficient water use. This can include adopting and advertising variable rates to discourage outdoor use during the hottest parts of the day. This topic, including efficient metering practices, can be explored more in-depth during the development of the water conservation plan.

Outdoor Water Use and Sustainable Landscapes

It is recommended that the City monitor the implementation and impacts of these ordinances and make adjustments as necessary; in particular, the City wishes to consider instituting a permitting process for new landscaping to ensure compliance and avoid the need to enforce costly tear-outs of non-compliant landscaping post-construction. To further the efforts the City has been making to promote efficient landscaping practices in new developments, it can provide education to residents on the following principles of sustainable landscaping, as well as implementing these principles in the maintenance of public green spaces:

Principles of Sustainable Landscaping

1. **Use turf grass efficiently** - Turf grass can be a practical and beneficial component of a water-wise landscape when properly applied; however, turf-grass-heavy landscapes are often designed and maintained inefficiently. Inefficient practices include overwatering, placing grass in areas that are inefficient to irrigate such as on steep slopes or in narrow spaces, and planting in areas where the grass isn't useful.
2. **Employ adequate soil preparation** - Best practices vary from plant to plant, and it is important to plan accordingly.
3. **Plan to place the right plants in the right places** - The placement of plants in a landscape should be chosen to maximize their desired usefulness and ensure that their water, light, and space needs are met. A water-efficient landscape provides shade, privacy, and beauty while minimizing waste, with the added benefit of decreasing yard maintenance.
4. **Select Trees with Reasonable Water Requirements.**
5. **Retain soil moisture with mulch** - mulching around trees, shrubs, and flower beds can result in a ten-fold reduction in evaporative water loss from the soil.
6. **Employ efficient irrigation techniques** - plants with similar water needs should be grouped together ("hydrozoning"). Then each zone can be watered on a schedule that meets its needs.
7. **Consider seasonal weather patterns** - for example, cut back on watering times in the spring and fall, when temperatures are cooler.
8. **Do not water on windy days and/or rainy days.**
9. **Do not water between the hours of 10:00 AM and 6:00 PM.**
10. **Sweep sidewalks and driveways instead of using the hose to clean them.**
11. **Wash cars using a bucket of soapy (biodegradable) water and rinse while parked on or near the grass or landscape** - ensure that the water running off goes to beneficial use instead of running down the gutter to waste.
12. **Check for and repair leaks in all pipes, valves, faucets, and hoses on secondary and culinary systems** - Verify there are no leaks by turning everything off and checking the water meter and valves to see if it is still running. Some underground leaks may not be visible due to draining off into storm drains, ditches, or traveling outside the property.
13. **Adjust and repair sprinkler heads** - maintain proper spray patterns and eliminate waste.
14. **Periodically check and adjust timers on sprinkling systems.**
15. **Cut lawns at the highest setting on the mower and keep all other landscaped areas free of weeds to reduce overall water needs.**
16. **The use of water fountains is discouraged.**
17. **Encourage low water landscaping at intersections, planting strips and similar locations in the city.**
18. **Continue to implement and monitor low-impact development practices** (see page 36 of the City's Engineering Standards) in all new developments, with a focus on minimizing the need for City water by capturing stormwater for productive use.

Modifying Operations to Eliminate Water Waste

One of the most impactful ways to reduce overall water consumption is to minimize waste that occurs due to theft, leakage, and other factors. Where relying on individual behavior changes presents uncertainty, the system loss between source and consumer is something that the City can directly control. The following are policies and practices that the City can adopt to reduce system waste:

- Continue to update and implement the projects outlined in the 2020 Culinary Master Plan - this plan tracks the condition of each asset and makes recommendations to keep the system in good repair.
- Conduct leak-detection testing for all waterlines - this should be done during trenching activities and annually on all main pipelines and services, especially in older areas of the system.
- Implement a program to replace galvanized steel water lines with copper and polyethylene pipe - these are less prone to corrosion and mineral buildup.
- Consider conducting regular water audits - these help to accurately quantify waste and identify targeted solutions.
- Install water meters on secondary connections to eliminate waste and monitor use.
- Encourage compact development; minimizing the length of water delivery systems while serving the same number of residents means less infrastructure that will deteriorate and leak.

Implementation

1. Establish a Clear and Realistic Vision for Nibley's Water Resources, Rights, and Delivery Systems.

a. Ensure access to the culinary water system is available for future developments in the City.
b. Meter secondary connections.
c. Educate the public on best practices for indoor and outdoor water use, as well as the City's current progress on meeting water conservation targets.
    - Develop educational materials such as brochures, online resources, and social media posts.
    - Include materials with water bills.
    - Provide school classrooms with lesson materials on water conservation and environmental stewardship.
d. Update the Culinary Water Master Plan to provide updated information to water providers and stakeholders on changes that need to take place.
e. Continue to require developers to provide needed water rights as development occurs.

2. Adopt Water Use Targets that Meet Local Needs While Reducing Unnecessary Consumption of Water Resources

a. Continue to adopt land use policies and practices that compliment ongoing water conservation efforts.
b. Continue to implement and encourage the City's water conservation ordinances with regards to landscape development.
c. Consider requiring single-family developments and similar uses to set measurable water conservation targets.
d. Implement the following measures as commercial centers develop:
    - Consider water use in the decision process regarding licensing of new commercial businesses
    - Consider requiring businesses to incorporate efficient water practices in their operations.
    - Consider giving lower-water use applicants ~~be~~ priority over higher-water users.
    - Consider adopting tiered water rates to encourage compliance with planned water use.

3. Collaborate with Neighboring and Regional Communities in Joint Water Preservation Efforts

a. Emphasize and fund education related to the Utah Division of Water Resources M&I Report.
b. Ensure the M&I Report is incorporated into future master plans.
c. Support improvements to local water rate structures to align incentives with continued conservation efforts.

d. Support programs to install higher-efficiency toilets, faucets, and shower heads.
e. Promote programs to repair indoor leaks and encourage good indoor water use habits.
f. Implement improved water timing systems for outdoor water applications that increase efficiency by adjusting irrigation schedules based on weather, landscaping needs, and drip irrigation systems.
g. Discuss water conservation efforts regularly with nearby communities, the County, and the Division of Water Resources.

4. **Implement Policies to Protect the Watershed and Drinking Water Resources**

a. Continue implementing low-impact development to recharge groundwater, minimize outdoor use, and preserve the natural water cycle to the highest extent possible.
b. Allow compact development and redevelopment that minimizes impacts on hillsides and the watershed by slowing urban sprawl.
c. Implement policies and practices to minimize waste and system losses in the water delivery system as described above.



IX. ECONOMIC DEVELOPMENT ANALYSIS

> I would love to see more restaurants and a grocery store, but still maintain the rural vibe of Nibley. A city center would help provide both options.
>
> — General Plan Survey Response

ECONOMIC DEVELOPMENT ANALYSIS

Analysis of Taxable Sales

Taxable sales within Nibley provide an important metric to assess the general economic health of the City. A sales gap (or "leakage") analysis is used to identify economic development opportunities for a community by evaluating the total purchases made by residents inside and outside the community (hence, the term "leakage" for sales lost outside the community). This type of analysis first identifies sales within the County for each major NAICS code category and then calculates the average sales per capita in each NAICS category. Per capita sales in the City are compared to average per capita sales countywide in order to estimate what portion of resident purchases are being made within City boundaries, and what amount is leaving the City. The resident purchases being made outside of the City represent an opportunity to recapture some of these lost sales. The analysis divides taxable sales into three major categories: retail sales, industry sales and sales related to services.

Retail Taxable Sales

Retail accounts for the largest share of taxable sales, making up 62% of total sales. Nibley's greatest retail strength is the Non-Store Retailers, accounting for 33 percent of total taxable sales, followed by sales at Motor Vehicle & Parts Dealers, Gasoline Stations, and Durable Goods (Wholesale Trade).

TABLE 11: RETAIL SPENDING BY PERCENT OF TOTAL RETAIL AND SERVICE TAXABLE SALES

NAICS Category	2020	2021	2022	2023	2024
Building Material & Garden Equip	1.7%	2.1%	2.0%	2.2%	1.3%
Clothing & Accessories	1.7%	1.8%	1.8%	1.7%	1.7%
Electrical & Appliance	0.9%	0.9%	0.9%	0.7%	0.8%
Food & Beverage	0.0%	0.0%	0.0%	0.0%	0.0%
Furniture & Home Furnishing	2.5%	0.7%	0.4%	1.1%	1.2%
Gas Station	10.2%	9.3%	9.6%	8.9%	8.2%
General Merchandise	1.4%	1.8%	1.9%	2.1%	2.6%
Health & Personal	0.4%	0.4%	0.8%	2.8%	1.2%
Miscellaneous Retail Trade	5.9%	2.5%	2.0%	1.8%	1.9%
Motor Vehicle & Parts Dealers	17.5%	23.6%	23.2%	21.6%	21.8%
Non-Store Retailers	41.4%	37.5%	35.8%	33.0%	32.8%
Sporting Good	0.8%	0.8%	1.0%	0.9%	1.6%
Wholesale Trade-Durable Goods	6.8%	6.6%	5.6%	6.1%	6.3%
Wholesale Trade-Nondurable Goods	0.5%	0.4%	0.5%	0.5%	0.5%
Wholesale Trade-Agent & Brokers	0.4%	0.5%	0.4%	0.6%	0.2%

Services Taxable Sales

Services represent 14 percent of the City's total taxable sales. Professional, Scientific and Technical Services represent the largest spending category in this group. Industries in this spending category consist of varied professions in both commercial spaces and home businesses. The second largest category is Motor Vehicle & Parts Dealers.

TABLE 12: SERVICES SPENDING BY PERCENT OF TOTAL RETAIL AND SERVICE TAXABLE SALES

NAICS Category	2020	2021	2022	2023	2024
Accommodation	0.3%	0.4%	0.6%	0.5%	0.6%
Administrative Support, Waste Management & Remediation Services	0.4%	0.4%	0.1%	0.1%	0.1%
Arts, Entertainment, And Recreation	0.0%	0.1%	0.1%	0.0%	0.3%
Educational Services	0.0%	0.0%	1.3%	2.0%	2.3%
Finance & Insurance	0.4%	0.4%	0.1%	0.2%	0.3%
Food Services & Drinking Places	0.2%	0.4%	1.3%	0.9%	1.7%
Health Care & Social Assistance	0.0%	0.0%	0.0%	0.0%	0.0%
Management of Companies & Enterprises	0.0%	0.0%	0.0%	0.0%	0.0%
Other Services, Except Public Administration	1.9%	1.4%	1.4%	1.9%	2.7%
Professional, Scientific, & Technical Services	3.3%	6.2%	7.8%	9.2%	8.1%
Public Administration	0.0%	0.0%	0.0%	0.0%	0.0%
Real Estate, Rental, & Leasing	1.5%	1.6%	1.3%	1.3%	1.6%

Industry Taxable Sales

Seventeen percent of Nibley's taxable sales are industry related. Utilities sales represent the largest spending category.

TABLE 13: INDUSTRY SPENDING BY PERCENT OF TOTAL RETAIL AND SERVICE TAXABLE SALES

NAICS Category	2020	2021	2022	2023	2024
Agriculture, Forestry, Fishing & Hunting	0.0%	0.0%	0.0%	0.0%	0.0%
Construction	0.8%	0.8%	2.1%	2.9%	1.5%
Information	5.8%	5.6%	5.3%	5.4%	6.2%
Manufacturing	0.5%	1.9%	3.1%	1.9%	2.6%
Mining, Quarrying, & Oil & Gas Extraction	0.0%	0.0%	0.0%	0.0%	0.1%
Transportation & Warehousing	0.0%	0.0%	0.0%	0.0%	0.0%
Utilities	10.2%	10.0%	11.7%	12.7%	11.7%

Sale Leakage Analysis

The table below provides a general overview of leakage and retention by major category. Negative numbers estimate the approximate leakage of taxable sales from Nibley City to other communities. The population and taxable sales numbers used in this analysis are from 2024. When leakage is occurring, the capture rate is below 100 percent, indicating the City is not collecting the average sales expected based on a per capita basis relative to the State average. While few categories are present for Nibley, positive numbers indicate that Nibley City is attracting more than the State average relative to that category, suggesting shoppers from outside the City are attracted to the area for certain types of purchases or that there is a high concentration of this type of spending. This is reflected in the capture rate as a number above 100 percent.

TABLE 14: 2024 RETAIL SALES LEAKAGE

NAICS Category	City Direct Taxable Sales	Per Capita Spending	County Per Capita Spending	Capture rate	Per Capita Leakage	Total Leakage
RETAIL						
Building Material & Garden Equip	$565,569	$74	$1,477	5%	($1,403)	($10,732,463)
Clothing & Accessories	$722,746	$94	$471	20%	($377)	($2,883,883)
Electrical & Appliance	$349,146	$46	$321	14%	($275)	($2,107,661)
Food & Beverage	$4,942	$1	$2,333	0%	($2,332)	($17,844,664)
Furniture & Home Furnishing	$525,480	$69	$193	36%	($125)	($952,697)
Gas Station	$3,500,000	$457	$398	115%	$59	$454,545
General Merchandise	$1,096,449	$143	$2,420	6%	($2,277)	($17,419,827)
Health & Personal	$498,129	$65	$257	25%	($192)	($1,466,617)
Miscellaneous Retail Trade	$815,500	$107	$627	17%	($521)	($3,984,186)
Motor Vehicle	$9,329,986	$1,219	$2,009	61%	($790)	($6,042,052)
Non-Store Retailers	$14,018,533	$1,832	$1,747	105%	$85	$649,403
Sporting Good	$702,997	$92	$489	19%	($397)	($3,036,912)
Wholesale Trade-Durable Goods	$2,675,131	$350	$1,417	25%	($1,068)	($8,167,761)
Wholesale Trade-Nondurable Goods	$220,083	$29	$266	11%	($237)	($1,814,803)
Wholesale Trade-Agent & Brokers	$100,619	$13	$36	37%	($23)	($173,879)
Subtotal Retail	$35,125,310	$4,591	$14,462	32%	($9,871)	($75,523,457)
INDUSTRY						
Agriculture, Forestry, Fishing & Hunting	$12,282	$2	$19	9%	($17)	($130,289)
Construction	$621,648	$81	$494	16%	($413)	($3,160,176)
Information	$2,631,355	$344	$886	39%	($542)	($4,150,450)
Manufacturing	$1,117,164	$146	$941	16%	($795)	($6,084,205)
Mining, Quarrying, & Oil & Gas Extraction	$25,000	$3	$80	4%	($77)	($589,487)
Transportation & Warehousing	$8,000	$1	$36	3%	($35)	($268,316)
Utilities	$5,000,000	$654	$589	111%	$65	$494,086
Subtotal Industry	$9,415,449	$1,231	$3,046	40%	($1,815)	($13,888,836)

TABLE 14: 2024 RETAIL SALES LEAKAGE (continued)						
NAICS Category	City Direct Taxable Sales	Per Capita Spending	County Per Capita Spending	Capture rate	Per Capita Leakage	Total Leakage
SERVICES						
Accommodation	$250,000	$33	$250	13%	($218)	($1,665,669)
Admin. & Sup & Waste Man. & Remed. Ser	$49,002	$6	$81	8%	($75)	($571,652)
Arts, Entertainment, and Recreation	$118,232	$15	$165	9%	($150)	($1,147,227)
Educational Services	$996,938	$130	$95	138%	$36	$272,767
Finance & Insurance	$135,713	$18	$45	39%	($27)	($208,466)
Food Services & Drinking Places	$734,728	$96	$1,562	6%	($1,466)	($11,217,542)
Health Care & Social Assistance	$3,000	$0	$37	1%	($36)	($277,584)
Management of Companies & Enterprises	$1,000	$0	$1	13%	($1)	($6,659)
Other Services-Except Public Administration	$1,139,644	$149	$570	26%	($421)	($3,221,509)
Professional, Scientific, & Technical Serv	$3,480,454	$455	$427	106%	$28	$211,108
Public Administration	$1,000	$0	$269	0%	($269)	($2,058,515)
Real Estate, Rental, & Leasing	$675,719	$88	$433	20%	($345)	($2,640,051)
Subtotal Services	$7,585,430	$991	$3,936	25%	($2,945)	($22,531,000)
OTHER						
Subtotal Other	$4,619,580	$604	$615	98%	($11)	($84,636)
ALL TAXABLE SALES						
TOTAL	$56,745,769	$7,417	$22,059	34%	($14,642)	($112,027,929)

*Income Adjusted



The City is leaking in most of all the major categories relative to County average spending. The per capita spending in Nibley is approximately $7,417, compared to the County average of $22,059. The total taxable sales leaking to other communities is estimated at $112M. Assuming a sales tax levy of 0.5 percent based on point of sale, this equates to a loss of $571K in tax revenues for 2024 sales.

The sales leakage from neighboring communities shown in **Figure 25** highlights that Logan serves as the core economic and commercial engine of the Cache Valley area. Logan captures a substantial share of regional taxable sales from the surrounding cities

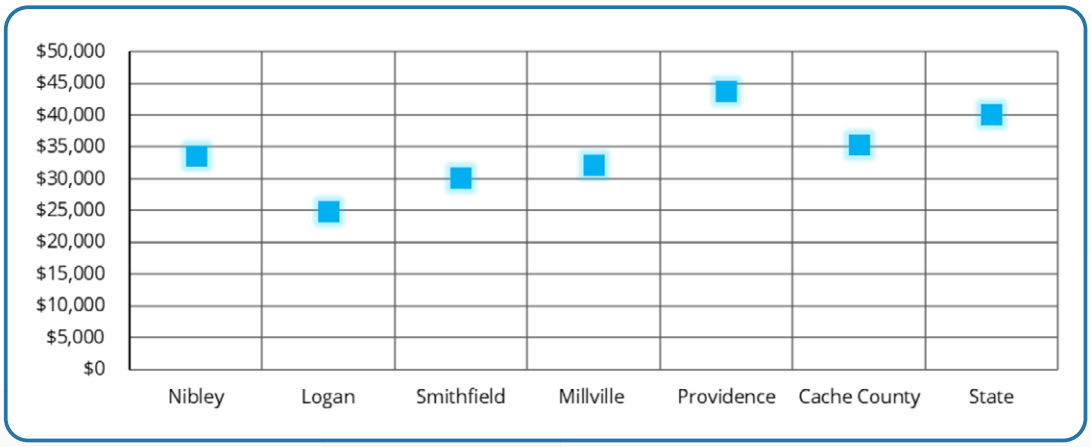


FIGURE 24: Neighboring Communities Per Capita Income

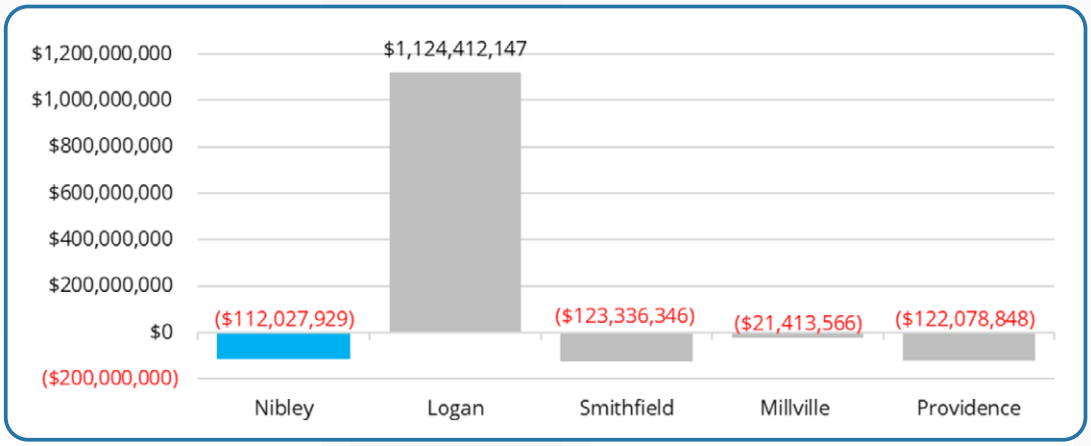


FIGURE 25: 2024 Neighboring Communities Taxable Sales Net Capture

Figure 26 illustrates the taxable sales over the past 10 years. With the increase in taxable sales, there has been an even larger increase in leakage. The annual estimated lost revenue increased by **401%** while the taxable sales occurring in Nibley only increased by **174%.** Per Capita spending increased by 51% .

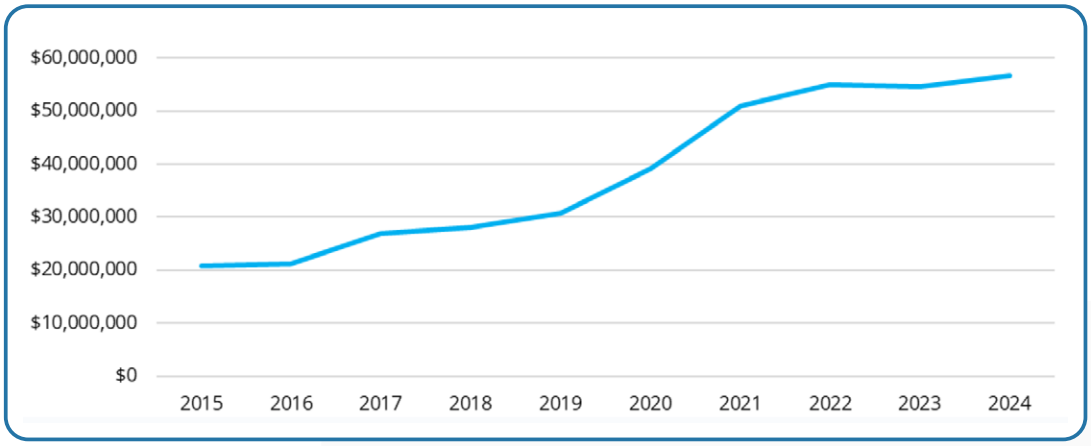


FIGURE 26: Historic Taxable Sales

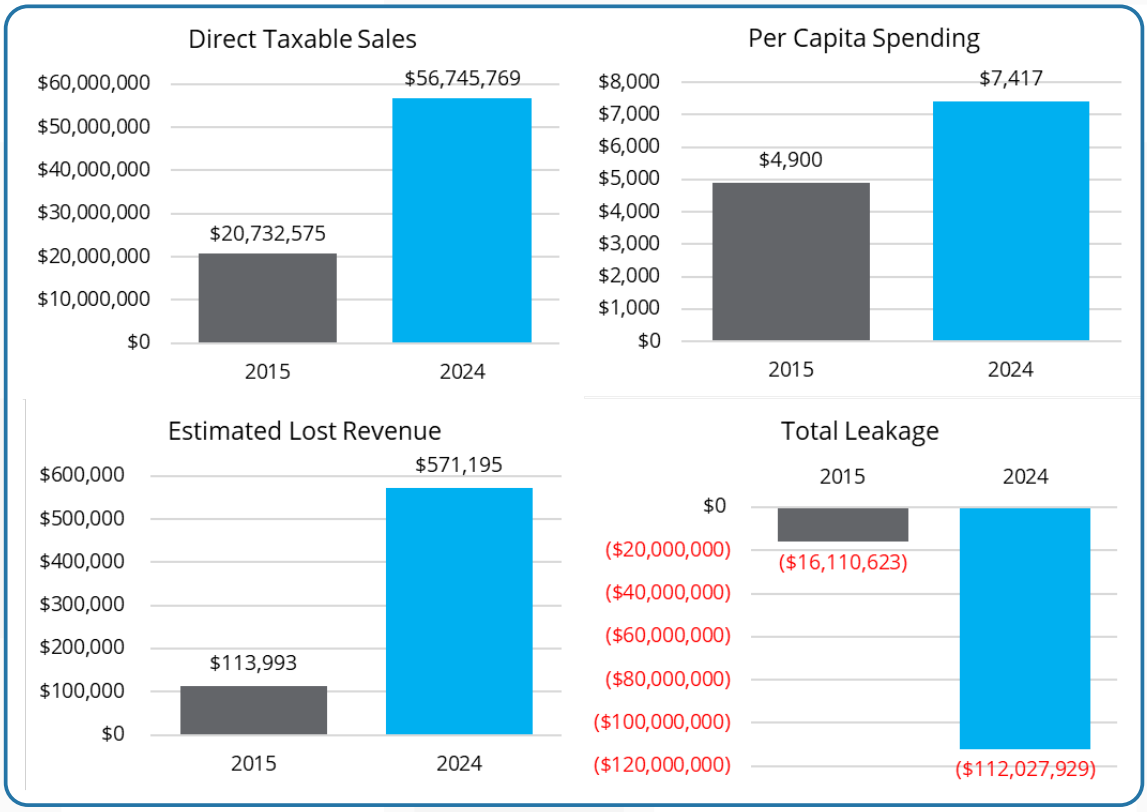


FIGURE 27: Historic Taxable Sales Comparison

Existing Market Conditions

The following section will address existing market conditions within the City including taxation, land uses and zoning, and an illustration of competitive market sites.

Property Tax

The total Nibley tax rate is made up of levies by Cache County, Multicounty and County Assessing, Cache County School District, Nibley City, the Millville-Nibley Cemetery Maintenance District, the Cache Mosquito Abatement District, and the Cache Water District. As shown in **Figure 28** the Cache County School District has historically accounted for approximately between 65 and 67 percent of the tax rate. The Nibley City municipal tax rate as a percentage of the total tax rate has fluctuated historically between 14 percent and 17 percent as shown in **Figure 29**.

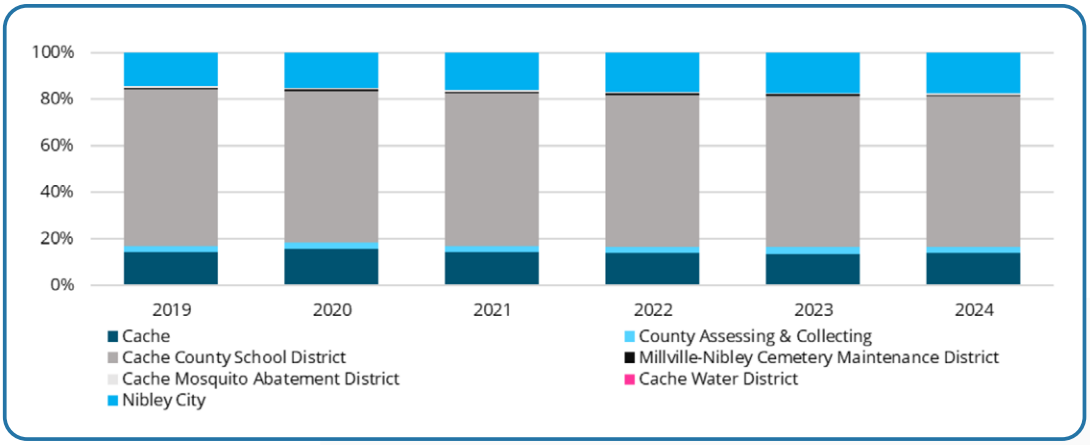


FIGURE 28: Historic Total Tax Rate For Nibley City

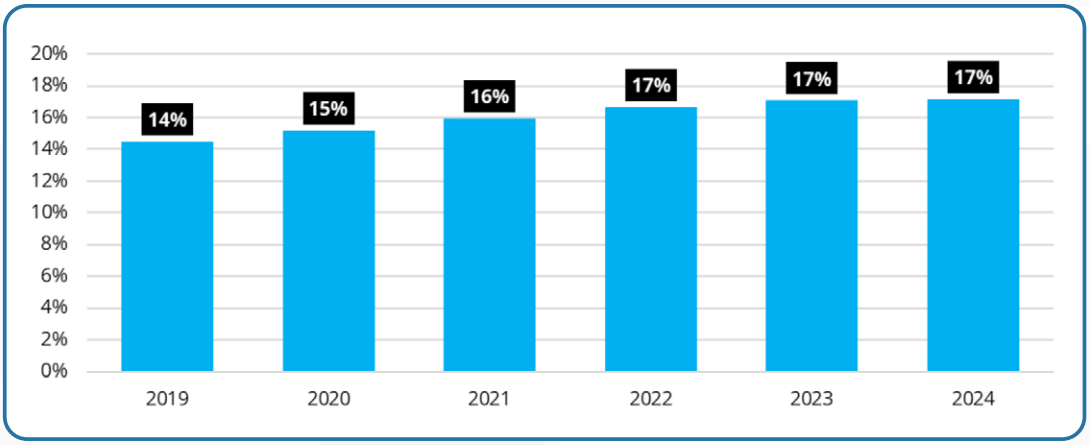


FIGURE 29: Historic Total Tax Rate For Nibley City

Land Use Analysis

The distribution of land uses in the City illustrates a concentration of residential development, with almost 83.7 percent of the City's Square footage attributed to residential properties. There are approximately 281 acres of vacant land, as shown below.

TABLE 15: NIBLEY CITY LAND USE DISTRIBUTION

Category	Total Market Value	Parcel Acres	SQFT	Land Market Value	% of Total SQFT	Parcel Count
Residential	$1,394,317,485	1,812	$4,442,095	$467,593,278	83.7%	2,714
Agricultural	$57,753,483	693	36,817	$56,884,686	0.7%	83
Commercial	$95,316,006	217	781,702	$27,664,436	14.7%	78
Tax Exempt	$1,251,000	203	2,690	$1,251,000	0.1%	121
Unknown	$1,931,000	1	18,740	$1,931,000	0.4%	23
Vacant	$23,379,572	281	23,918	$23,368,079	0.5%	163
Blank	0	0	0	0	0%	14
Grand Total	$1,573,948,546	3,206	5,305,962	$578,692,479	100%	3,182

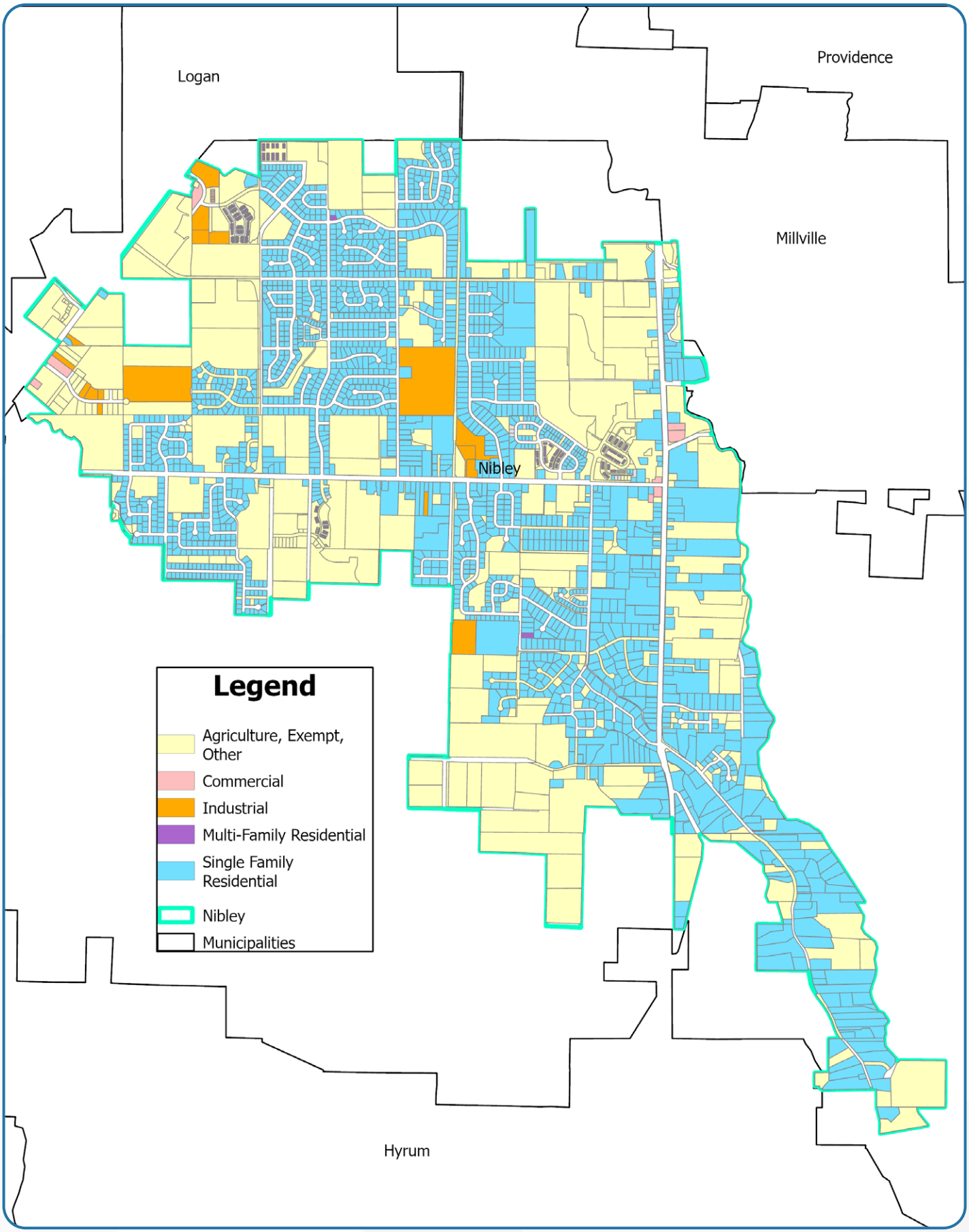


FIGURE 30: Existing Property Types within Nibley City

Competitive Market Sites

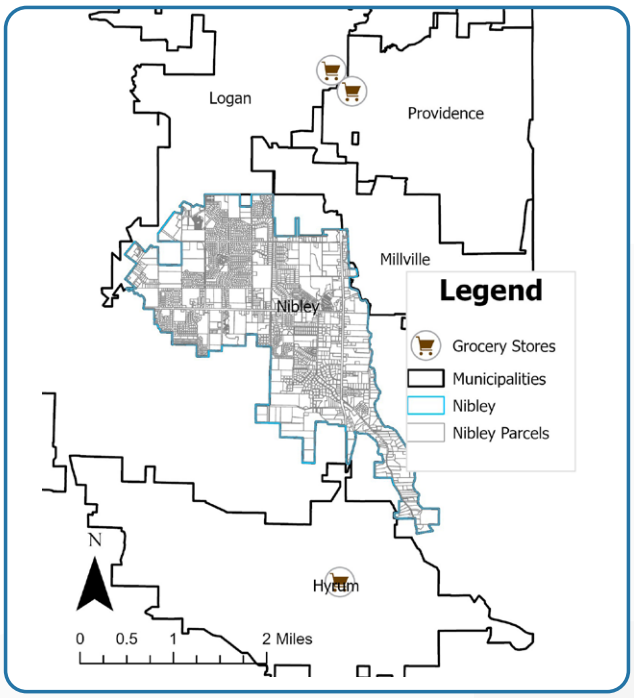


FIGURE 31: Competitive Market Sites

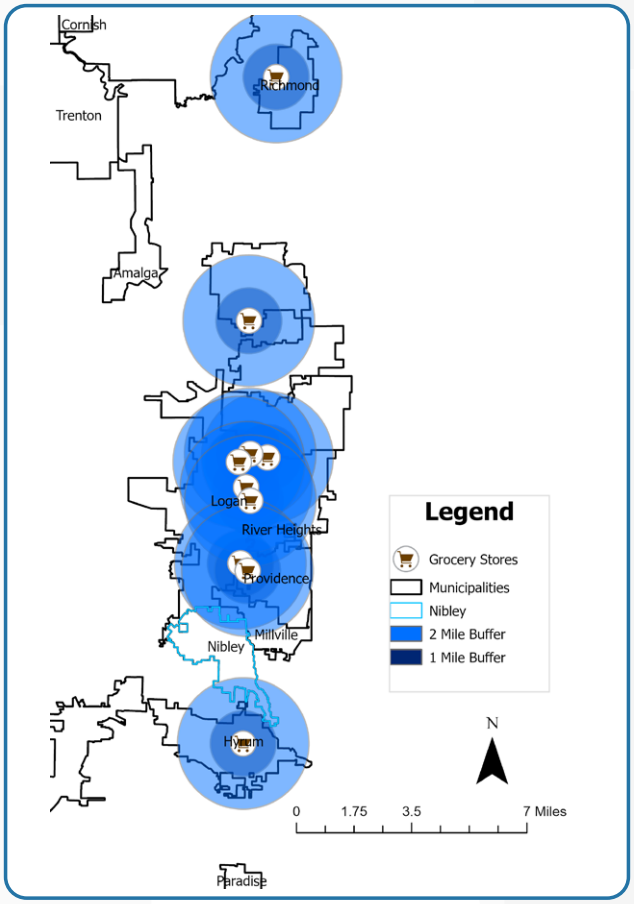


FIGURE 32: Cache County Grocery Sites

There are several competitive markets in the communities surrounding Nibley. **Figure 31** includes three neighborhood scale retail sites containing grocery stores. Logan and Providence both hold competitive sites. Just south of Nibley, Hyrum has a small competitive market. It is important to note that there are other competitive sites other than the grocery sites depicted in the figure below for the purposes of this analysis.

A one- and two-mile buffer of grocery sites in the valley is shown in **Figure 32**. This illustrates that existing competitive markets barely reach Nibley and highlights the City's growth potential. Future commercial growth will continue to follow rooftops.

Employment

US Census On the Map data for 2022 illustrates 195 residents both live and are employed within Nibley while 1,451 of those who work in the City live elsewhere and 3,060 residents of the City are employed outside of the City, demonstrating a larger proportion of residents leaving the City for work.

2025 WFRC TAZ employment projections estimate the total job count in Nibley is 2,816 which is notably higher than the Census estimate. The TAZ data illustrates that the City will experience an increase in the percentage of total employment. All categories of jobs will experience an increase with non-typical jobs (agriculture, construction, mining, and home-based jobs) increasing the most. Office jobs (office, health care, government, and education) are expected to increase at the smallest margin.

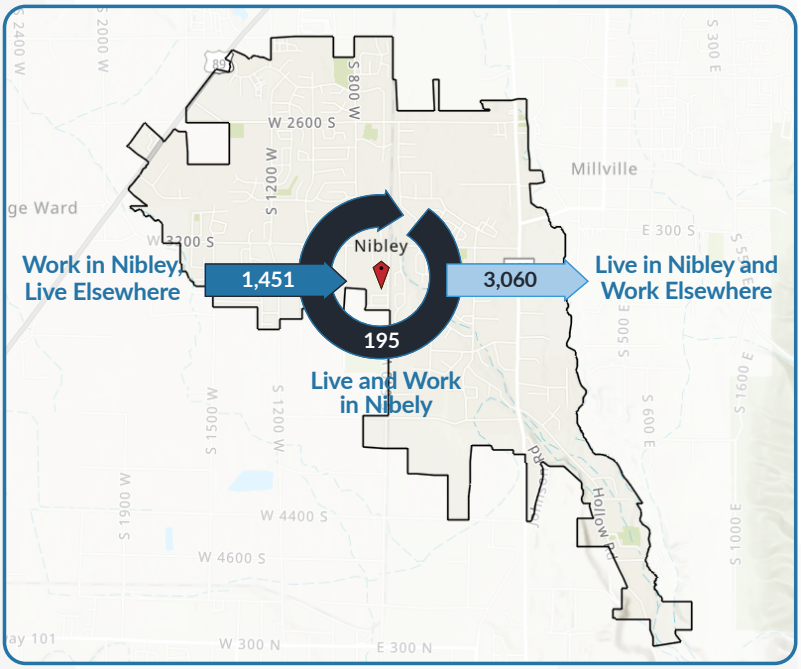


FIGURE 33: US Census 2022 On the Map Data Illustration

TABLE 16: NIBLEY PROJECTED EMPLOYMENT BY CATEGORY						
	Employment				Growth (2025–2050)	
	2025	2030	2040	2050	Numeric Increase	Percent Increase
Industrial Jobs	714	721	787	857	143	16.7%
Non-Typical Jobs	854	940	1,100	1,252	398	31.8%
Office Jobs	526	558	577	560	34	6.1%
Retail Jobs	722	918	505	759	37	4.9%
Nibley Total	**2,816**	**3,137**	**2,969**	**3,428**	**612**	**17.9%**

Source: Wasatch Front Regional Council, Traffic Area Zone Projections

Regional Growth and Employment

As shown in Figure 1, the City's population is projected to continue to increase through 2050, reaching 17,800 persons per General Plan estimates

The population and employment in Cache County will also continue to grow. Although employment in Nibley is projected to grow by 21.7%, the total growth makes up 2.3% of the county's employment growth. Many of the less populated cities in Cache Valley will also see their workforce grow by a high percentage, but the majority of the growth in employment will happen in Logan City. It is important to note that this data represents employment populations within a community and not the amount of workforce living within a community.

TABLE 17: CACHE COUNTY CITIES PROJECTED EMPLOYMENT						
	Employment				Growth	
	2025	2030	2040	2050	Numeric	%
Amalga	646	688	782	1,037	390	60.4%
Clarkston	71	74	85	89	19	26.5%
Cornish	102	102	104	130	28	27.6%
Hyde Park	2,030	2,174	2,500	2,554	524	25.8%
Hyrum	4,687	4,973	5,587	6,389	1,702	36.3%
Lewiston	1,030	1,087	1,210	1,488	458	44.4%
Logan	53,826	57,006	64,799	70,931	17,104	31.8%
Mendon	259	284	288	250	(9)	-3.6%
Millville	823	873	968	1,259	436	53.0%
Newton	131	131	172	189	58	44.4%
Nibley	2,816	3,138	2,969	3,427	611	21.7%
North Logan	10,159	10,836	11,822	12,611	2,451	24.1%
Paradise	98	104	127	163	65	66.1%
Providence	3,859	4,143	4,557	4,987	1,128	29.2%
Richmond	1,110	1,166	1,313	1,562	452	40.7%
River Heights	1,186	1,234	1,368	1,517	331	27.9%
Smithfield	4,455	4,766	5,474	5,150	695	15.6%
Trenton	119	123	135	150	31	26.4%
Wellsville	1,079	1,150	1,298	1,515	436	40.4%
Total	**88,487**	**94,051**	**105,557**	**115,398**	**26,911**	**30.4%**

Source: WFRC TAZ All job projections

Supportable Commercial Zoning

To determine the supportable commercial zoning within Nibley, this analysis evaluates future taxable sales growth and per capita spending by sector. This analysis provides an estimate of supportable acreage by the following categories: general retail, industry, services, and total commercial acreage.

~~The supportable commercial zoning methodology employed in this analysis utilizes estimated per capita spending of $7,417 in Nibley. Assuming a new population of 9,549 residents (2024 – 2050) within the City using the General Plan estimates, the total supportable commercial zoning is estimated at approximately 177K – 236K SF. There are several factors that go into the sales volume Per SqFt of gross living area. It can vary by community or nature of the business. Because of this, 2 different numbers for sales volume have been used to estimate a range of supportable commercial square footage as shown in **Table 18**. This analysis assumes a median sales volume of $300 and $400 per square foot of gross leasable area (GLA) and floor area ratios (FAR) of 0.20 and .18.~~



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TABLE 18: SUPPORTABLE COMMERCIAL ZONING BASED ON PER HOUSEHOLD SPENDING HIGH VOLUME ESTIMATE

Analysis Based on Per Capita Spending	General Retail	Industry	Services	Other	Total
Per Capita Spending (County Income Adjusted)	$4,591	$1,231	$991	$604	$7,417
New Population Growth (2050)	9,549	9,549	9,549	9,549	9,549
Total New Spending	$43,838,921	$11,751,160	$9,467,164	$5,765,569	$70,822,814
Median Sales Volume Per Sq.Ft. of GLA	$400	$400	$400	$400	$400
Supportable SF	**109,597**	**29,378**	**23,668**	**14,414**	**177,057**
General Commercial Floor to Area Ratio	0.20	0.20	0.20	0.20	0.20
Acres Supportable (Based on State per HH Spending)	12.6	3.4	2.7	1.7	20.3
Median Sales Volume Per Sq.Ft. of GLA	$300	$300	$300	$300	$300
Supportable SF	**146,130**	**39,171**	**31,557**	**19,219**	**236,076**
General Commercial Floor to Area Ratio	0.18	0.18	0.18	0.18	0.18
Acres Supportable (Based on State per HH Spending)	18.6	5.0	4.0	2.5	30.1

It is likely that commercial growth will develop around existing neighborhood scale retail, which provides personal services, food services, gas and lodging and general retail purchases. It is expected that the area will continue to see development in small-scale office development as well, as shown in the comparison of average retail development requirements in **Table 19.** With a population of less than 20,000 residents and competition from neighboring communities, expansion will be limited to neighborhood scale developments.

TABLE 19: TYPICAL RETAIL DEVELOPMENT REQUIREMENTS

Type of Center	Leading Tenant	Typical GLA	General Range in GLA	Usual Minimum Size in Acres	Approximate Minimum Population Required
Neighborhood	Supermarket	60,000	30,000 – 100,000	3 – 10	3,000 – 40,000
Community	Supermarket, drugstore/ pharmacy, discount department store, mixed apparel	180,000	100,000 – 400,000	10 – 30	40,000 – 150,000
Regional	One or two full line department stores	600,000	300,000 – 900,000	10 – 60	150,000 or more
Super Regional	Three or more full line department stores	1,000,000	600,000 – 2,000,000	15 – 100 or more	300,000 or more

Source: Urban Land Institute, Retail Development, 4th ed.

Barriers to Entry

Some commercial development may be impacted by factors that serve as barriers toward unconstrained commercial growth within the community. These barriers may include growth in online sales, City ordinances, development costs, or geographic challenges. Future commercial development in Nibley may be hindered by these types of barriers. The following paragraphs discuss some of the barriers to entry that may exist within the City.

Shift to Online Sales

Online sales will continue to impact the traditional brick-and-mortar approach. The US Census Bureau's estimate of retail e-commerce sales as percent of total quarterly retail sales continues to rise, increasing from nearly 6.9 percent in 2015 to 16.1 percent during the first quarter in 2025.[2]

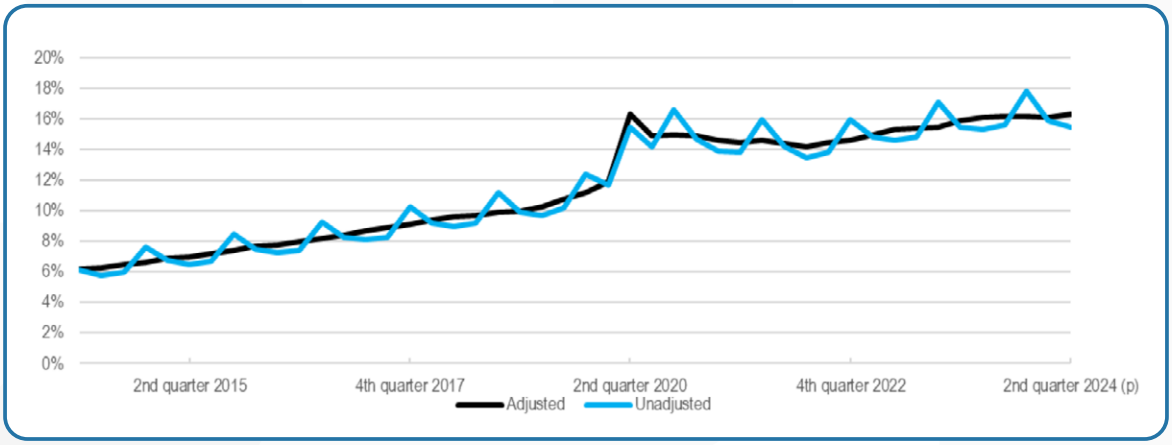


FIGURE 34: Quarterly U.S. Retail E-commerce Sales as a % of Total Quarterly Retail Sales

[2] Source: 2015 Annual Retail Trade Report https://www.census.gov/retail/index.html

Monthly retail sales figures by the Census Bureau show sales from non-store retailers like Amazon, eBay, QVC, and Alibaba increased 6.9 percent from 2023 to 2024.[3] This will likely result in a shift from location-based retail to online purchases. Methods to promote increased commercial development include:

- Allow for more residential development and population growth;
- Provide development incentives;
- Promote niche markets that will capture sales from surrounding communities;
- Remove barriers to entry; and,
- Promote other types of commercial development (industrial, tech, office, etc.).

Although taxable sales in Nibley and Cache County are following the national trend of shifting toward online sales, a significant portion still occurs through traditional retailers. Non-store retailers account for only 7.92% of the County's total sales, ranking as the 4th largest sales category. The categories listed in **Table 20** continue to contribute to local sales, highlighting potential sectors for future economic development initiatives. Retail - food and beverage stores consist of grocery stores and supermarkets while food services & drinking places encompass restaurants, bars, and catering establishments.

TABLE 20: TOP TAXABLE SALES SECTORS IN CACHE COUNTY

	Detailed Sector	Taxable Sales CY 2024	% Total Sales
1	Retail-General Merchandise Stores (452,455)	$362,637,623	10.97%
2	Retail-Food & Beverage Stores (445)	$349,581,013	10.58%
3	Retail-Motor Vehicle & Parts Dealers (441)	$301,058,335	9.11%
4	Retail-Nonstore Retailers (454)	$261,831,782	7.92%
5	Food Services & Drinking Places (722)	$234,082,860	7.08%

Source: Taxable Sales

Land Cost

Another barrier to entry may be the cost of land. A comparison of the total market value of land within Cache County versus Nibley City may illustrate the land value disparity. The total market value of all land within Cache County is approximately $13.9B. With a total of 487K acres of land, this equals around $28K per acre. This data may be impacted by higher ratios of undevelopable, exempt, government, forest or other lower valued lands that are not as prevalent within a City. Nibley's estimated market land value per acre is $180K.

Although Nibley's land value is higher than the county average, it remains cheaper than the neighboring cities Logan and Providence offering a potential economic development advantage. While Hyrum has a slightly lower land value, Nibley's closer proximity to larger populations strengthens its position for supporting commercial development.

TABLE 21: COMPARISON OF MARKET LAND VALUES

2024	Total Acres	Market Land Value	Market Value Per Acre
Cache County	487,264	$13,918,129,882	$28,564
Nibley	3,206	$578,692,479	$180,502
Logan	12,002	$3,559,971,480	$296,615
Providence	2,741	$791,181,104	$288,647
Hyrum	5,219	$886,013,016	$169,767

Source: UGRC Cache County Parcels

[3] Source: U.S. Census Bureau, Retail Indicators Branch

Development Cost: Impact Fees

Many communities within Utah assess impact fees to offset the cost of needed infrastructure related to growth. Total impact fees vary from community based on level of service, age of infrastructure, proportional allocation of buy-in to new facilities, and the inclusion of financing mechanisms and inflation. While impact fees can be a barrier to limiting economic growth, municipalities have tools to mitigate this impact. These include waiving or reducing impact fees, establishing redevelopment areas to fund infrastructure, or allowing development to provide information that may result in a reduced fee.

Location

The City is located along Highway 89 and SR-165.[4] Average Annual Daily Trips (AADT) along these roadways range from 27,000 trips on Highway 89 and 21,000 trips on Main St (SR-165) However, the City is not adjacent to a major interstate. Proximity to a regional transportation network allows communities to attract larger developments like distribution centers or industrial centers, which in turn stimulate job growth and spending.

Lower Population and Rooftops

The City's population is projected to continue to increase through 2050, reaching 17,600 persons [5]. The population in Cache County is projected to reach 201,573[6] with the concentration increasing in the Logan vicinity.

SWOT Analysis

Strengths

Nibley's primary strengths lie in its ongoing growth and residential development, supported by a high level of service (LOS) for parks, recreation, water, and sewer. The flat and developable land offers potential for future expansion, while proximity to Utah State University, recreation areas, and other amenities increase Nibley's appeal. The City has a strong sense of community with a rich history and a younger population with higher-than-average education and income levels. Additionally, the location along state roads provides accessibility, and the presence of a diverse economy that includes home-based businesses contributes to its resilience.

Weaknesses

Despite these strengths, there are identifiable weaknesses. The lack of a defined downtown area limits commercial identity and activity. The continued growth places pressure on services and facilities. There is limited industrial land available for development, which restricts non-residential growth opportunities. Economic development has been slow to match the pace of residential growth, and competition from nearby communities has further challenged the City's efforts to expand its commercial base. Additionally, the high number of residential units along major routes has created potential issues with traffic, safety, and land use ratios.

Opportunities

Nibley has several opportunities to pursue. Economic development, programs, and incentives could attract new businesses and diversify the local economy. Enhancing partnerships with community service providers and developers could strengthen growth management and improve amenities. Downtown revitalization efforts would help establish a more defined commercial core and create a community area that fosters engagement and identity. The future annexation planning could strategically guide future expansion and available opportunities. The City also has opportunities to strengthen relationships with regional organizations such as BRAG.

Threats

With all the growth and opportunities, there are also potential threats that Nibley must address. A high-water table presents a flooding threat and challenges for construction and infrastructure. The predominance of residential land use could limit fiscal sustainability, and economic competition from the established surrounding communities may inhibit growth. Continued residential development without adequate balance could strain local services and infrastructure.

Rising housing costs risk reducing affordability, and uncertainty from state legislation or one-size-fits-all policy approaches could disrupt local planning efforts.

[4] UDOT

[5] Master plan

[6] WFRC TAZ

Implementation

1. **Ensure Financial Sustainability**
   a. Address revenue and expenses in the City's general fund and financial plan. Economic development directly influences the ability and sources used to generate revenue.
2. **Coordinate with Economic Development Entities**
   a. Increase coordination with economic development and planning entities (BRAG) with a focus on the local workforce (USU & Bridgerland).
3. **Focus Commercial Growth in Key Nodes, with Buffers**
   a. Existing and future key development areas include Highway 89, Main Street, the Town Center, 3200 South, and the 4400 South corridor. Positioned between Nibley and Hyrum, 4400 South offers rail access and potential for industrial or mixed-use development. Existing users already generate significant truck traffic.
4. **Maintain Economic Development Focus**
   a. Complete and update Economic Development Strategic plan with established resources and partnerships.
5. **Increase Housing Supply to Match Demand**
   a. Increase housing through higher densities near commercial areas with mixed-use and other residential as indicated in the proposed future land use map.
   b. City should promote housing options to ensure sustainable growth.

Additional Economic Development Financing Tools

There are a wide variety of tools and incentives available to help achieve economic development goals. Below is a brief description of several resources available to the City.

Redevelopment Areas – Tax Increment Financing

Tax increment financing ("TIF") is the most widely used tool for economic development in the State of Utah. The creation of CRAs, or historically URA, EDA or CDAs, provides a source of financing redevelopment through the creation of tax increment. Redevelopment agencies negotiate with taxing entities to share a portion of the property tax that is generated by new development in a certain area for a specific length of time.

Tax Increment Revenue Bonds

Tax Increment Revenue Bonds allow redevelopment agencies to pledge tax increment funds to repay the debt service. The projected tax increment is often discounted by the bond market, as the tax increment is the only source to repay the bonds, and project areas have little to no tax increment at the beginning of a new project. These bonds are generally more difficult to sell, due to the risk of repayment.

Revolving Loan Funds and Grants

A revolving loan fund is a source of money from which loans are made for small business development projects. A loan is made to a business and as repayments are made, funds become available for future loans to other businesses. This tool is mainly used to finance local, expanding, or small businesses within the community.

The funds used to create a revolving loan fund may have rules governing the program design. For example, the Department of Housing and Urban Development has specified rules for Community Development Block Grants. Matching grants or revolving loan funds have been very successful in various communities throughout Utah. Dilapidated areas within the City may benefit from creating a revolving loan fund that would encourage the upgrade of facades and other building renovations. Most businesses see increased traffic from improvements to their properties.

Business Improvement Districts

A business improvement district (BID) is a public-private partnership that allows for additional taxes to be collected from businesses within a designated area. The taxes generated by a BID are used for public improvements based on the concept that well-maintained public spaces will increase commerce. BIDs are managed by nonprofit corporations created by the district. BIDs allow

businesses to share the costs to increase business activity within the community through joint ventures including 1) joint marketing, 2) ad campaigns, 3) events in the district area, and 4) planning for parking and facility improvements. The City may contribute through facilitation of meetings at municipal buildings, advertising on municipal websites, etc.

Sales Tax Incentives

For strong destination retail anchors, the City may offer a sales tax incentive for a period of time. The City should consider sales tax incentives on a case-by-case basis. This should only be considered for a major tax-generating retailer or to retain a current major tax-generating business.

Special Assessment Bonds

Special Assessment Bonds allow a governmental entity to designate a specific area which will be benefited by public improvements and levy a special assessment, like a tax lien, to finance the public improvements. This assessment is then used to repay the debt service. Usually, only the property owners receiving the benefit from the improvements are assessed the costs.

Special Assessment Bonds may not be created if 50 percent or more of those liable for the assessment payment protest its creation. These bonds usually have a higher interest rate than the other bonds discussed in this section. All improvements must be owned by the issuer and repayment cannot exceed twenty years. The main advantage to these bonds is: 1) no bond election required, 2) only benefited owners pay for the improvements, and 3) limited risk to the City.

Municipal Building Authority Lease Revenue Bonds ("MBA")

Cities, counties, and school districts are allowed to create a non-profit organization solely for the purpose of accomplishing the purpose of acquiring, constructing, improving, and financing the cost of a project on behalf of a public body that created it. Normally, MBA bonds are used to construct municipal buildings, however MBA bonds have been used to finance parks and recreation facilities as well. The legal limitation on MBA bonds issued is 40 years.

Sales Tax Revenue Bonds

Sales tax revenues can be utilized as a sole pledge for the repayment of debt. These bonds do not require a bond election and are often used for the acquisition and construction of any capital facility owned by the issuing entity. The bond market usually requires a higher debt service ratio of at least two or three times the revenue to debt.



X. APPENDICES

Appendix A – Growth Scenarios

Appendix B – Housing Development and Analysis Resources

Appendix C – Nibely General Plan Survey Results

Appendix A — Growth Scenarios

SCENARIO 1: GROWTH AS-IS

OVERVIEW

DESCRIPTION:

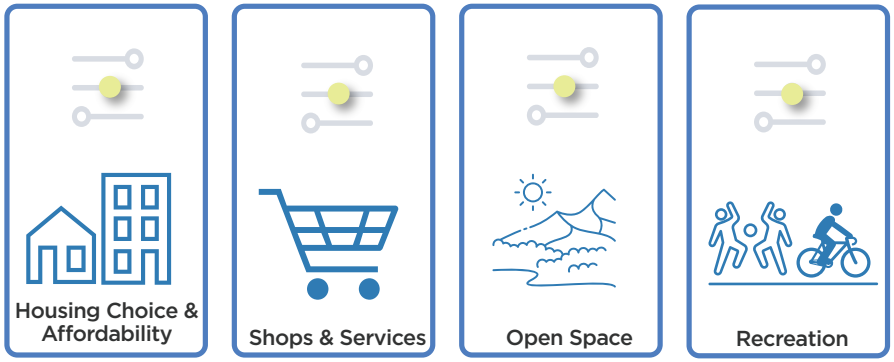
Continue current pattern of growth.

CONSIDERATIONS:

- ✓ Familiar development pattern
- ✓ Supports demand for single-family housing
- ✗ Leads to land sprawl and fewer open space preservation opportunities
- ✗ Limits economic development and future shops and services

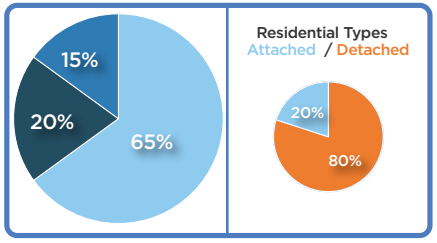
QUALITY OF LIFE METRICS

Low Medium High



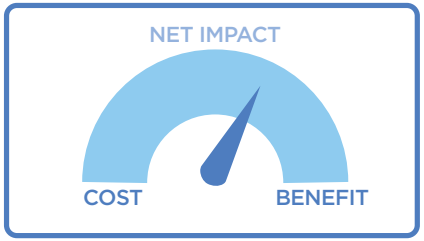
LAND USE MIX

Commercial Residential Open Space



Residential Types
Attached / Detached

TAX IMPACT



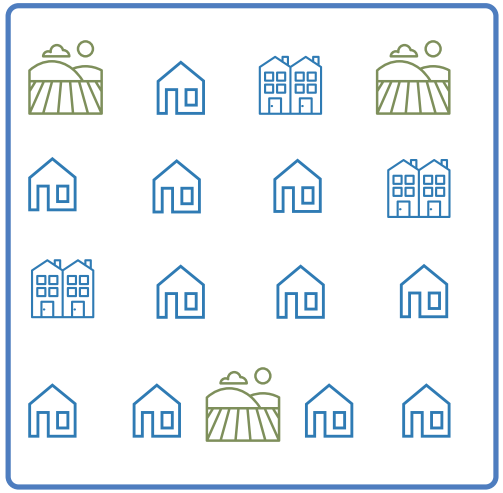
SCENARIO ELEMENTS

HOUSING

Blend of detached and attached units



GROWTH PATTERN



ACCESS TO AMENITIES

DAILY NEEDS AND ESSENTIALS
Groceries, pharmacies, banks

HEALTHCARE
Clinics, childcare, senior services

DINING AND RETAIL
Restaurants, shops, and local businesses

RECREATION AND CULTURAL
Gyms, parks, arts and entertainment

OPEN SPACE

Emphasis on opportunistic open space preservation as future growth occurs.



SCENARIO 2: COMPACT / CENTERED GROWTH

OVERVIEW

DESCRIPTION:

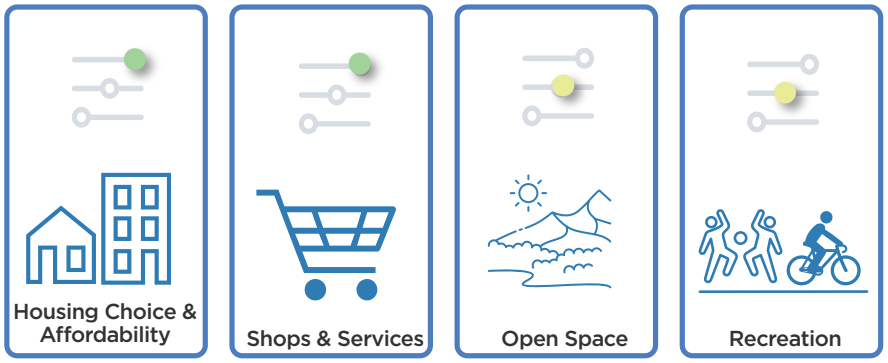
Focus growth into a town center that supports walkability, housing variety, and local businesses.

CONSIDERATIONS:

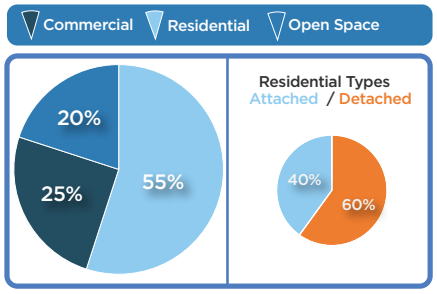
- ✓ Supports community building
- ✓ Encourages growth of local business
- ✓ Preserves open space and rural edges
- ✗ Less familiar patterns of development
- ✗ Requires major zoning and policy change

QUALITY OF LIFE METRICS

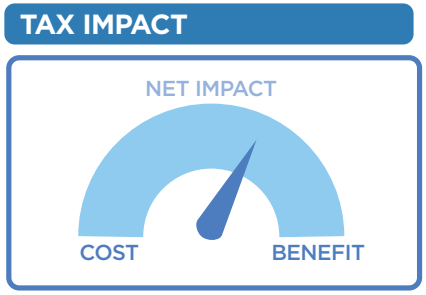
Low Medium High



LAND USE MIX



TAX IMPACT



SCENARIO ELEMENTS

HOUSING

Blend of detached and attached housing with retail services integrated









GROWTH PATTERN



ACCESS TO AMENITIES

DAILY NEEDS AND ESSENTIALS
Groceries, pharmacies, banks

HEALTHCARE
Clinics, childcare, senior services

DINING AND RETAIL
Restaurants, shops, and local businesses

RECREATION AND CULTURAL
Gyms, parks, arts and entertainment

OPEN SPACE

Emphasis on open space preservation at edges of city. Large swaths of land preserved for agricultural use.



SCENARIO 3: LOW INTENSITY GROWTH

OVERVIEW

DESCRIPTION:

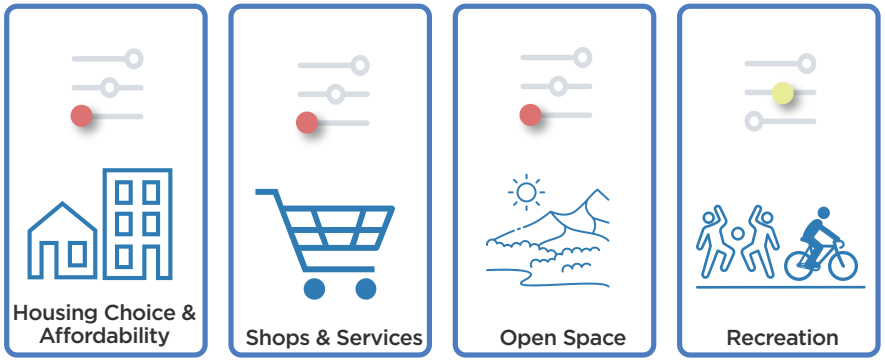
Limit density to preserve Nibley's rural character and minimize additional growth.

CONSIDERATIONS:

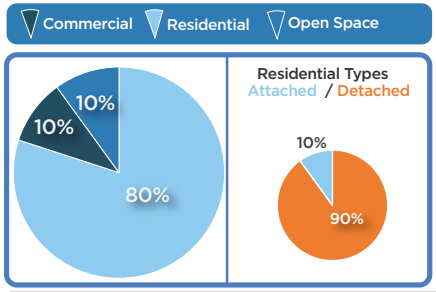
- ✓ Preserves rural character
- ✓ Maintains low traffic on local roads
- ✗ Limits housing supply and affordability
- ✗ Limits close access to shops, services, and local jobs

QUALITY OF LIFE METRICS

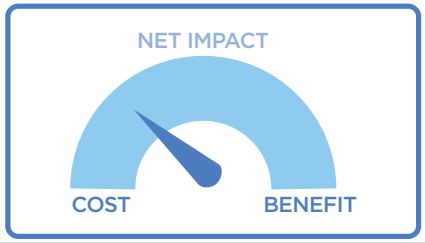
Low Medium High



LAND USE MIX



TAX IMPACT



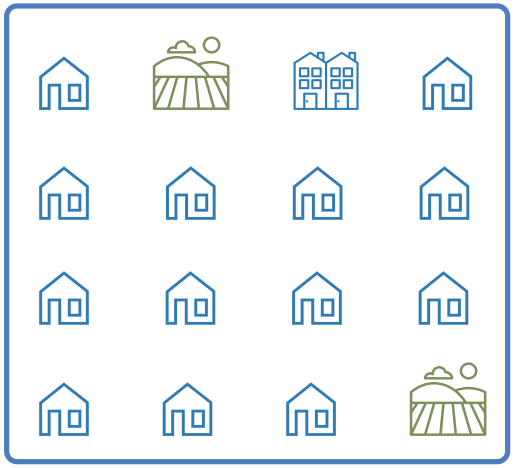
SCENARIO ELEMENTS

HOUSING

Emphasis on detached housing units



GROWTH PATTERN



ACCESS TO AMENITIES

DAILY NEEDS AND ESSENTIALS
Groceries, pharmacies, banks

HEALTHCARE
Clinics, childcare, senior services

DINING AND RETAIL
Restaurants, shops, and local businesses

RECREATION AND CULTURAL
Gyms, parks, arts and entertainment

OPEN SPACE

Reduced land available for agricultural preservation and open space as residential development occurs at lower densities.



SCENARIO 4: CONNECTED & ACTIVE COMMUNITIES

OVERVIEW

DESCRIPTION:

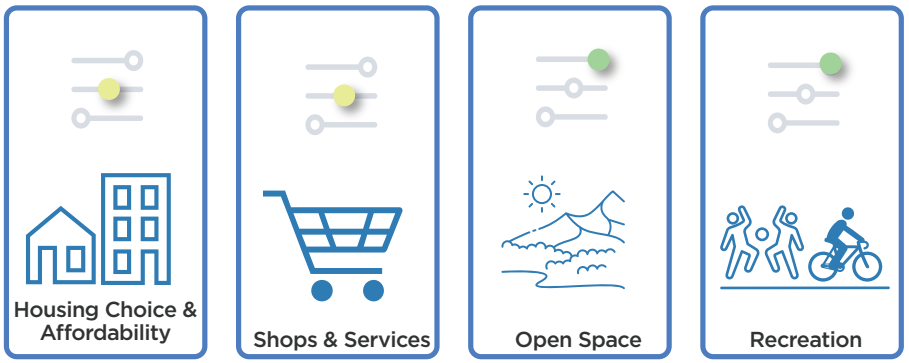
Grow through neighborhoods built around parks, trails, and local gathering places.

CONSIDERATIONS:

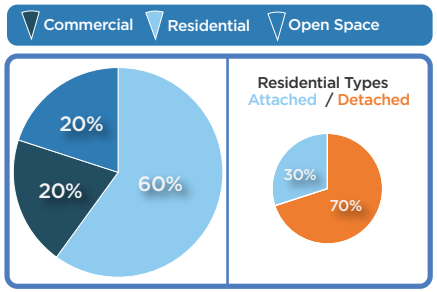
- ✓ Fosters a strong sense of community by supporting active living
- ✓ Provides walkable and bikeable neighborhoods with high access to open spaces and recreation
- ✗ Requires complex planning and coordination
- ✗ Less emphasis on a concentrated town center

QUALITY OF LIFE METRICS

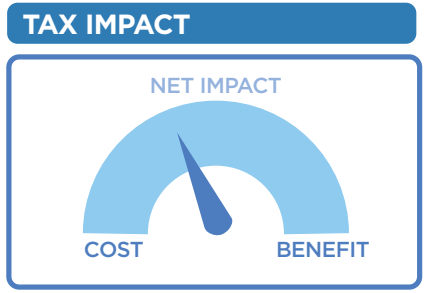
Low Medium High



LAND USE MIX



TAX IMPACT



SCENARIO ELEMENTS

HOUSING

Blend of detached and attached housing clustered in neighborhood centers

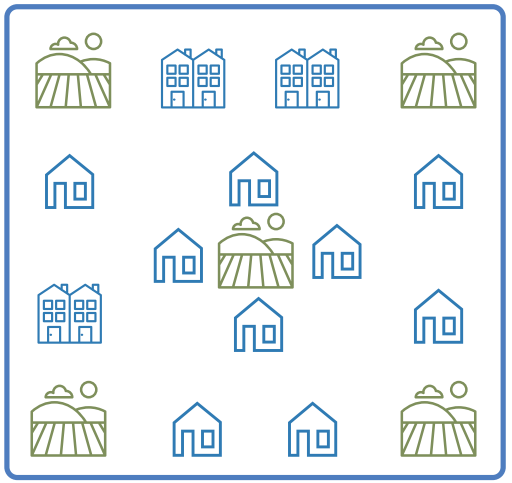








GROWTH PATTERN



ACCESS TO AMENITIES

DAILY NEEDS AND ESSENTIALS
Groceries, pharmacies, banks

HEALTHCARE
Clinics, childcare, senior services

DINING AND RETAIL
Restaurants, shops, and local businesses

RECREATION AND CULTURAL
Gyms, parks, arts and entertainment

OPEN SPACE

Preservation for public use. Emphasis on trails, pathways and outdoor recreation access.



WHAT IS A GENERAL PLAN?

A guiding document for the future of our community.

TOPIC AREAS:

- Growth Management
- Housing
- Transportation
- Environmental
- Water Preservation
- Land Use
- Open Space
- Economic Development

WHAT DOES THE GENERAL PLAN AIM TO ESTABLISH?

- A Statement of Vision
- A Set of Community-Wide Goals
- A Preferred Scenario for Future Growth
- A Decision-Making Guide for Development
- An Implementable Framework for More Specific Planning

WHAT IS INCLUDED IN A GENERAL PLAN?

GOALS: What the community hopes to achieve.

POLICIES: Guidelines for how decisions should be made.

OBJECTIVES: Measurable steps to reach each goal.

MAPS & DIAGRAMS: Illustrating future land use and growth.

STRATEGIES FOR IMPLEMENTATION: A guide for realizing the vision over time.

Appendix B — Housing Development and Analysis Resources

APPENDIX B - HOUSING DEVELOPMENT AND ANALYSIS RESOURCES

Numerous programs are available to encourage the development and preservation of affordable housing at all income levels. The following are resources available to the City to facilitate housing strategies, evaluate housing initiatives, and develop new perspectives on housing affordability. Some tools may require the City to identify funding sources to support local programs, and while these programs are available in the region, specific implementation and eligibility may vary.

Bear River Association of Governments (BRAG)

BRAG is a Multicounty association serving Box Elder, Cache and Rich Counties. BRAG provides programs and services for low-income households, seniors, and people with disabilities. They also offer regional economic planning and emergency assistance. Funding for these programs is primarily provided by federal and state grants.

Example Programs:

- Heat utility assistance
- Housing choice voucher program
- Homelessness services
- Self-reliance through employment and training

Community Development Block grant (CDBG) via Brag

The Community Development Block Grant (CDBG) is federally funded by HUD and administered by the State and regional associations such as BRAG. The program benefits low to moderate-income renters, first-time buyers, and community infrastructure. Objectives of the program include housing rehabilitation, down payment assistance, and infrastructure that supports housing. This funding helps the City improve housing conditions, availability, and affordability.

Housing Choice Voucher Program via Brag

The Housing Choice Voucher (HCV) program (often called "Section 8") is HUD's primary rental assistance for low-income households. Vouchers are federally funded but administered locally by Public Housing Agencies (PHAs). In Cache Valley, BRAG has a housing authority that administers the program.

Eligible households rent units in the private market. BRAG pays a subsidy directly to the landlord, and tenants pay about 30 percent of their adjusted income toward rent. At the start of a lease, they may pay up to 40 percent if the rent is above the payment standard. Public Housing Agencies set payment standards, usually between 90 and 110 percent of HUD Fair Market Rents or Small Area Fair Market Rents.

Eligibility is based on income limits, household size, and citizenship/eligible immigration status. By federal rule, at least 75% of households admitted each year must be extremely low-income (≤30% of area median). Waitlists are common, and applicants may apply to multiple PHAs.

Other State/Federal Programs

Olene Walker Housing Loan Fund

The Olene Walker Housing Loan Fund (OWHLF) is Utah's state affordable-housing fund. It's administered by the Department of Workforce Services' Housing & Community Development Division and governed by the OWHLF Board. The board has 14 voting members representing local government, lending, builders, rental housing, advocacy, manufactured/modular housing, rural interests, and transit-oriented development.

By law, OWHLF can fund acquisition, new construction, rehabilitation, land purchase, preservation of existing affordable units, predevelopment grants, mediation programs to prevent evictions, and certain pilots (e.g., low-income ADU loan guarantees; subordinate shared-appreciation loans). It provides grants or below-market loans, with interest based on ability to pay.

Example Programs:

- Multifamily Program: gap financing for 5+ unit rental projects (plus predevelopment grants).
- Rural Single-Family Home Land Revolving Loan: 0% subordinated land/lot-dev loans up to $25k per home for households ≤80% AMI in rural Utah.
- Rural Single-Family Rehabilitation Assistance Grant (forgivable), SFRRP, and HomeChoice (for eligible disabled homebuyers via a partner nonprofit).

USDA Home Loans/ Rural Development

The majority of Cache County (Excluding Logan, Providence, and North Logan) is eligible for USDA home loans. The Section 502 Guaranteed Loan Program provides financing without requiring down payment in qualifying areas.

Neighborhood nonprofit organizations housing corporation (NNHC)

NNHC is a nonprofit based in Logan that focuses on providing affordable housing to people in Cache Valley and surrounding areas

Example programs

- Owner-builder program - Families build their own home and earn "sweat-equity" from the savings of doing the work themselves. Financed through USDA Rural Development.
- HomeChoice- offers a second mortgage to reduce payment of households with a resident who has a disability, 1% interest rate. It is funded by OWHLF.
- Counseling services before purchase, reverse mortgage counseling, and credit counseling
- Developed communities with affordable rental properties for individuals, families, people with disabilities, and senior citizens

Land Use Academy of Utah (LUAU)

Missing Middle Housing Toolkit

The Land Use Academy of Utah (LUAU), is a statewide uniform and comprehensive online land use website resource to train, inform, and educate elected and appointed officials in statutory land issues and best planning practices. LUAU provides the Missing Middle Housing (MMH) Toolkit, where all communities in Utah can learn about, consider, plan for, and implement more housing options tailored to their city or town. The Toolkit is continually updated with new and enhanced resources.

Appendix C — Nibley General Plan Survey Results

Constant Contact Survey Results

Campaign Name: Nibley General Plan Survey Draft

Survey Starts: 945

Survey Submits: 440

Export Date: 08/16/2025 12:29 AM

CHECKBOXES

What is your connection to Nibley? (Check all that apply)

Answer Choice	0% 100%	Number of Responses	Responses Ratio
I live here		433	98%
I work here		39	8%
I own a business here		14	3%
I visit regularly		9	2%
Other		3	0%
	Total Responses	**441**	**100%**

CHECKBOXES

What are the three most important priorities for Nibley's future? (Select up to 3)

Answer Choice	0% 100%	Number of Responses	Responses Ratio
Affordability / Providing more diverse housing options		77	17%
Managing growth and development		288	66%
Expanding parks, open space, and recreation programs		272	62%
Improving roads and traffic flow		121	27%
Supporting local businesses and economic growth		94	21%
Preserving the small-town feel		323	74%
Enhancing public safety		73	16%
Other		21	4%
	Total Responses	**436**	**100%**

RANK ORDER

Please rank the following statements as a reflection of your priorities for Nibley’s future (1 most important, 5 least important)

Answer Choice	Average Rank	Ranked 1	Ranked 2	Ranked 3	Ranked 4	Ranked 5
Trails, Parks & Recreation "A connected, family-friendly community with safe walking and biking routes, quality parks, and access to open space for all residents."	2.03	160 (36%)	161 (37%)	66 (15%)	33 (7%)	13 (3%)
Housing & Affordability “A city that provides a range of housing choices for all ages and incomes, allowing families to stay, grow, and thrive in Nibley."	3.38	40 (9%)	68 (15%)	99 (22%)	138 (31%)	88 (20%)
Economic Growth & Local Business "A city that supports local businesses, brings in new commercial opportunities, and offers more ways to live, work, and shop within Nibley."	3.12	40 (9%)	77 (17%)	139 (32%)	145 (33%)	32 (7%)
Agricultural Roots & Heritage "A community that preserves its agricultural heritage and open spaces while welcoming thoughtful, small-scale growth that fits Nibley’s rural character."	2.23	168 (38%)	103 (23%)	71 (16%)	77 (17%)	14 (3%)
None of the Above	4.24	25 (5%)	24 (5%)	58 (13%)	40 (9%)	286 (66%)
Total Responses	**433**					

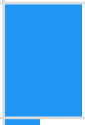
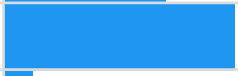
RANK ORDER

Nibley is projected to continue to grow substantially in the coming years. Please rank which of the following best reflects your vision for growth in Nibley's future? (1 best, 5 least)

Answer Choice	Average Rank	Ranked 1	Ranked 2	Ranked 3	Ranked 4	Ranked 5
Growth As Is "Continue current growth patterns"	3.65	14 (3%)	37 (8%)	126 (29%)	162 (37%)	91 (21%)
Compact / Centered Growth "Focus growth into a town center that supports walkability, housing variety, and local businesses"	3.00	44 (10%)	106 (24%)	130 (30%)	104 (24%)	46 (10%)
Growth through Connected and Active Neighborhoods "Grow through neighborhoods built around parks, trails, and local hubs"	2.14	124 (28%)	181 (42%)	82 (19%)	26 (6%)	17 (3%)
Low Growth "Limit growth to preserve Nibley's rural character and minimize new development"	2.06	228 (53%)	66 (15%)	40 (9%)	74 (17%)	22 (5%)
None of the above	4.14	20 (4%)	40 (9%)	52 (12%)	64 (14%)	254 (59%)
Total Responses	**430**					

MULTIPLE CHOICE

Which of the following statements best reflects your view on future housing in Nibley?

Answer Choice	0% 100%	Number of Responses	Responses Ratio
We need a wider range of housing types to support young families, seniors, and others with different needs		49	11%
I support dense housing in certain areas if it helps preserve farmland and open space elsewhere		26	5%
I support some growth, but only if infrastructure can keep pace		95	21%
New housing should prioritize maintaining the traditional character of Nibley		103	23%
I'm concerned about any further housing growth		145	33%
I don't have a strong opinion		18	4%
	Total Responses	**436**	**100%**

NUMERIC SCALE

Allow for a higher concentration and wider variety of housing types near commercial services.

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Strongly Oppose)			151	34%
2			93	21%
3			103	23%
4			49	11%
5 (Strongly Support)			38	8%
Mean	2.38			
Median	2.00			
		Total Responses	**434**	**100%**

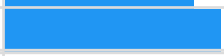
NUMERIC SCALE

Allow smaller lot sizes for certain areas for starter homes

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Strongly Oppose)			117	27%
2			74	17%
3			108	25%
4			80	18%
5 (Strongly Support)			53	12%
Mean	2.72			
Median	3.00			
		Total Responses	**432**	**100%**

NUMERIC SCALE

Requiring a majority of housing to be owner occupied, with a portion dedicated as affordable to moderate income households

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Strongly Oppose)			27	6%
2			44	10%
3			109	25%
4			119	27%
5 (Strongly Support)			136	31%
Mean	3.67			
Median	4.00			
		Total Responses	**435**	**100%**

NUMERIC SCALE

Reduce, waive, or eliminate impact fees related to moderate income housing

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Strongly Oppose)			71	16%
2			59	13%
3			190	43%
4			62	14%
5 (Strongly Support)			50	11%
Mean	2.91			
Median	3.00			
		Total Responses	**432**	**100%**

NUMERIC SCALE

Rezone areas which allow for the production of housing which is affordable to households earning a moderate income

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Strongly Oppose)			97	22%
2			84	19%
3			159	36%
4			62	14%
5 (Strongly Support)			31	7%
Mean	2.64			
Median	3.00			
		Total Responses	**433**	**100%**

NUMERIC SCALE

Restaurants & Cafes

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1			44	10%
2			51	11%
3			103	23%
4			120	27%
5			117	26%
Mean	3.49			
Median	4.00			
		Total Responses	**435**	**100%**

NUMERIC SCALE

Grocery Stores & Retail Stores

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Negative Impact)			73	16%
2			54	12%
3			95	21%
4			104	23%
5 (Positive Impact)			109	25%
Mean	3.28			
Median	3.00			
		Total Responses	**435**	**100%**

NUMERIC SCALE

Office & Professional Services

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Negative Impact)			77	17%
2			89	20%
3			141	32%
4			68	15%
5 (Positive Impact)			58	13%
Mean	2.86			
Median	3.00			
		Total Responses	**433**	**100%**

NUMERIC SCALE

Recreation & Entertainment

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Negative Impact)			22	5%
2			30	6%
3			86	19%
4			117	26%
5 (Positive Impact)			182	41%
Mean	3.93			
Median	4.00			
		Total Responses	**437**	**100%**

NUMERIC SCALE

Industrial Park

Answer Choice	0%	100%	Number of Responses	Responses Ratio
1 (Negative Impact)			181	41%
2			107	24%
3			97	22%
4			25	5%
5 (Positive Impact)			23	5%
Mean	2.08			
Median	2.00			
		Total Responses	**433**	**100%**

MULTIPLE CHOICE

Which of the following approaches to economic development do you most support for our community?

Answer Choice	0%	100%	Number of Responses	Responses Ratio
Maintain rural character without pursuing significant development, by increasing taxes if needed to fund services and infrastructure.			87	19%
Pursue more commercial development to broaden the tax base, with the goal of potentially lowering property taxes over time.			54	12%
A balanced approach that allows for some commercial development while preserving key aspects of the community's rural character.			270	61%
None of the above / Unsure			25	5%
		Total Responses	**436**	**100%**

OPEN QUESTION

What types of stores or services, if located in a Nibley Town Center, would reduce your need to travel to nearby cities?

Restaurants, Grocery store, Hardware store, Car mechanic
Trader Joe's, grocery store
Groceries. Hardware .Otherwise all services are within 10 minutes The idea of focusing on local business vs chains I'd ridiculous. Clearly whoever wrote the question has never been an owner of a business. You have to get a return on the investment.
304 Response(s)

NUMERIC SCALE

How supportive would you be of a town center that primarily features small, locally-grown businesses that originate in Nibley, rather than chains or businesses from outside the city?

Answer Choice	0% 100%	Number of Responses	Responses Ratio
1 (Strongly Oppose)		24	5%
2		26	5%
3		125	28%
4		122	27%
5 (Strongly Support)		139	31%
Mean	3.75		
Median	4.00		
	Total Responses	**436**	**100%**

CHECKBOXES

What kinds of recurring events would you like to see in a town center to keep it active and thriving year-round?

Answer Choice	0% 100%	Number of Responses	Responses Ratio
Farmers markets		330	78%
Outdoor concerts or movies		219	51%
Food truck nights		217	51%
Holiday or seasonal festivals		316	74%
Art fairs or craft markets		180	42%
Fitness or wellness events (yoga in the park, etc.)		175	41%
Kids/family activities		319	75%
Other		19	4%
	Total Responses	**422**	**100%**

NUMERIC SCALE

What is your level of comfort with including a mix of residential housing (such as townhomes or apartments) within or near the town center that also includes businesses, parks, and other amenities?

Answer Choice	0% 100%	Number of Responses	Responses Ratio
1 (Strongly Oppose)		133	30%
2		85	19%
3		110	25%
4		61	14%
5 (Strongly Support)		45	10%
Mean	2.54		
Median	2.00		
	Total Responses	**434**	**100%**

RANK ORDER

Rank in order of importance, which types of open space would you most like to see prioritized in Nibley? (1 most, 5 least)

Answer Choice	Average Rank	Ranked 1	Ranked 2	Ranked 3	Ranked 4	Ranked 5
Undisturbed natural areas/conservation lands for wildlife and environmental protection	2.92	98 (22%)	99 (22%)	68 (15%)	73 (16%)	93 (21%)
Agricultural preservation (fields, pastures, and working farms)	2.70	113 (26%)	103 (23%)	74 (17%)	84 (19%)	57 (13%)
Developed areas for outdoor recreation (i.e. playgrounds and other park amenities, large grass areas for play and organized sports, etc.)	3.07	95 (22%)	65 (15%)	88 (20%)	80 (18%)	103 (23%)
Scenic open lands and view corridors	3.38	33 (7%)	68 (15%)	128 (29%)	106 (24%)	96 (22%)
Trail corridors for walking, biking, etc.	2.94	92 (21%)	96 (22%)	73 (16%)	88 (20%)	82 (19%)
Total Responses	**431**					

MULTIPLE CHOICE

What is the biggest transportation issue in Nibley?

Answer Choice	0% 100%	Number of Responses	Responses Ratio
Traffic congestion		72	16%
Road maintenance		63	14%
Pedestrian & bike safety		99	22%
Public transit options		29	6%
No major concerns		132	30%
Other		37	8%
	Total Responses	**432**	**100%**

OPEN QUESTION

Provide us with your comments concerning issues and opportunities in Nibley.

I like the idea of a recreation center in Nibley

You can't legislate local farms and local business. Economics will dictate what happens there.

Most of Nibley issues would be solved by eliminating lot size and frontage restrictions and garage rules.

The council members don’t listen to the people who voted them.

Test

223 Response(s)

OPEN QUESTION

Please include your name, phone number, and email if you would like the chance to win one of ten $25 Amazon Gift Cards. If selected, you will be notified to pick up the Gift Card at Nibley City Offices during regular Office hours.

Ryan Cowley
435-232-4577
ryanmcowley88@gmail.com

Pea00007@gmail.com

Jamie Pearce
208-351-2838
Kni04005@gmail.com

258 Response(s)

APPENDIX C - NIBLEY GENERAL PLAN SURVEY RESULTS

What is your connection to Nibley?

- I live here — 433 responses
- I work here — 39 responses
- I own a business here — 14 responses
- I visit regularly — 9 responses
- Other — 3 responses
  - "My dad works for Nibley City" (1)
  - "I worked here" (1)
  - "I have kids here" (1)

What are the three most important priorities for Nibley's future? (Select up to 3)

- Preserving the small-town feel — 323
- Managing growth and development — 288
- Expanding parks, open space, and recreation — 272
- Improving roads and traffic flow — 121
- Supporting local businesses and economic growth — 94
- Affordability / more diverse housing options — 77
- Enhancing public safety — 73
- Other — 21
  - "Stop high density housing."
  - "None. My house is in the 'town center.' I don't want a whole bunch of people swarming by my house regularly."
  - "More police! Speeding on side streets not just 3200."
  - "Nothing. Stop wasting our tax dollars!!"
  - "Speeding issues through residential streets. No police! Everyone knows and no one cares!!"
  - "Better internet. Only xfinity is available where I live and it is having major issues. Google Fiber would be awesome."
  - "Trees in the middle of the road making turn lanes way too short."
  - "Speeding through neighborhoods. Would like 4-way stops at 2600 S 1000 W and Nibley Park Ave and 1000 W, as well as speed humps along 1000 W."
  - "The width of the roads are decided by the different builders which causes confusing patterns and half finished roads. Dangerous and confusing."
  - "The ugly concrete barriers and mountable islands at each intersection along 1200 W. They're still a safety hazard and do nothing to deter speeding on that road as they were intended to."
  - "Stop building apartments and condos! Valley is over populated."
  - "Walkable cities are a terrible idea and have not worked. They don't provide enough parking for people that will have at the least 2 cars with no space for visitors."
  - "Improving roads, public safety, growth and development, open space, and pedestrian/bike friendly neighborhoods to me are all one package. They build on each other…"
  - "Not interested"
  - "None"

Transportation

Top transportation issues (open-ended): 432 responses

- Pedestrian & bike safety
- Traffic congestion at key intersections
- School zone safety on 2600 S
- Limited east-west connectivity

All Responses:

- "Pedestrian & bike safety"
- "Make school zone on 2600 s and 800 west safer"
- "training needs to be done, in the newsletter and social media posts on using the roundabout during the school zone hours"
- "The road barriers at the intersections and all along 1200 West are dangerous and terrible and should be removed ASAP. The whole road was poorly designed."
- "Pedestrian & bike safety"
- "The roads aren't safe for biking. However, there are people in our community that depend on biking to get to work, school, etc. we need protected bike

lanes that connect neighborhoods and businesses. Utah county has excellent examples!"

- "Traffic congestion"
- "The traffic at 2600 and 800 is horrendous and dangerous for the school kids.... Also the stupid cement triangle things on 1200. Those are wrecking cars and it's so hard to see children on the paths behind the barriers."
- "Traffic congestion"
- "I'd love to have a cafe to sit at and do work/homework. It's also hard to know what's going on and when. I read the newsletters, but there are so many things I hear about after the fact that I wish always publicized better. I'd love a farmers market."
- "Traffic congestion"
- "The road barriers at the intersections and all along 1200 West are dangerous and terrible and should be removed ASAP. The whole road was poorly designed."
- "Road maintenance"
- "Pedestrian & bike safety"
- "Road maintenance"
- "The high bump on the intersections on 12th west are a joke for turning onto the other roads and need to be taken out !!!"
- "Traffic congestion"
- "Stop building high density housing and allowing smaller lots. We don't want them. We want to keep the small town feel and it's disappearing with every apartment or townhouse community you allow. Please stop we don't have the water or infrastructure."
- "Pedestrian & bike safety"
- "The ugly concrete barriers and mountable islands at each intersection along 1200 W. They're still a safety hazard and do nothing to deter speeding on that road as they were intended to."
- "Road maintenance"
- "The road on 1200 with the cement barriers and cement blocks on the ground is absolutely awful and a huge eye sore for this city. All the cement needs to be removed from that road other than the round about."
- "The width of the roads are decided by the different builders which causes confusing patterns and half finished roads. Dangerous and confusing."
- "Hurry up and open 10th to 12th west!"
- "More police! Speeding on side streets not just 3200."
- "Speeding through neighborhoods. Would like 4-way stops at 2600 S 1000 W and Nibley Park Ave and 1000 W, as well as speed humps along 1000 W."
- "None. Nibley is so centrally located to such a wide variety of businesses and services, there is no need to radically change the city's footprint."
- "No more apartments in our city. Reduce rental homes, or at least enforce laws that are on the books. There are multiple rentals in Nibley where there are 5-6 cars outside and the yards are full of weeds (probably not owner occupied)."
- "Make sure Logan doesn't spread into surrounding unincorporated land. Work closer with other small towns."
- "Traffic congestion, Dog licensing fees are silly to me. I shouldn't have to pay a government institution to have a pet. Taxes on top of taxes etc."
- "Public transit options"
- "Road maintenance"
- "Traffic at 2600 S and 800 W... it is hard to cross at certain times of day. A roundabout or 4 way stop would help a lot!"
- "People run bus stops all the time. It's scary"
- "The road and bike lanes by Stonebridge neighborhood cause a lot of confusion and congestion as not more than 1 car can go through the barriers at a time"
- "the dependence on 3200 creates big issues when it needs to close down for maintenance especially for neighborhoods on the west side of town. They lack roads going east to west that can get them to and from their homes via a different route than 3200"
- "Trees in the middle of the road making turn lanes way too short."
- "Mountable islands are confusing and frustrating to all drivers. They are a terrible distraction to every driver who has to drive around or over them."
- "I walk a lot through Nibley and it seems like there is a lot of speeding happening through residential areas. Since there are so many young families, it is dangerous."

Additional Comments

223 respondents provided comments on Nibley's opportunities and challenges.

Key themes include:

- Maintaining rural/small-town character
- Concerns about high-density housing
- Road safety and walkability
- Need for more local businesses and family activities
- Parks, trails, and open space preservation

All Quotes:

- "Make school zone on 2600 s and 800 west safer training needs to be done, in the newsletter and social media posts on using the roundabout during the school zone hours."
- "The road barriers at the intersections and all along 1200 West are dangerous and terrible and should be removed ASAP. The whole road was poorly designed. The roads aren't safe for biking. However, there are people in our community that depend on biking to get to work, school, etc. we need protected bike lanes that connect neighborhoods and businesses. Utah county has excellent examples!"
- "The traffic at 2600 and 800 is horrendous and dangerous for the school kids.
- Also the stupid cement triangle things on 1200. Those are wrecking cars and it's so hard to see children on the paths behind the barriers."
- "I'd love to have a cafe to sit at and do work/homework. It's also hard to know what's going on and when. I read the newsletters, but there are so many things I hear about after the fact that I wish always publicized better. I'd love a farmers market."
- "I would love for Nibley to be an outlier in valley when it comes to growth. I flew over the valley and looked down and loved seeing the open fields and green areas. There are enough commercial areas nearby, no more are necessary."
- "There's got there's got to be incentives either from the city or county level to keep much of the ag in ag business."
- "I love living in Nibley. I also understand the need for dense housing like townhomes. However condos and/or apartments are crazy. Way to dense for a city like Nibley."
- "Stop building high density housing and allowing smaller lots. We don't want them. We want to keep the small town feel and it's disappearing with every apartment or townhouse community you allow. Please stop we don't have the water or infrastructure."
- "Trash cans being overfilled and blowing down the streets during windy days."
- "There are plenty of options for businesses that are wicked close to Nibley. We don't need businesses in the town."
- "I would really appreciate the city council members look into and consider attracting residential fiber optic internet like google fiber or strata networks. This is a really big attractor that will effect economic growth."
- "The high bump on the intersections on 12 th west are a joke for turning onto the other roads and need to be taken out !!!"
- "None at this time. Thank you."
- "Hurry up and open 10th to 12th west!"
- "I am concerned with the number of high density housing units Nibley is allowing. We need bigger lots with open space."
- "Please stop trying to turn us into Logan. Small and local is why we moved here please preserve that feel, we are close enough to gas stations and grocery stores, we don't need more."
- "Previous council members' development decisions have destroyed my confidence in representative local government. I don't follow current meetings and members; I would rather not get stressed and waste my breath trying to fight getting screwed again."
- "I'm sad to see all the farmland and ranches being bought up for development. Nibley is quickly losing its small town appeal."
- "I'm concerned with the drivers in Nibley that drive in the bike lane or swerve to scare runners and bikers. I would love to see more business development in Nibley to help reduce property taxes."
- "I understand growth needs to happen but my heavens at the rate the city is putting in mass housing is unbelievable. The school are busting at the seems. Traffic is just getting worse and Church's are struggling too. When is enough enough?"
- "The road and bike lanes by Stonebridge neighborhood cause a lot of confusion and congestion as not more than 1 car can go through the barriers at a time."
- "I love the commitment to the small town feel- keep it up!"
- "We need parks on the West side of town. (Glorified retention ponds don't count!). Would love a trail system."

- "Internet issues. I hope we can get Google Fiber. The 12th W to 10th W connection being finished will be nice. A traffic circle at 8th W by Heritage Park would be great."
- "The south vallley needs a full recreation center! Indoor outdoor swimming pool for young families and a lap pool for swimmers. Weight rooms, cardio rooms. Track."
- ● "I love living in Nibley! Open minded growth and continued community involvement are keys for me."
- Stop trying to make Nibley be like Logan. If people wanted to live in the congestion and bustle of Logan they wouldn't have picked to live in Nibley. I wanted to live here because it was still small/rural but not so far from everything."
- "Id love to see a city center with shops and businesses around Ridgeline Park."
- "The road on 1200 with the cement barriers and cement blocks on the ground is absolutely awful and a huge eye sore for this city. All the cement needs to be removed from that road other than the round about."
- "I would love to see more restaurants and a grocery store, but still maintain the rural vibe of Nibley. A city center would help provide both options. And more walking paths between neighborhoods and parks would be nice."
- "the dependence on 3200 creates big issues when it needs to close down for maintenance especially for neighborhoods on the west side of town. They lack roads going east to west that can get them to and from their homes via a different route than 3200."
- "I've watched too many UT communities encourage growth for short-sighted economic 'gains.' Nibley's a true unicorn, offering the peace & serenity we all came here seeking w/ proximity to every possible good/service needed. More is sometimes just more."
- "Enough with the multi-unit housing low income housing…though I recognize that the city of Logan will allow them to use our land and then receive the tax revenue if we don't."
- "No more apartments in our city. Reduce rental homes, or at least enforce laws that are on the books. There are multiple rentals in Nibley where there are 5-6 cars outside and the yards are full of weeds (probably not owner occupied)."
- "Nibley needs to increase the tax base and relieve the pressure on residents. Eventually Nibley needs to be self-supporting with utilities, waste management etc."
- "We are a small town next to a larger city. Leave us a small town. Quit trying to make us larger. If you want to live in a city, MOVE!"
- "Dog licensing fees are silly to me. I shouldn't have to pay a government institution to have a pet. Taxes on top of taxes etc."
- "People run bus stops all the time. It's scary."
- "Fire Justin Maughn, Tom Dickerson and Evan. Nibley city does not want to be like logan."
- ● "I love Nibley as a small town, and concerned that the feeling will be lost with all the development without the infrastructure adapting to accommodate it. This development will make it hard to leave our neighborhood in any direction."
- "More stop lights needed, particularly at the 2600 intersection by Nibley Elementary."
- "This survey is important, but some of the question are set up with guided/led answers. Nibley is a wonderful place to live. 1200 W should be fixed. We need more parks and open space. We need a splash pad, tennis courts etc."
- "Why ask our opinion when you will just bow down to the latest developer."
- "I like the idea of a recreation center in Nibley."
- "The schools are overcrowded, and the planned middle school is not going to fix the problem considering the massive population growth from current multifamily housing developments in progress. We need more schools."
- "I would love to see some more parks and playgrounds in nibley! Especially walking distance for the west side of town! The closest one to me is at least a mile away, and it's hard to walk that far with a toddler."
- "I put pedestrian and bike safety as the most important transportation issue, but a close second is public transit options. I would also love more commercial growth as the population expands. Studies have shown that public ridership is proportionally linked with service frequency. Nibley's bus only comes once an hour and meanders too much."
- "My biggest current concern is that the fees are higher than normal. $55 per month for sewer fees is pretty outrageous."
- "Please reduce high density housing, it will not benefit Nibley long term."

- "I didn't move to Nibley for retail opportunities. Once in car driving into Logan or Hyrum is great with me and my wife. We want to keep Nibley a single resident community with at least 1/4 acre lots. No more Townhouses or apartments."
- "Would love a comprehensive urban trail system."
- "This no longer has a small town feel. Way too many apartments and they just keep on building. Homes to close, and Nibley city codes need to be looked at and adjusted. Were these codes open to public comment before they were written and enforced."
- "I would love to see more commercial development to help supplement taxes. This can help in many areas and take some of the burden off residents. (City center, rec center, etc)."
- "Why is Nibley still called rural it is no longer that. It has changed to much to be called rural."
- "1200 west is weird, but otherwise, nicely done from what I can tell."
- "Enforce codes."
- "I moved from Logan to Nibley because I liked the open space and rural feel. I know that growth is inevitable and others like me want to experience this feeling too, but it makes me sad to see all the farmland being replaced by development."
- "I don't want much more housing development."
- "A big concern for Nibley and our state is having attainable housing for our children to live in. If we don't address this issue then Utah and Nibley will not have vibrant thriving communities with people in all stages of life."
- "For the last 20 or so years Nibley has been far to interested growing this city to the detriment of things that used to make Nibley a great place to live."
- "Keep nibley for the locals. Not trying to become a mini logan. why can't our kids play on our own rec teams. Because they are filled with kids from other townships. Our kids should have priority first. Not be turned away."
- "The are no parks that have shaded play areas. Would love to have at least one play structure (Heritage Park maybe?) that has a shade cover. Also, a splash pad would be awesome for all aged kiddos. More marked walking trails away from traffic."
- "You should add a permanent Gaga pit."
- "You say you listen to the people who live in Nibley, but I have NEVER heard someone say "please bring in a bunch of apartments and condos". We want small town!"
- "Bike lane and sidewalk need to be fixed and put in place on 2600 S. from Nibley elementary going west out to the roundabout circle."
- "You can't legislate local farms and local business. Economics will dictate what happens there. Most of Nibley issues would be solved by eliminating lot size and frontage restrictions and garage rules."
- "I don't want Nibley to lose our comfortable, peaceful feel."
- "More walking trails."
- "800 W needs widened and a bike pathway. 2600 S and 800 W probably needs a light."
- "Connect Nibley Business Park off Hwy 89 to the rest of Nibley. Forcing highway use is dangerous, adds commute time, and prevents safe walking or biking. A short connecting road would fix this."
- "We are starting to see way too many homes crammed into spaces. Town homes and small lots (less than .5 acres) are not supposed to be in Nibley! Please stop approving these types of developments."
- "Nibley really needs some sort of grocery store."
- "Nibley is an amazing place to live."
- "The growth rate is too large to maintain the small town atmosphere, people who live in nibley do so because of the community feel that it has and the current growth plan is taking away from that."
- "Fix 1200 W. Cars in the bike lane, no where for snow to go, crosswalk lights at 2600 S roundabout don't work half the time. Wasting water on grass strip on 1200 while Nibley Garden park is dry & full of thistles."
- "STOP WITH THE ORDINANCE ABOUT PARKING OUTSIDE YOUR HOME DURING THE WINTER! I DON'T KNOW WHO IMPLEMENTED IT. IT'S BASICALLY A TAX ON FAMILIES WITH MORE THAN TWO VEHICLES. NEEDS TO STOP!"
- "I dislike the new road built on 1000 West."
- "1200 west is lame."
- "The parking nazi needs to stop! We were ticketed at 12:01 November 1st. Ridiculous. I get the importance of clearing for the plow but has been handled poorly. Get rid of firefly nature reserve. it looks horrible, and stinks. Not worth tax money."
- "Our sports recreation teams are being filled up by individuals who do not live in Nibley but other surrounding cities which eliminates the opportunity for Nibley children to play on local teams. Nibley is too focused in becoming another Logan."

- "I recognize that affordable housing has to be part of Nibley's growth, and farm land will be hard to protect. I'd support commercial development away from neighborhoods. We really need some indoor sport facilities. A covered pool would be awesome."
- "Support agriculture and local businesses and the natural beauty of Nibley. Thank you!"
- "Infrastructure keeping up with development. Outdoor walking biking paths. Rec center with pool. indoor entertainment and opportunity to stay active in the colder months."
- "It's hard to take the time to provide feedback because I feel like every time I do my comments fall upon deaf ears."
- "No more high density housing. More Bike/walking paths, parks would be nice."
- "Make sure Logan doesn't spread into surrounding unincorporated land. Work closer with other small towns."
- "Spend less on recreation to save tax money. No rec center! Reduce park impact fee to make housing more affordable."
- "800 isn't bike friendly, more crossing guards for Nibley Elementary at 800 and Nibley Parkway."
- "I moved to Nibley because it had a small town feel and I am extremely worried about its growth! Houses are being built on top of eachother and all the beautiful fields are turning into housing developments. It is very disappointing and sad."
- "Nibley is loosing its rural feeling. Need to limit future building of high density housing. It only takes a few years for high density housing to become rundown & trashy."
- "No more apartments! Keep the fields please! IF there is a city center keep it to one location and only allowing apartments where the city center is located. Please Do Not add a city center without plans and budget for traffic control!"
- "Make Logan take back strata, also I'm fine with lower income housing if it is sparse, well maintained, but most importantly keeps Nibley for Nibley. No more of these Californians turning our town into a cesspool."
- "I'm concerned about high rise development and apartment or townhome style rather then housing."
- "Please stop approving condescend housing like ridgeline park. We are losing the small town love of Nibley."
- "There are enough houses in Utah. The problem is people buying up multiple and then renting out some. We don't need to build more, we need to limit purchasing multiple houses."
- "The council members don't listen to the people who voted them."
- "I feel that there are some parts of Nibley that get more love than others. Some green spaces are well taken care of and others are dead, filled with weeds, and an after thought. We moved here for the green and open spaces, please keep it that way."
- "Runners and walkers in the road when we have sidewalks everywhere is a problem."
- "1200 w is dangerous! Parks are not maintained. Park on 1600 w is a joke. Grass area isn't even usable."
- "To much growth with very little infrastructure to support it. Loss of agricultural lands and over restrictions on agriculture in community. 10th w road layout, hard to navigate, not accessible and not necessary."
- "I would just like to see sidewalks allowing safe biking or running/walking anywhere in town. I just find when I'm out sidewalks aren't always consistently available. This also applies to roads that connect to neighboring cities."
- "I'd love to see more growth with shops, markets, etc."
- "I don't see myself being able to afford a home in Nibley soon, but I love the character, family feel, and spacing that Nibley provides. I think higher density housing could potentially take away from that, but maybe not if done correctly?"
- "Continued growth in Nibley requires substantial upgrading of the infrastructure (roads, sewers, water, etc). Improvements to the transportation grid and increasing public transportation opportunities are essential. Improvements to snow removal."
- "Why do we not have a water park? All other cities around us do."
- "We love Nibley! However the theory behind affordable housing (aka teeny tiny lots with mini homes) only work when those homes are affordable. The prices for those small houses are far too high to make them affordable."
- "Nibley was truly great before all of the growth. Missing all of the open space and farmland and agricultural feel already. It's not what it was nor what we chose to live here for, anymore. Would love to see the 'growth' chill out and leave things be."
- "Keep the area peaceful and safe."

- "You keep approving high density housing, now you want to bring businesses and you have no infrastructure plan! This is obvious from the drunken stupor of 3200 S and 1200 W traffic will only get worse."
- "Nibley's past dev of large lots is bad for the city's future costs and has contributed to the lack of commercial goods and services here. Also makes it an isolating place for kids to go places alone. Public transit is a bigger issue but is CV wide."
- "We have seen this or variants of this survey so many times over the last 5 years. Data collection time is over. Move on to analysis and execution of some of these ideas."
- "There is very little oversight from law-enforcement to enforce traffic laws. With the new roads that have been built on the north end of the city there are many violations daily: speeding, running, stop signs, etc. Somebody is going to get hurt."
- "If adding new businesses they should be ones that are backed by a large corporation, so that it doesn't go out of business super fast... it will take time for people to get use to shopping here. Small town mentality and saving money."
- "To concerned with becoming more like Logan."
- "The changes made on 1200 W between 2600 and 3200 S are both unsafe and aesthetically dull and disappointing."
- "Nibley is a great place to live! We moved here over 30 years ago when it was quiet, peaceful, and farm ground. The housing growth in Nibley is out of control! There has to be a limit to growth. There is no way the infrastructure can keep pace."
- "The new light onto the highway needs a blinking yellow light from highway to 3200. Slows down traffic dramatically."
- "1200 West is the absolute worst road design I have ever seen or driven on. I cannot believe the amount of money the city has wasted on that ridiculous road design. It is so obnoxious to drive on and turn on and off of."
- "I think that we are building too fast for the infrastructure."
- "Having more professional business for growth would be great for jobs locally. To much shopping or fast food would lead to traffic congestion."

Summary:

These results represent the collective input of 442 community members and provide clear, actionable priorities for the city's General Plan update. The most consistently supported themes center on preserving Nibley's character, managing growth, expanding parks and trails, and encouraging local business development.

Agenda Item #9

Description	**Discussion and Consideration:** Ordinance 25-36: Amending NCC 21.10.020 Open Space Subdivision, Including Requirements for Setbacks, Lot Size Standards, and Variation (Second Reading)
Presenter	Justin Maughan, City Manager
Staff Recommendation	Approval of Ordinance 25-36: Amending NCC 21.10.020 Open Space Subdivision, Including Requirements for Setbacks, Lot Size Standards, and Variation
Planning Commission Recommendation	Approval of Ordinance 25-36: Amending NCC 21.10.020 Open Space Subdivision, Including Requirements for Setbacks, Lot Size Standards, and Variation
Reviewed By	Levi Roberts, City Planner Larry Jacobsen, Mayor Justin Maughan, City Manager Joel Yellowhorse, City Attorney Planning Commission

Background:

The Planning and Zoning Commission has been discussing potential changes to the Open Space Subdivision Ordinance. Based upon that discussion, Staff has drafted some amendments that incorporate some of the recommendations from this discussion. These amendments are designed to provide more variety of lot sizes, while allowing for creativity in design, while mitigating effects of locating in close proximity to established neighborhoods.

Specifically, the following changes have been drafted:

- Increase setbacks for side and rear yards that abuts property with greater setback requirements. Side yards would increase to 10’. Rear yards would increase to 25’.
- Require variation in lot sizes for all subdivisions with 40 or greater lots. No more than 40% of lots could fall within a range of 1,500 sq ft.
- Remove minimum lot size and frontage requirements. This was necessary to allow for flexibility in design to facilitate variation in lot sizes. The same number of lots would be allowed but with flexibility in design of lot configuration.
- Adopt a minimum buildable area standard of 1,500 sq ft for all lots to ensure lots are buildable considering setback requirements.

City Staff shared these draft amendments with several developers and subdivision designers in the area. Two detailed responses to this inquiry are included in the packet.

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ORDINANCE 25-36

AMENDING NCC 21.10.020 OPEN SPACE SUBDIVISION, INCLUDING REQUIREMENTS FOR SETBACKS, LOT SIZE STANDARDS, AND VARIATION

WHEREAS, Nibley City regulates land use within Nibley City boundaries; and

WHEREAS, Nibley City promotes variation in housing options to serve the needs of existing and future residents; and

WHEREAS, Nibley City strives to mitigate impacts of new development upon existing neighborhoods.

NOW, THEREFORE, BE IT ORDAINED BY THE NIBLEY CITY COUNCIL OF NIBLEY, UTAH THAT:

1. The attached amendments to Nibley City Code 21.10.020 be adopted.
2. All ordinances, resolutions, and policies of the City, or parts thereof, inconsistent herewith, are hereby repealed, but only to the extent of such inconsistency. This repealer shall not be construed as reviving any law, order, resolution, or ordinance, or part thereof.
3. Should any provision, clause, or paragraph of this ordinance or the application thereof to any person or circumstance be declared by a court of competent jurisdiction to be invalid, in whole or in part, such invalidity shall not affect the other provisions or applications of this ordinance or the Nibley City Municipal Code to which these amendments apply. The valid part of any provision, clause, or paragraph of this ordinance shall be given independence from the invalid provisions or applications, and to this end the parts, sections, and subsections of this ordinance, together with the regulations contained therein, are hereby declared to be severable.
4. This ordinance shall become effective upon posting as required by law.

PASSED BY THE NIBLEY CITY COUNCIL THIS ___ DAY OF _____ 2026.

_____
Larry Jacobsen, Mayor

ATTEST: _____
Cheryl Bodily, City Recorder

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21.10.020 Open Space Subdivision

A. Purpose: The purpose of this section is to provide for subdivision development within Nibley City in a manner that:

1. Helps preserve the rural feeling of Nibley City as outlined in the General Plan;
2. Provides Open Space Land with a specific purpose that provides visual and physical access to the public.
3. Supports adopted City policies to conserve a variety of irreplaceable and environmentally sensitive resources and agricultural lands as set forth in the General Plan;
4. Protects constrained and sensitive lands, including, but not limited to, those areas containing sensitive features such as steep slopes, floodplains, and wetlands, by setting them aside from development;
5. Provides Open Space Land, including those areas containing unique or natural features such as meadows, grasslands, tree stands, streams, stream corridors, berms, waterway, farmland, wildlife corridors and/or habitat, historical buildings and/or sites, archeological sites, and green space, by setting them aside from development;
6. Reduces erosion and sedimentation by the retention of existing vegetation and the minimization of development on steep slopes and other constrained and sensitive lands;
7. Provides for a diversity of lot sizes to accommodate a variety of age and income groups and residential preferences, so that the community's population diversity may be enhanced;
8. Provides incentives for the creation of greenway systems and Open Space Land within the City for the benefit of present and future residents.
9. Creates neighborhoods with direct visual and/or physical access to Open Space Land;
10. Maintains and creates scenic views and elements of the City's rural and scenic character and minimizes perceived density by maintaining views of new development from existing roads.

B. Definitions: For the purpose of this section, the following words shall have the meanings set forth herein:

1. OPEN SPACE LAND: Any parcel or area of land dedicated under this section as indicated on an Open Space Subdivision Plat for the access and/or visual enjoyment of the public. Open Space Land must meet the standards and requirements of this section. Open Space Land may not be contained in the privately-owned parcel except as specifically allowed in this ordinance. Open Space Land must have 25% of its border adjacent to public access right-of-way, easement, or City park or contain a trail open to the public which traverses or runs adjacent to the Open Space Land. Open Space Land area shall not be included in setback areas calculations for principal or accessory uses.
2. CONSTRAINED AND SENSITIVE LAND: Land which is generally unbuildable without engineered ground modifications, or which contains features including, but not limit to Federal, State, or municipally designated wetlands, floodplains, slopes greater than 20%, faults, designated canals per Nibley Ordinance and other geologically or environmentally sensitive features that require mitigation, special insurance or permits from government authorities to allow development. This land may be used as Open Space Land if it complies fully with conditions within this ordinance for qualification of Open Space.
3. WATERWAY: Surface water runoff and drainage, drainage ditches and irrigation waterways, whether surface or subsurface and natural waterways including creeds, streams, springs, rivers, ponds, and wetlands.
4. TREE STAND: A group or cluster of trees within a geographic location that are occurring naturally or artificially.
5. MEADOWS: Land vegetated with native species of grasses, trees, forbs, and flowers, either undisturbed or constructed, that can be sustained without supplemental irrigation. Actively used pasture and agricultural land are not considered Meadows under this definition.
6. PASTURE: A fenced enclosure or confined area used for the grazing of livestock or small animals which contains sufficient vegetation to serve as the principal food source for the livestock confined therein.
7. NET DEVELOPABLE LAND: Net Developable Land shall include the total area of the proposed development minus land that is required by Nibley City ordinance to be dedicated to the City including, but not limited to:
    a. Public access rights-of-way

b. Land required to be dedicated along waterways

c. Preservation lands with infrastructure installed to City standards by the developer as part of the development process (parks, trails, etc.)

d. Constrained and Sensitive Land as defined herein

e. Easements, lands dedicated to the City for preservation space but without public rights of access, and other utility or general rights-of-way without access to the public shall be included as Net Developable Land.

8. Net Developable Land may be calculated for the purposes of concept review and preliminary plat approval based on either rule of thumb as outlined in the Lot Standards chart for the underlying zone of the proposed subdivision or based on actual measurements derived from the proposed plat. Calculation of Net Developable Land for final plat approval shall use actual measured Net Developable Land area. The proponent shall demonstrate compliance with this provision by calculation based on values demonstrably derived from the proposed final plat.

C. Applicability:

1. The election to develop the property as an Open Space Subdivision is voluntary and provided to developers as an alternative to the standard subdivision process codified in NCC 19 and NCC 21. The intent of this section and the Open Space Subdivision options is to encourage the creation and development of flexible designed Open Space Land and variety in lot size and conformation. Open Space Subdivisions may be developed within applicable residential zones of the City. Open Space Subdivisions shall be developed in accordance with and subject to the development standards, conditions, procedures and regulations of this section and with all other applicable subdivision ordinances and zoning regulations of the City which are not otherwise in conflict with the provisions of this section.

2. In cases of conflict with other Nibley City ordinances, the terms of this section shall govern.

3. Development Options: In R-1, R-1A,R-2, and R-2A zones in Nibley City, developers may elect to develop an Open Space Subdivision. If the zone is not listed above, it does not qualify for an Open Space Subdivision.
4. Developers desiring to develop the property as Open Space Subdivision are subject to the development standards, conditions procedures and regulations of this section.

D. Application Process:

1. Applications for an Open Space Subdivision shall be submitted and processed in accordance with the requirements and procedures set forth in the City Subdivision Ordinance, including submission and approval of schematic, preliminary and final plans or plats, and any additional procedural requirements set forth in this section, including, but not limited to, submission of a sensitive area designation plan and maintenance plan.
2. Pre-application Meeting: Applicants for an Open Space Subdivision may request a pre- application meeting with the Development Committee as established in NCC 21.06.030. To assist with this review the developer may submit the draft plan of the proposed subdivision with such details as the following:
    a. Zoning and parcel location
    b. Total gross acres
    c. Estimated right-of-way dedication
    d. Estimated Constrained and Sensitive Land
    e. Estimated Net Developable Land
    f. Estimated Open Space Dedication and proposed uses
    g. Total number of lots based on density bonus
    h. Estimated lot sizes and subdivision layout.

3. Sensitive Area Designation Plan Map: All applications for a Open Space Subdivision shall include a sensitive area designation plan map prepared in accordance with the provisions set forth herein and submitted with the preliminary plat. The sensitive areas designation plan map shall identify all constrained and sensitive lands within the property boundaries as set forth in this section. The sensitive area designation plan map shall also clearly identify all natural or cultural resources present on the property, including, but not limited to those defined in this ordinance (geographic features, meadows, tree stands, streams, stream corridors, floodwalls, berms, waterways, canals, irrigation ditches, farmland, pastures, wildlife corridors and/or habitat; historic buildings and/or sites; archeological sites; cultural features and green space). Applicants are solely responsible for the accuracy and designation of constrained and sensitive lands as defined in this ordinance, and natural and cultural resources as defined by the United States, State of Utah, Cache County, and Nibley City on the sensitive area designation plan map for their project and applicable adjacent property. The applicant shall include all sensitive areas within four hundred feet (400') of the developments property boundaries as noted in City, County, State, and Federal records.

4. Maintenance Plan for preserved Open Space Land: The developer must submit a Preliminary Maintenance Plan in accordance with subsection M,2 of this section and with the preliminary plat. For final plat application, the developer must submit a Final Maintenance Plan in accordance with subsection M,3 of this section. The Final Maintenance Plan shall be attached to the Development Agreement required by NCC 21 and recorded with the Final Plat for the property.

E. Dimensional Standards:

1. Incentive Multiplier: The incentive multiplier within an Open Space Subdivision shall be determined in accordance with the Incentive Multiplier Chart.

Incentive Multiplier Chart

Zone	Open Space Ratio[1] (OSR)	Incentive Multiplier			
R-1	0.25 ≤ OSR < 0.30	1.25			
	0.30 ≤ OSR < 0.35	1.30			
	0.35 ≤ OSR < 0.40	1.35			
	0.40 ≤ OSR	1.40			
R-1A	0.25 ≤ OSR < 0.30	1.25			
	0.30 ≤ OSR < 0.35	1.30			
	0.35 ≤ OSR < 0.40	1.35			
	0.40 ≤ OSR	1.40			
R-2	0.25 ≤ OSR < 0.30	1.25			
	0.30 ≤ OSR < 0.35	1.30			
	0.35 ≤ OSR < 0.40	1.35			
	0.40 ≤ OSR	1.40			
R-2A	0.25 ≤ OSR < 0.30	1.25			

	0.30 ≤ OSR < 0.35	1.30			
	0.35 ≤ OSR < 0.40	1.35			
	0.40 ≤ OSR	1.40			
Notes: 1. The OSR is the ratio of the area of the Open Space Land divided by the area of the Net Developable Land.					

2. Variation of Lot sizes Requirement: For Subdivisions with 40 or greater lots, a variation in lot sizes is required. No more than 40% of lots within a subdivision may be composed of any one lot size category according to the following chart:

Lot size category	Lot size range
1	3,000 – 4,500 ft^2
2	4,501 – 6,000 ft^2
3	6,001 – 7,500 ft^2
4	7,501 – 9000 ft^2
5	9,001 – 10,500 ft^2
6	10,501 – 12,000 ft^2
7	12,001 – 13,500 ft^2
8	13,501 – 15,000 ft^2
9	15,001 – 17,500 ft^2
10	17,501 – 20,000 ft^2
11	20,001 ft^2 or greater

3. Minimum Setback Standards: Minimum setbacks for principal buildings within an Open Space Subdivision shall be determined in accordance with the Minimum Setback Standards Chart. Minimum setbacks of accessory buildings shall be determined in accordance with the underlying zone.

Minimum Setback Chart					
Zone	Open Space Ratio (OSR)	Front yard	Side Yard, interior	Side Yard, street	Rear yard
R-1	As per underlying zone (see NCC 19.22.010)			25	
R-1A	As per underlying zone (see NCC 19.22.010)			25	
R-2	0.25 ≤ OSR < 0.30	As per underlying zone (see NCC 19.22.010)		25	
	0.30 ≤ OSR < 0.35	As per underlying zone (see NCC 19.22.010)		25	
	0.35 ≤ OSR < 0.40	25(35)[1]	8 (10)[2]	25(35)[1]	20 (25) [3]
	0.40 ≤ OSR	25(35)[1]	8 (10)[2]	25(35)[1]	20 (25) [3]
R-2A	0.25 ≤ OSR < 0.30	25(35)[1]	8 (10)[2]	25(35)[1]	20 (25) [3]

	0.30 ≤ OSR < 0.35	25(35)[1]	8 (10)[2]	25(35)[1]	20 (25) [3]
	0.35 ≤ OSR < 0.40	20(35)[1]	5 (10)[2]	20(35)[1]	15 (25) [3]
	0.40 ≤ OSR	20(35)[1]	5 (10)[2]	20(35)[1]	15 (25) [3]

[1] Greater distance required where yard faces arterial road.

[2] Greater distance required for any side yard which abuts existing property with residential zoning that requires a minimum setback of 10 feet or greater for side yard, interior.

[3] Greater distance required for any rear yard which abuts existing property with residential zoning that requires a minimum setback of 25 feet or greater for rear yard.

4. Minimum buildable area standard: No lot within an Open Space Subdivision may have a buildable area that is less than 1,500 ft^2 after subtracting minimum setback areas.

5. Procedure for Calculating Allowed Number of Lots: The Allowed Number of Lots including the density bonus for a Open Space Subdivision shall be determined as follows using the appropriate Incentive Multiplier from the Lot Standards Chart. The developer shall follow the process outlined below to determine allowable properties of the proposed subdivision and use these properties in developing the preliminary and final plats. All calculations and measurements shall be clearly documented in order and following the process outlined below and submitted with the plat applications:

    a. The subdivision must be in one of the approved zones as listed within the Open Space Subdivision requirements, and all calculation will be based on the parcel's current zone at the time of application and the associated Lot Standards Chart.

b. Provide to the City the total area contained within the subdivision plat.

c. Provide to the City the total area being dedicated to rights-of-way.

d. Provide to the City the total acres of Constrained and Sensitive Land.

e. Provide the City the total Net Developable Land area as defined within this section.

f. State the area of proposed Open Space Land.

g. Calculate Open Space Ratio.

h. Calculate the Base Number of Lots per zone:

    1) Base Number of Lots R-1 = Net Developable Land / 1 acre

    2) Base Number of Lots R-1A = Net Developable Land / .75 acres

    3) Base Number of Lots R-2 = Net Developable Land / 0.5 acres

    4) Base Number of Lots R-2A = Net Developable Land / 0.32 acres

i. Determine Incentive Multiplier

    1) Determine Incentive Multiplier based on the Lot Standards Chart, the applicable zone, and the Open Space Ratio.

j. Calculate total allowed

    1) Total allowed lots = Base number of lots multiplied by the Incentive Multiplier

F. Lot Area, Frontages, and Zoning Regulations:

1. Except for lot size and frontage requirements, the Zoning Regulations (NCC 19) for the underlying zone shall apply to Open Space Subdivisions, unless otherwise noted within this section.

G. Conservancy Lots:

1. Open Space Land and Constrained and Sensitive Land may be included within individual residential lots when such areas can be properly protected and preserved in accordance with the intent and purpose of this section. Such lots shall be known and referred to as "conservancy lots". These lots must contain a minimum of 0.5 acres of Open Space Land, except for areas approved by Nibley City as defined Landscape Buffers, and that Open Space Land must meet the design standards and use standards within this section.

2. Regulations: Open Space Land and Constrained and Sensitive land within a Conservancy Lot shall remain subject to all regulations and requirements for such land as set forth herein, including, but not limited to, use, design, maintenance, ownership and permanent protection. Open Space Land must be developed and maintained within the first year of the date of issuance of a Notice to Proceed under NCC 21.

3. The portion of each Conservancy Lot that is not Open Space Land must meet the minimum lot size on the applicable Lot Standards Chart and shall be the portion of the Conservancy Lot used to calculate the average and minimum lot size within the subdivision.

H. Use Regulation: Use of the land in an Open Space Subdivision that is not Open Space Land is subject to any restrictions set forth in NCC 19, unless otherwise specified within this section, for the zone in which the land is located. Use of Open Space Land within an Open Space Subdivisions is subject to the following:

1. Permitted Uses on Open Space Land: The following uses are permitted in Open Space Land areas:

    a. Street rights-of-way may traverse Open Space Land if permitted under City ordinances; provided, areas encumbered by such facilities and/or rights-of-way shall not be counted as Open Space Land when computing the Open Space Ratio in the Lot Standards Chart.

    b. Utility rights-of-way or easements, including above ground and underground utilities may traverse Open Space Land if permitted by City ordinance; areas encumbered by such facilities and/or rights-of-way may be counted as Open Space Land when computing the Open Space Ratio in the Lot Standards Chart so

long as the rights-of-way and easements otherwise meet the requirements of this ordinance for Open Space Land.

c. Agricultural and horticultural uses, including raising crops wholesale nurseries and associated buildings that are specifically needed to support active, viable horticultural operations. Wholesale nurseries must obtain an operating permit and business license from the City and must comply with all fencing and maintenance requirements of this ordinance.

d. Conservation of open land in its natural state, e.g., meadows, tree stands, wetlands, forestland.

e. Waterways along with dedicated public access rights-of-way or easements along one or both sides.

f. Underground utility easements for drainage, access, sewer or water lines, electric lines or other public purposes.

g. Active noncommercial recreation areas, such as trails, playing fields, playgrounds, courts, and multipurpose trails. These parcels shall be maintained by the City or an owners' association and shall be open to the public if maintained by the City, or residents within the Open Space Subdivision if maintained by a functional owners association.

h. Agricultural uses excluding livestock operations involving swine, poultry, and mink. Open Space Land of less than one-half (0.5) acre may be used as landscaped buffers for roadways, landscaped entrances to subdivisions, neighborhood "pocket parks" or similar amenities that meet standards and uses listed herein.

i. Fencing that is rural in character. All fencing must be transparent, such as rail fences, post fences, or wire fences and architecturally appropriate to the use as determined by the City Planner. Chain link fences are not permitted on Open Space Land. All applicants must receive a fence permit from the City before construction of any proposed fence.

j. Golf courses, not including commercial miniature golf. A development plan must be turned in as part of the approval process that outlines ownership, development, and building plans.

k. Neighborhood Open Space Land uses such as village greens, commons, picnic areas, community gardens, trails, and similar low-impact passive recreational uses. Neighborhood Open Space Land must be owned and maintained by an owners' association or the City.

l. Pasture for sheep, goats, cows, horses or other animals approved by Nibley City code. Pasture and animal density must conform with Nibley City Animal Land Use Regulations and be enclosed with appropriate fencing.

m. Silviculture, in keeping with established standards for selective harvesting and sustained yield forestry.

n. Water supply and sewage disposal systems, and stormwater detention areas designed, landscaped, and available for use as an integral part of the Open Space Land. These facilities must be built to Nibley City Engineering design standards and specifications, must contain a tree for every 300 square feet and planted around the perimeter, an irrigation system must be installed, and be planted with grass or natural vegetation

2. Prohibited Uses on Open Space Land: The following uses shall be considered prohibited in Open Space Land areas:

    a. Motor vehicles are prohibited except as necessary to maintain and operate the property and/or utility facilities within the property. Recreational motorized off-road vehicle usage including but not limited to motorcycles, dirt bikes, go-carts, OHVs, dune buggies, side-by-sides and their derivatives, and snowmobiles are prohibited.

    b. Firearm ranges, and other uses similar in character and potential impact are prohibited.

    c. Advertising of any kind and any billboards or signs; provided, directory and information signs may be displayed describing the easement and prohibited or authorized the use of the same.

d. Any cutting of trees or vegetation, except as reasonably necessary for fire protection, thinning, elimination of diseased growth, control of non-native plant species, maintenance of landscaped areas, and similar protective measures or those activities relating to permitted agricultural uses or other uses allowed within this section.

e. Any development, construction or location of any manmade modification or improvements such as buildings, structures, roads, parking lots, or other improvements, except as may be necessary to support a permitted use.

f. Any dumping or storing of ashes, trash, garbage, vehicles, trailers, recreational vehicles or other equipment except for equipment needed to maintain the land.

g. Any filling, dredging, excavating, mining, drilling, or exploration for and extraction of oil, gas, minerals or other resources from the property.

h. Any residential, commercial or industrial activity except as specifically permitted in this ordinance.

i. Burning of any materials, except as necessary for agricultural, drainage and fire protection purposes.

j. Changing the topography of the property by placing on it any soil, dredging spoils, landfill, or other materials, except as necessary to conduct specifically permitted purposes.

k. Hunting or trapping for any purpose other than predatory or problem animal control.

l. The change, disturbance, alteration, or impairment of significant natural ecological features and values of the property or destruction of other significant conservation interests on the property.

m. The division, subdivision or de facto subdivision of the property.

n. The use of motor vehicles, including snowmobiles, all-terrain vehicles, motorcycles and other recreational vehicles.

o. All other uses and practices inconsistent with and detrimental to the stated objectives and purpose of this section.

3. Constrained and Sensitive Lands: Except for passive recreational activities, no development or residential uses shall be permitted within Constrained and Sensitive Lands

4. Open Space Land Coordination: When directed by the Planning Commission, Open space land shall be consolidated and located on the border of proposed subdivision and be located adjacent to undeveloped or open space land. In consideration of open space consolidation, design standards described in this chapter shall be maximized, including the preservation of significant areas and natural landscape, and adequate pedestrian access.

5. Open Space Lands: Standards pertaining to the quantity, quality, configuration, use, permanent protection, ownership, and maintenance of the Open Space Land within an Open Space Subdivision shall be complied with as provided herein.

I. Open Space Land Design Standards: Open Space Land shall be located and designed within the Open Space Subdivision to add to the visual amenities of neighborhoods and the surrounding area by maximizing the visibility of Open Space Land. Designated Open Space Land within an Open Space Subdivision shall also comply as defined in this section, permitted uses as listed in this section, and meet three (3) or more of the following standards:

1. Significant Areas and Natural Landscape: Open Space Land shall include the most unique and sensitive resources and locally significant features of the property within the subdivision. Specifically, meadows, waterways and wetlands as defined in this Ordinance, and tree stands and contain a minimum of 0.5 acres. Other uses include berms, wildlife corridors and/or habitat and must extend a minimum of 15’ on each side of the feature. This Open Space Land may also contain historic buildings and/or sites, archeological sites, and cultural features. The maintenance plan shall outline how the property will be preserved and maintained. The maintenance plan must specify what type of feature(s) that is being preserved and how the property will be maintained.

2. Contiguous Land: Open Space Land within an Open Space Subdivision shall be contiguous within the subdivision, or to other Open Space Land in adjacent subdivisions or developments to provide for large and integrated Open Space Land areas within the City.

3. Agricultural Land: Privately held Open Space Land that is used for agricultural purposes as defined in this Ordinance and is 0.5 acre or greater in size.

4. Buffering: Open Space Land shall be designed to provide buffers and to protect scenic views as seen from existing public rights-of-way and from public parks or trails. Buffering area along public rights-of-way or street must be at least thirty (30') feet wide. Buffering must be landscaped, at the sole cost of the developer and shall provide for every hundred (100) linear feet of buffer, six (6) trees and fifteen (15) shrubs. Tree and shrub species must be approved by the City's arborist or the City's Park Director. Trees and shrubs shall be planted within thirty (30) feet of the right-of-way or public park. Irrigation shall be provided by the developer and shall be designed and installed to Nibley City Standards for City parks current at the time of approval of Final Plat. Open Space buffer areas shall be under single ownership.

5. Pedestrian Access: Developer shall provide pedestrian access to Open Space Land which is open to public or owners' association member use. Access methods can be a trail, park, recreation space, or neighborhood gathering space.

6. Recreation Space: Open Space Land may be designated as recreation space or park space, including maintained grass, trails, picnic areas, playgrounds, sports fields or other recreation and park amenities. Any recreation spaces that are to be dedicated to Nibley City are conditional upon the City Council's approval, and amenities must be approved by the City Council before final approval of the preliminary plat or maintenance plan can be given. Publicly and owners' association owned open spaces shall be fully developed and operational in conjunction with each phase of the subdivision as a percentage of the total developed value of the subdivision (for example, if 25% of the dollar value of the development is being constructed, then a minimum of 25% of the dollar value of the built-out Recreation Space must be developed). The determination of value, construction sequencing, and acceptance criteria shall be specified in the development agreement; until

improvements are accepted by the City for the attendant phase, no permits shall be issued for subsequent phases.

J. Permanent Protections of Open Space Land:

1. Conservation Easement: All Open Space Land shall be permanently restricted from future development by a conservation easement or other method of protection and preservation acceptable to the City. Under no circumstances shall any development be permitted in the Open Space Land at any time, except for those permitted or conditional uses listed herein and approved in conjunction with the Open Space Subdivision. All conservation easements, or another acceptable method of protection and preservation of the Open Space Land within a Open Space Subdivision, shall be approved by the City Council and recorded prior to or concurrent with the recording of the final plat for the Open Space Subdivision.
2. Terms and Conditions: All conservation easements, or another acceptable method of protection and preservation of the Open Space Land within a Open Space Subdivision, shall be in substantially the same form as the standard conservation easement form provided by the City and shall include, at a minimum, the following terms and/or conditions:
    a. Legal description of the easement;
    b. Description of the current use and condition of the property;
    c. Permanent duration of easement;
    d. Permitted and conditional uses;
    e. Prohibited development and/or uses;
    f. Maintenance responsibilities and duties; and
    g. Enforcement rights and procedures.

3. Marking of Open Space Land: Open space land shall be marked at each corner and property line intersection with a minimum 4" diameter x 3' deep concrete monument provided with an aluminum or brass cap cast or epoxied into the monument. Caps shall be stamped "Nibley Conservation Marker, Do Not Remove", and an arrow stamped into the cap perpendicular to the Open Space boundary line and pointing into the Open Space. Monuments shall be placed such that the top 6" of the monument is above finished grade at the monument location.

4. Grantee: Unless otherwise approved by the City Council, the grantee of a conservation easement shall consist of one of the following acceptable entities which entity shall be qualified to maintain and enforce such conservation easement: land trust, conservation organization, or governmental entity. The City may, but shall not be required to, accept, as grantee, a conservation easement encumbering Open Space Lands within a Open Space Subdivision, provided there is no cost of acquisition to the City for the easement and sufficient access to and maintenance responsibilities regarding the Open Space Land are provided.

K. Ownership of Open Space Land:

1. Undivided Ownership: Unless otherwise approved by the City Council and subject to the provisions set forth in this section, the underlying fee Ownership of the Open Space Land shall remain in single Ownership and may be owned and maintained by one of the following entities: homeowners' association, land trust, conservation organization, governmental entity, or private individual.

2. Property Not Subject to Subdivision: Property subject to a conservation easement, or another acceptable method of protection and preservation, shall not be subdivided.

3. Nibley City may at its sole discretion opt to take ownership of Open Space Land prior to the preliminary plat approval stage. In the event that the applicant requests or the Planning Commission recommends that Open Space land be dedicated to Nibley City, the City Council must approve the development agreement which includes dedication of open space prior to preliminary plat approval. The developer shall landscape the property with sod, grass, trees and an irrigation system or other natural landscape features as appropriate as determined by the City Council.

4. Owners Association: Open Space Land may be held in common ownership by a Home Owners or other acceptable Owners Association, subject to all the provisions for Owners Associations set forth in state law, the City Code, and the following:

    a. A description of the organization of the proposed Association, including its bylaws, and all documents governing ownership, maintenance, and use restrictions for Open Space Land, including restrictive covenants for the subdivision, shall be submitted by the developer with the final plat application.

    b. The proposed association shall be established, funded and operating (with financial subsidization from the Developer, if required by the City in the development agreement) prior to or concurrent with the recording of the final plat for the subdivision;

    c. Membership in the association shall be mandatory for all purchasers of property within the subdivision and their successors in title.

    d. The association shall be the responsible party for maintenance and insurance of its Open Space Land under the Final Maintenance Plan for the subdivision;

    e. The bylaws of the association and restrictive covenants for the subdivision shall confer legal authority on the association to place a lien on the real property of any member who falls delinquent in dues. Such dues shall be paid with the accrued interest before the lien may be lifted; and

    f. Written notice of any proposed transfer of Open Space Land by the Association or the assumption of maintenance for the Open Space Land must be given to all members of the Association and to the City no less than thirty (30) days prior to such event.

    g. The owners' association shall be required to provide a bond or line of credit to the City for the cost of one year of maintenance of property owned by the Association, to be maintained by the Association for as long as the Association owns the Open Space.

h. In the event of a failure of the owners' association to maintain the properties in accordance with the requirements of the development agreement, the City shall revoke the owners' association's bond, determine an appropriate assessment for the operation and maintenance of the open space, and assess all properties of the Subdivision on a monthly basis for said maintenance.

5. Private Ownership: A conservation parcel may be owned by a private individual or entity. Such parcels shall have a defined purpose and restrictions recorded in the maintenance plan and comply with this section.

L. Maintenance of Open Space Lands:

1. Costs: Unless otherwise agreed to by the City, the cost and responsibility of maintaining Open Space Land shall be borne by the owner of the underlying fee of the Open Space Land.

2. Preliminary Maintenance Plan: A Preliminary Maintenance Plan shall be turned in with the preliminary plat for proposed maintenance of Open Space Land within the subdivision. This plan shall outline the following:

   a. The proposed Ownership of the Open Space Land;

   b. The party that will be responsible for maintenance of the Open Space Land;

   c. The proposed use of the Open Space Land and how each parcel of Open Space Land meets the standards listed within this section;

   d. The size of each Open Space Land parcel; and

   e. The proposed concept plan for landscaping of the Open Space Land.

3. Final Maintenance Plan: The developer shall submit a plan outlining maintenance and operations of the Open Space Land and providing for and addressing the means for the permanent maintenance of the Open Space Land within the proposed Open Space Subdivision application for the subdivision. If the maintenance plan addresses Open Space Land that is to be owned or dedicated to Nibley City, the maintenance plan shall conform to all conditions and terms of the development agreement approved by the City Council that includes

the dedication of open space The developer shall provide a final maintenance plan with the final plat and the plan shall contain the following:

a. Ownership agreements for Open Space Land;

b. A description of the use of the Open Space Land and how that use complies with this section;

c. The establishment of necessary regular and periodic operation and maintenance responsibilities for the various kinds of Open Space Land (e.g., lawns, playing fields, meadow, pasture, wetlands, stream corridors, hillsides, cropland, woodlands, etc.);

d. The estimated staffing needs, insurance requirements, and associated costs, and define the means for funding the maintenance of the Open Space Land, and the operation of any common facilities located thereon, on an ongoing basis, including means for funding long-term capital improvements as well as regular yearly operating and maintenance costs; and

e. The landscaping plans for parcels that will be owned by an owners association or by the City.

f. Approval: The Final Maintenance Plan must be approved by the Administrative Land Use Authority prior to or concurrent with final plat approval for the subdivision. The Final Maintenance Plan shall be recorded against the property within the subdivision and shall include provisions for the City's corrective action rights as set forth herein. Any changes or amendments to the Final Maintenance Plan must be approved by the Administrative Land Use Authority.

4. The developer shall offer an approved letter of credit, bond or escrow for all proposed improvements and must complete all proposed open space improvements within the first three years of approval. If a designated open space parcel is planned to be maintained by a single property owner, the developer shall maintain that property until title is transferred to a new property owner.

5. Failure to Maintain: For all open space designated under the terms of this Ordinance, including privately held Open Space Lands, the responsible party for the maintenance of the Open Space Land in accordance with the

terms of this ordinance, the approved maintenance agreement, any conditional use permits, business licenses or any other agreements between the City and the responsible party, or the operation of any common facilities located thereon fails to maintain all or any portion of the Open Space Land or common facilities in accordance with the aforementioned agreements and ordinances, the City may assume responsibility for the maintenance and operation of the Open Space Land. If the City assumes responsibility under this paragraph, any remaining development escrow or bond funds may be forfeited, liens for maintenance costs shall be assessed as described herein, and any permits, licenses or operating agreements may be revoked or suspended by the City in the City's sole discretion. The owner shall not impede the City in their efforts to maintain the open space.

6. Corrective Action: The City may enter the premises and take corrective action, including extended maintenance. The costs of such corrective action may be charged to the property Owner and may include administrative costs and penalties. Such costs shall become a lien on said properties. Notice of such lien shall be filed by the City in the county recorder's office. The maintenance plan and all other documents creating or establishing any Association or conservation organization for the property shall reference the City's corrective action authority set forth herein and shall be recorded against the property.
7. Implementation and Maintenance: The developer of the subdivision shall fund implementation and maintenance of the conservation easement until such time as the control of the easement is transferred to the long-term manager. The developer shall address implementation, development, maintenance and transfer procedures in the sensitive area designation plan map or master development plan, as applicable.
8. Maintenance Access: The developer of the subdivision shall provide sufficient maintenance access from a dedicated right-of-way to all Open Space Land and constrained and sensitive lands within the Open Space Subdivision.

M. Fee in-lieu of Open Space

1. For Open Space Subdivision developments that are within 1/2 mile of a dedicated or master-planned City Park which is two (2) acres or greater, as identified in the Nibley City Parks, Recreation and Open Space Master Plan,

a developer may pay a fee in-lieu of amenities and open space required. The fee in-lieu of open space required shall be based upon the acreage of the open space that is not provided and shall be set by the Consolidated Fee Schedule, adopted by the City Council.

2. All fees in-lieu of open space shall supplement the improvement and maintenance of parks and recreation facilities in Nibley City.
3. If the developer pays a fee-in-lieu of open space requirements, the developer may develop the commensurate additional number of housing units that the fee-in-lieu offsets. For example, if the developer pays a fee-in-lieu of open space that is equal to 0.25 Open Space Ration, an additional 0.25 Incentive Multiplier shall be allotted to the development, as noted in the Lot Standards Chart of this Section.
4. Any fee in-lieu of open space must be approved by City Council as part of a development agreement approval.

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Outlook

Re: Nibley City Open Space Subdivision Update

From Michael Taylor <mtaylor@civilsolutionsgroup.net>
Date Wed 11/5/2025 1:42 PM
To Levi Roberts <levir@nibleycity.gov>
Cc Clay Schaffner <cschaffner@civilsolutionsgroup.net>

---CAUTION--- This email originated from outside of the organization.

Levi,

This is an interesting proposal. It could help produce a range of home sizes, but it could also result in some even denser, more clustered developments. A few things to consider:

- The 40 lot threshold may have some unintended results. An extreme example: if I were to develop a subdivision with 39 lots with all category 1 size lots of 3,000sf that were 40'x75', I would need ~780lf of roadway. At $400/lf of road, that's $312K. When I go to 40 lots, and only 40% can be 3,000sf (40x75), 4,501sf (45x100), and 6,001sf (60x100), then my length of roadway becomes 920lf, or rather $368K. That one additional house resulted in a price jump of 18% in infrastructure costs. I think this could end up discouraging developments in the 40-50 lot range, because the developer's overall profits are going to be greater by staying below that threshold.
- I did some quick numbers on the Fields at Nibley job and it appears that under this ordinance, the subdivision could have been even more dense with about 30% less roadway. Of course, what would they do with the extra 3-acres? Dedicate it perhaps? Or maybe they fit it into the lots to try to get some higher per lot sale prices, as long as the price of additional roadway frontage from bigger lots doesn't exceed the expected gains in home sales values. Keeping in mind that from what I understand from real estate agents, the size of a yard does not make a proportionate difference in the sale value of the home; most of the difference is in the size of the home itself. So as long as the lot is big enough for the desired home product, the developer is always going to be incentivized to keep the lots as small as possible...

This is outside of the present political discussion, but for what it's worth, I would recommend the council consider some of the insights from the Strong Towns team. I just don't think the tax base is there in Nibley to support a robust parks system + all sorts of random open spaces throughout the City. And I think some of the elected officials get that, and that's why they don't want most of this random open space dedicated to them. But even if you form an HOA, then the cost is still passed on to the homebuyer for maintenance, and home affordability gets further out of reach. Plus, studies show that MORE open space is not necessarily the solution, but the quality of it. Location, accessibility, and programming all matter. If Nibley is going to be a City, I would support the "Keep the City, City; and the Country, Country" approach, which would seem to suggest you locate open space where it provides the most benefit and then zone for enough density to create a tax base that can support said open space. I'll stop there...

Regards,

Michael E. Taylor, PE, Vice President
Civil Solutions Group
www.civilsolutionsgroup.net
CELL 435.890.4498
CACHE VALLEY | SALT LAKE | UTAH VALLEY

On Tue, Nov 4, 2025 at 3:18 PM Levi Roberts <levir@nibleycity.gov> wrote:

> Hello,
>
> Nibley City is working on an update to the Open Space Subdivision Code. Attached is what is being considered by the Planning Commission next week on November 13. These are intended to result in more variety of lot sizes and mitigate some effects of locating a subdivision with smaller lot sizes and less restrictive setbacks to those with larger lots and more restrictive setbacks.
>
> As a developer or designer of residential subdivisions, we value any feedback you might have. We are particularly interested in learning whether these changes would present any challenges or opportunities for development. Please let me know if you have any comments on these proposed changes.
>
> Thanks,
>
> **Levi Roberts, AICP**
> *City Planner*
> 455 West 3200 South
> Nibley, Utah 84321
> O: 435-752-0431 ext. 105
> C: 435-760-8459
> Email: levir@nibleycity.gov

MEMORANDUM

To: Nibley City Council and Planning Commission
From: Heritage Land Development, LLC & Alliance Engineering
Date: November 6, 2025
Subject: Joint Policy and Technical Review – Nibley City Code §21.10.020 "Open Space Subdivision"

---

1. Introduction

Heritage Land Development and Alliance Engineering appreciate the opportunity to jointly review and provide professional input on Nibley City's Open Space Subdivision ordinance (§21.10.020).

Collectively, our firms have significant experience in Utah's municipal planning and development processes, including the preparation, design, and implementation of conservation-oriented subdivisions. We view this ordinance as a **strong, forward-looking framework** that aligns well with best practices in community design, land conservation, and sustainable development.

Our intent in this memorandum is to (1) acknowledge the ordinance's strengths, (2) highlight opportunities to improve clarity and administration, and (3) recommend refinements that enhance the balance between **developer incentives** and **public benefit**.

---

2. Overall Assessment

The Open Space Subdivision ordinance represents one of the most well-structured local frameworks we've seen for rural and semi-rural municipalities in Utah.
It provides:

- **Predictable developer incentives** through a quantified bonus system,
- **Protection of sensitive environmental features**, and
- **Clear expectations for open space usability and maintenance.**

The structure is consistent with national standards such as those promoted by the **American Planning Association (APA)** and **Randall Arendt's Conservation Design** principles, as well as best practices in comparable Utah cities like Farmington, Lehi, and Midway.

---

3. Key Strengths and Best Practices

A. Incentive-Based Density System

The ordinance's **Open Space Ratio (OSR) and Incentive Multiplier** table provides a direct and transparent formula for determining allowable lot yields.
This mechanism:

- Rewards projects that preserve higher levels of open space;
- Promotes flexible design without arbitrary negotiation; and
- Allows developers to incorporate meaningful open areas early in the design phase.

Joint Observation:
The incentive system provides an excellent framework for balancing land conservation with project feasibility. The City could further enhance this model by granting **incremental bonuses** for designs that achieve multiple community objectives such as trail linkages, public access to open space, or integration with city park systems.

B. Preservation of Constrained and Sensitive Lands

The ordinance correctly excludes sensitive lands (wetlands, floodplains, steep slopes) from the **Net Developable Land** calculation while still allowing them to be preserved as open space.
This is a critical distinction that ensures:

- Density is earned only from *buildable* land; and
- Sensitive features are protected and incorporated meaningfully into site design.

This approach mirrors conservation subdivision models widely adopted throughout the Intermountain West.

C. Maintenance, Bonding, and Enforcement

The required **Preliminary and Final Maintenance Plans**, along with **bonding and corrective action provisions**, demonstrate foresight and administrative discipline.
The ability for the City to assume maintenance and recover costs through liens ensures accountability and long-term quality of the open space.

Recommendation:
Consider requiring a brief **annual compliance certification** from HOAs or easement holders verifying ongoing maintenance and compliance with the recorded plan. This proactive step helps prevent deterioration before it becomes an enforcement issue.

D. Fee-In-Lieu Option

Allowing a **fee-in-lieu** of on-site open space provides valuable flexibility, particularly for infill projects or those near existing city parks.
This option maintains the public benefit while preventing the creation of small or isolated "leftover" spaces.

Recommendation:
Tie the fee-in-lieu rate to the **City's current per-acre park improvement cost**, ensuring that collected funds are commensurate with the value of the open space not provided on-site.

E. Lot Diversity and Neighborhood Character

The required **lot size variation** standard (no more than 40% in one lot size category) promotes both architectural diversity and neighborhood quality.
This approach supports the City's goal of maintaining visual variety and providing a range of housing opportunities, a key principle of balanced community design.

---

4. Areas for Clarification or Enhancement

Topic	Current Provision	Joint Recommendation	Purpose
Connectivity & Contiguity	Open space "should" be consolidated or adjacent, but not mandatory.	Require open space to connect to adjacent greenways or planned trail corridors when feasible.	Creates continuous systems and higher community value.
Usable vs Passive Open Space	Ordinance does not distinguish between types of open space.	Define a minimum percentage (25–30%) of open space that must be usable, accessible, and improved (trails, play areas, etc.).	Ensures practical and functional community spaces.
Net Developable Land Definition	Certain easements may be counted toward Net Developable Land.	Clarify that only buildable, accessible easements may be included in Net Developable Land.	Prevents inflated density calculations.
Enhanced Incentive Opportunities	Bonuses are based solely on OSR thresholds.	Allow modest additive bonuses (+0.05 multiplier) for achieving multiple benefits such as trail	Encourages higher-quality design outcomes.

Topic	Current Provision	Joint Recommendation	Purpose
		connectivity, habitat restoration, or public access.	
Maintenance Oversight	Reactive enforcement through City lien authority.	Require periodic HOA reporting or City inspection prior to bond release.	Ensures proactive maintenance oversight.
Administrative Implementation	Relies heavily on interpretation and individual plan review.	Develop a standardized **Open Space Subdivision Checklist** for staff and applicants.	Increases consistency and review efficiency.

Agenda Item #13

Description	**Workshop**: 2026 Goals
Presenter	Justin Maughan, City Manager
Recommendation	
Reviewed By	Mayor Larry Jacobsen Justin Maughan, City Manager

Background:

Previous 2025 Goals:

1. Are assets still assets, do we need to sell some of it, specifically next to City Hall?
2. Take a general look at Code Enforcement, both actual code and enforcement policies.
3. Focus Council on legislating and let PZ deal with land use.
4. Participate and be active in Cache Fire District.
5. Continue being the leader in In-Door recreation, and work towards a bond.
6. Increase economic development in the City.
7. Better public notice for code changes.
8. Advertise and let people know about Utah Public Notice Website.
9. Review Emergency plan and policies.
10. Look at water and stormwater rates.
11. Clean up section 19 and 21 of code.
12. Coordinate better with other municipalities and state agencies.

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Nibley City
2026 Goal Workshop

Justin Maughan, PE

29 January 2026

2025 Goals:

1. Are assets still assets, do we need to sell some of it, specifically next to City Hall?
2. Take a general look at Code Enforcement, both actual code and enforcement policies.
3. Focus Council on legislating and let PZ deal with land use.
4. Participate and be active in Cache Fire District.
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9. Review Emergency plan and policies.
10. Look at water and stormwater rates.
11. Clean up section 19 and 21 of code.
12. Coordinate better with other municipalities and state agencies.

2026 Goals:

Planning Commission Goals- 2026

1. Review and Implement Strategies of General Plan and Moderate-Income Housing Plan.
    a. Update of Annexation Plan
2. Review and Update Nibley City's Zoning, Subdivision, Architectural Design Standards and Transportation Design Standards for consistency with General Plan, Town Center Vision, Active Transportation Plan, and Transportation Master Plan.
    a. Update access, connectivity and intersection spacing standards.
3. Partner with Cache County, Millville and Providence on a Hwy 165 Corridor Study that explores alternatives for future HWY 165 function, access, etc. and a regional real estate economics study of future population and travel patterns to identify likely market demand for retail, services, and jobs along the corridor.
4. Complete Development of Transportation Master Plan.
5. As necessary, update Nibley City Code for compliance with State Code.

Nibley City Council

FEBRUARY 19, 2026

NIBLEY

WALL CONSULTANT GROUP

PUBLIC FINANCE ADVISORS
LEWIS | ROBERTSON | BURNINGHAM

NIBLEY GENERAL PLAN UPDATE

NIBLEY FORWARD



WHAT IS THE GENERAL PLAN?

THE **GENERAL PLAN IS**:

- A Statement of Vision
- A Set of Community-Wide Goals
- A Decision-Making Guide for Development
- A Framework for More Specific Planning

THE **GENERAL PLAN IS NOT**:

- X A Zoning Ordinance
- X A Rigid/Static Document
- X A City Budget
- X A Parcel-Specific Policy Statement

SCHEDULE

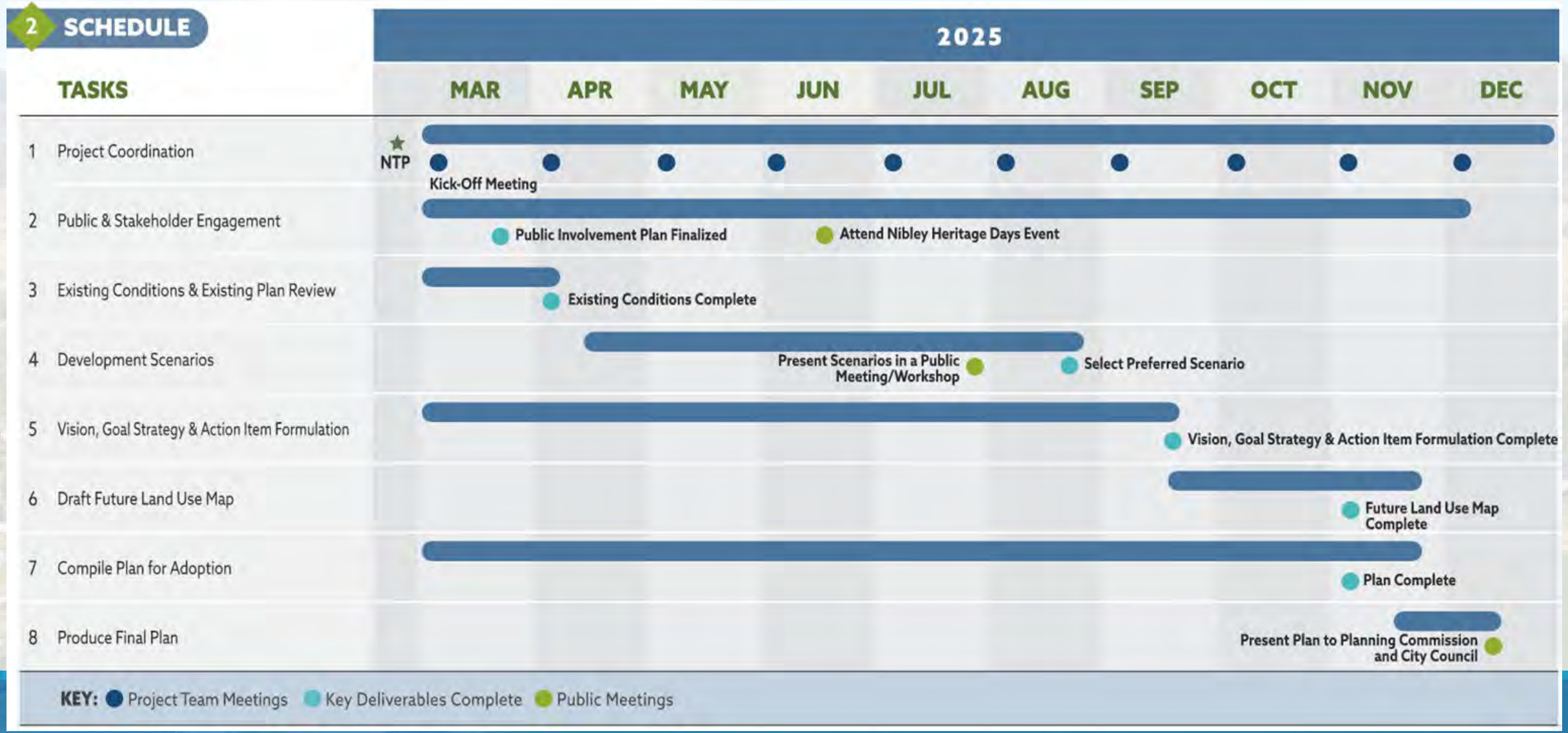
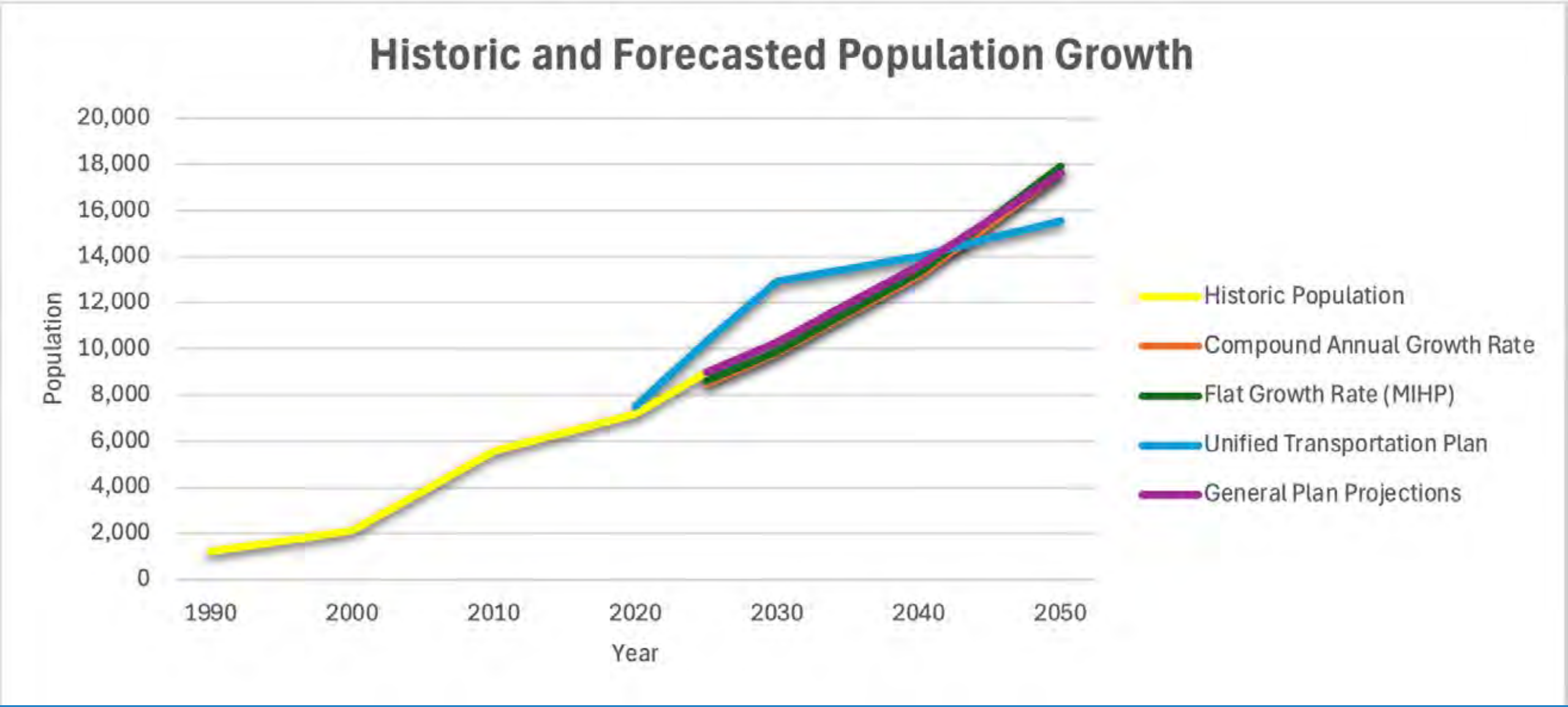

2 SCHEDULE
2025
TASKS
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC
1 Project Coordination
NTP
Kick-Off Meeting
2 Public & Stakeholder Engagement
Public Involvement Plan Finalized
Attend Nibley Heritage Days Event
3 Existing Conditions & Existing Plan Review
Existing Conditions Complete
4 Development Scenarios
Present Scenarios in a Public Meeting/Workshop
Select Preferred Scenario
5 Vision, Goal Strategy & Action Item Formulation
Vision, Goal Strategy & Action Item Formulation Complete
6 Draft Future Land Use Map
Future Land Use Map Complete
7 Compile Plan for Adoption
Plan Complete
8 Produce Final Plan
Present Plan to Planning Commission and City Council
KEY: Project Team Meetings Key Deliverables Complete Public Meetings

TABLE 1: HISTORIC AND FUTURE POPULATION PROJECTIONS								
Year	1990	2000	2010	2020	2025	2030	2040	2050
Population	1,220	2,111	5,564	7,168	9,000	10,300	13,600	17,600



PUBLIC ENGAGEMENT

- Growth Scenarios Workshop
- Heritage Days Table
- Community Survey
- USU Wellbeing Survey
- Stakeholder Interviews



June 17th Growth Scenarios Workshop

#1: GROWTH AS-IS

"Continue current pattern of growth"

HOUSING
Blend of detached and attached units



CONSIDERATIONS:

- ✓ Familiar development pattern
- ✓ Supports demand for single-family housing
- ✗ Leads to land sprawl and fewer open space preservation opportunities
- ✗ Limits economic development and future shops and services

#2: COMPACT / CENTERED GROWTH

"Focus growth into a town center that supports walkability, housing variety, and local businesses."

HOUSING
Blend of detached and attached housing with retail services integrated



CONSIDERATIONS:

- ✓ Supports community building
- ✓ Encourages growth of local business
- ✓ Preserves open space and rural edges
- ✗ Less familiar patterns of development
- ✗ Requires major zoning and policy change

#3: LOW INTENSITY GROWTH

"Limit density to preserve Nibley's rural character and minimize additional growth."

HOUSING
Emphasis on detached units



CONSIDERATIONS:

- ✓ Preserves rural character
- ✓ Maintains low traffic on local roads
- ✗ Limits housing supply and affordability
- ✗ Limits close access to shops, services, and local jobs

#4: CONNECTED & ACTIVE COMMUNITIES

"Grow through neighborhoods built around parks, trails, and local gathering places."

HOUSING
Blend of detached and attached housing clustered in neighborhood centers

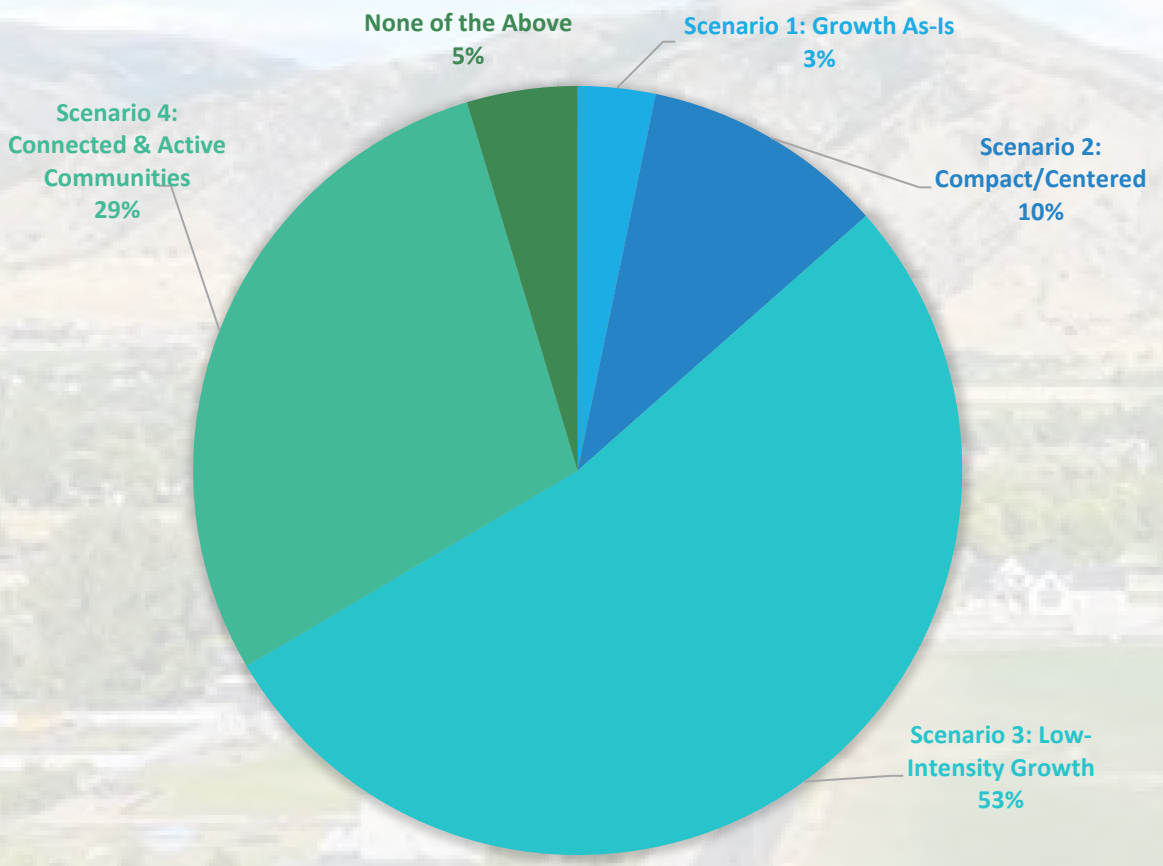


CONSIDERATIONS:

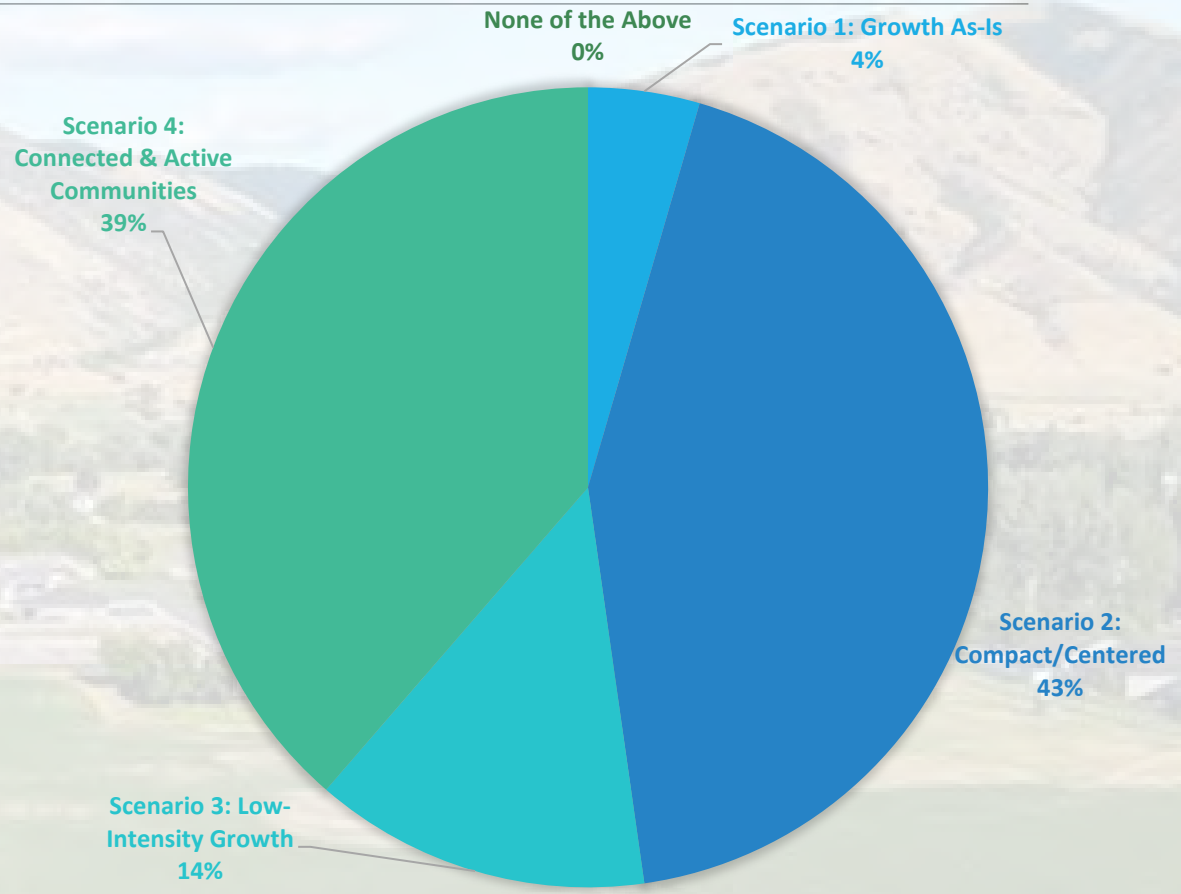
- ✓ Fosters a strong sense of community by supporting active living
- ✓ Provides walkable and bikeable neighborhoods with high access to open spaces and recreation
- ✗ Requires complex planning and coordination
- ✗ Less emphasis on a concentrated town center

GROWTH SCENARIO RESULTS

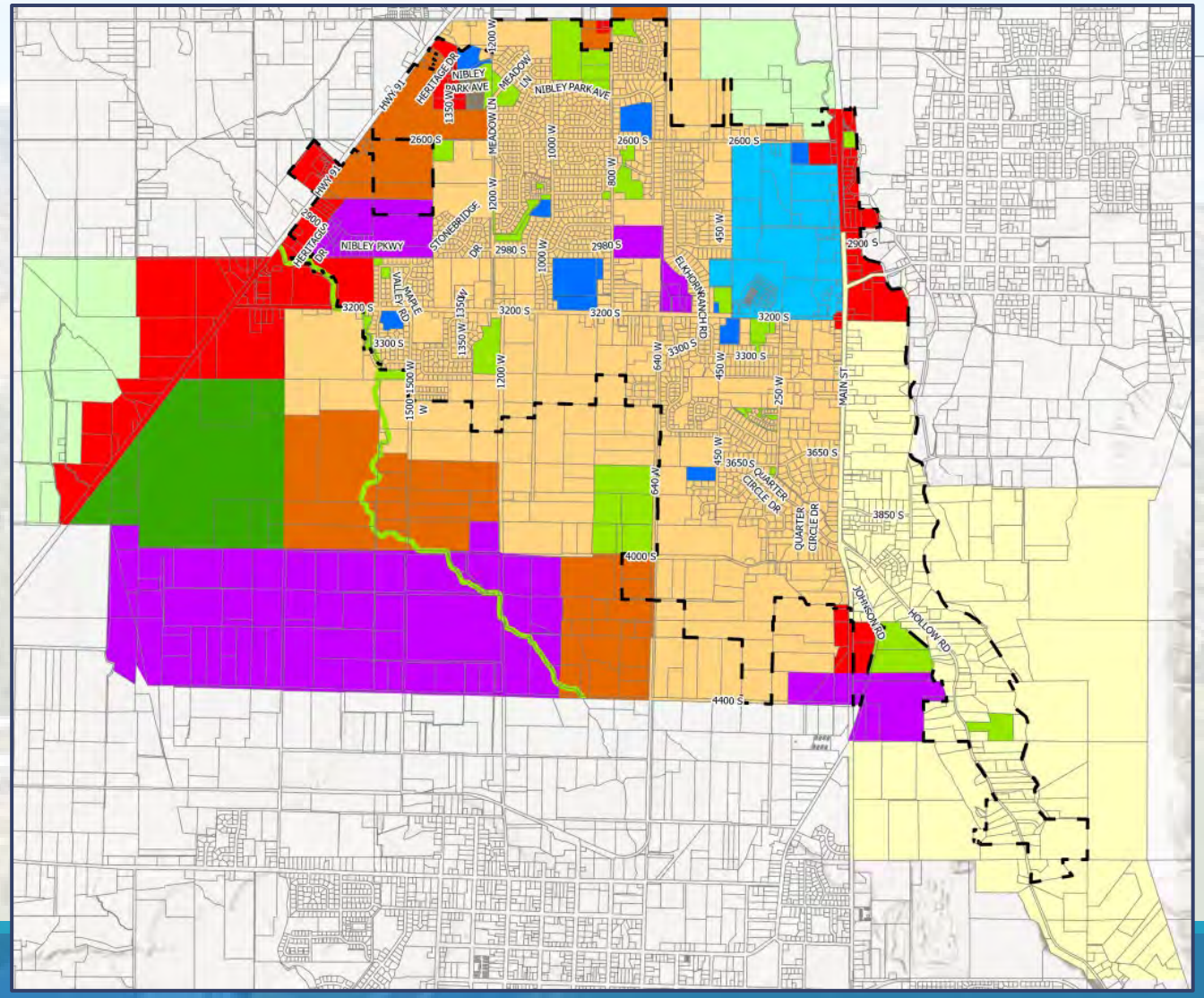
Community Survey



Growth Scenario Workshop/Heritage Days



EXISTING FUTURE LAND USE



Legend

- Nibley Municipal Boundaries
- Parcels

Future Land Use

- Commercial
- Commercial and Medium to High Density Residential
- Industrial
- Town Center
- High Density Residential
- Medium Density Residential
- Low Density Residential
- Open Space, Agriculture, and Low Density Residential
- Agriculture
- Parks, Open Space, and Trails
- Municipal, Schools, and Churches

FUTURE LAND USE MAP

Commercial node supported by higher-intensity residential

More defined uses for town center area

3200 S Gateway that emphasizes gathering spaces and neighborhood services

Supportive neighborhood commercial in future high growth node







Legend

- Current Boundary
- Proposed Annexation

Future Land Use

- Attached Residential
- Detached Residential
- Detached Residential - Large Lot
- Mixed Residential
- Civic / Institutional
- Commercial
- Employment
- Industrial
- Mixed Use (Commercial)
- Mixed Use (Neighborhood Commercial)
- Open Space
- Park
- Greenway Concept

0 0.25 0.5 1 Miles

N

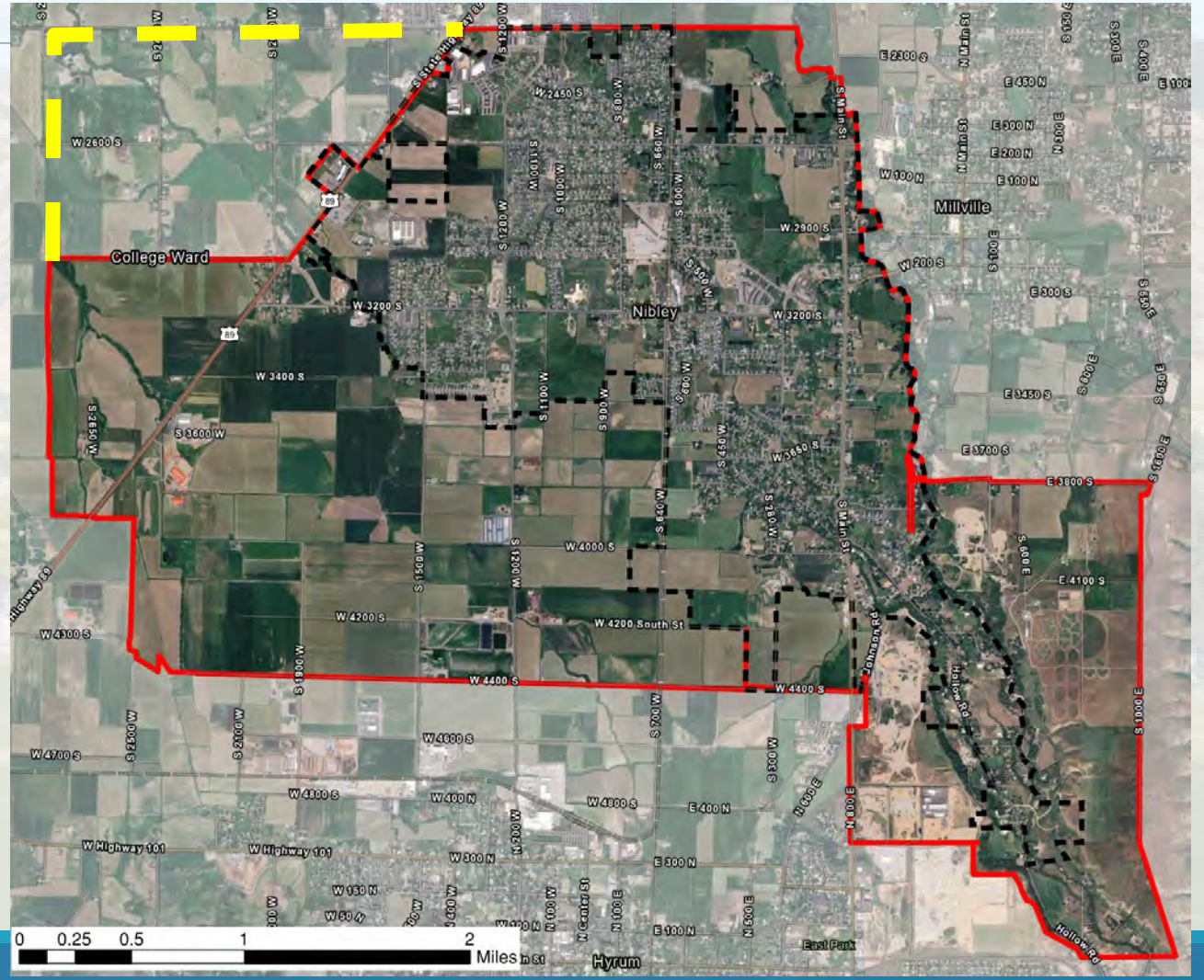
FUTURE LAND USE

Policy Direction

- Continue pursuing creation of Town Center
- Support expanded neighborhood commercial along 3200 S and other future nodes.
- Update Zoning Code including:
  - Establish new residential zoning framework
    - Consider community's vision, market realities, enable a greater variety of housing product types.
  - Adopt a commercial/residential mixed-use overlay
  - Focus on form for new development
  - Incentivize commercial development

ANNEXATION

- Consider expansion of annexation area
- May be more efficient to service with utilities
- Economic development potential

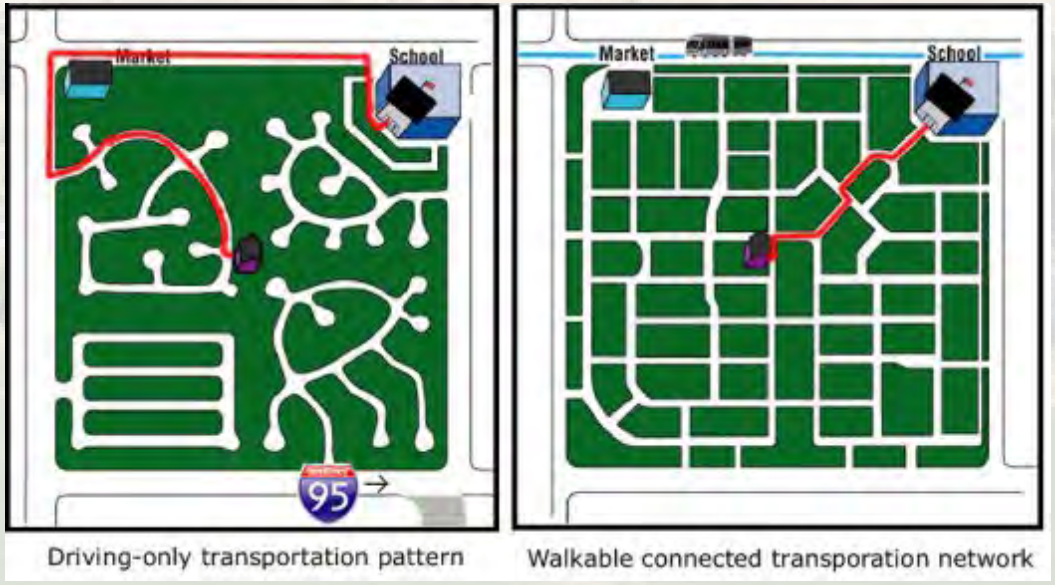


TRANSPORTATION



Policy Direction

- Focus on traffic safety measures through traffic calming.
- Improved street connectivity with limited cul-de-sacs.
- Adopt a Zero Fatalities policy as the City's guiding principle for roadway planning and design.



Driving-only transportation pattern

Walkable connected transporation network

ECONOMIC ANALYSIS

Summary

- High Sales Tax Leakage- capture rate of 34%.
- Majority of Land (83.7%) for residential uses.
- Competitive markets: Providence, Logan and Hyrum
  - Enough separation (2+ miles) that there is opportunity.
- Barriers to entry such as growth in online sales, development costs and geographic challenges may hinder economic development.
- Strengths, Weaknesses, Opportunities and Threats

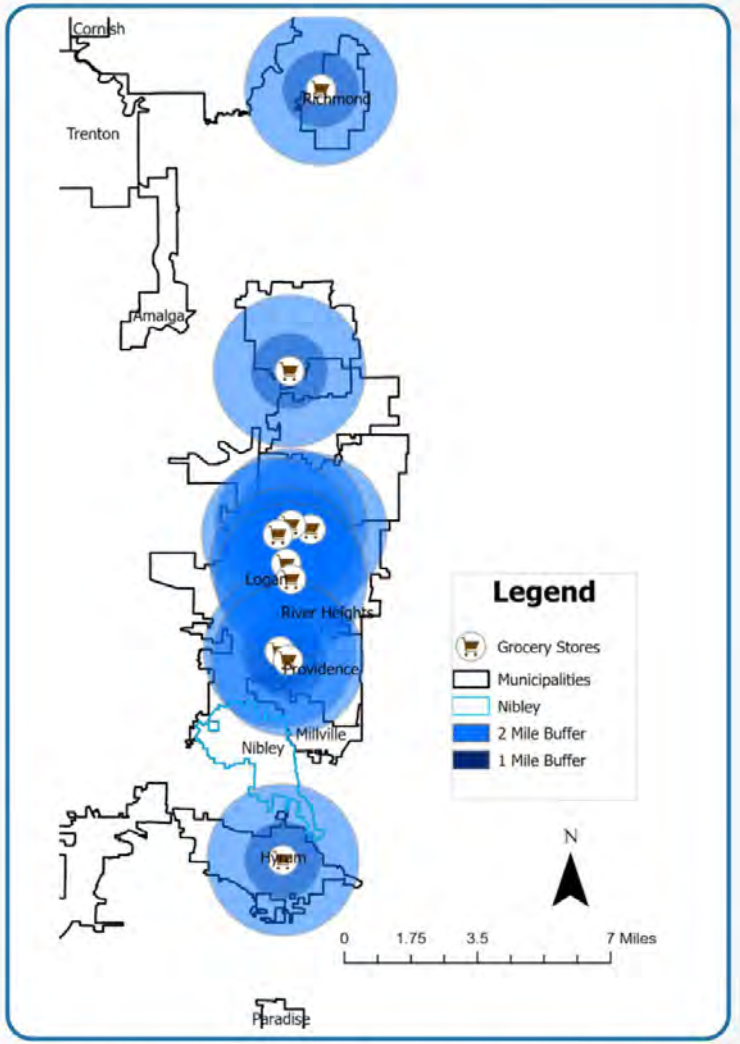


FIGURE 32: Cache County Grocery Sites

ECONOMIC RECOMMENDATIONS

Policy Direction

- Complete and update Economic Development Strategic plan with established resources and partnerships.
- Increase housing through higher densities near commercial areas with mixed-use and other residential.
- Promote housing options to ensure sustainable growth.

OTHER ELEMENTS

- Housing (Focus on Moderate-Income Housing Needs)
- Parks, Open Space and Recreation
- Public Facilities
- Water Conservation & Preservation

RECOMMENDATION

Staff and Planning Commission Recommendation

Approve Ordinance 26-01—Adoption of the Nibley City General Plan

Open Space Subdivision Code

Background

- Recommended updates to Open Space Subdivision are designed to:
  - Provide more variety of lot sizes
  - Allow creativity in design
  - Mitigate effects of locating close to established neighborhoods

- Planning Commission discussed these and other objectives that may be pursued for an update to the ordinance.

Open Space Subdivision Code

Background

Based upon P&Z feedback, the following changes have been drafted:

- Increase setbacks for side and rear yards that abuts property with greater setback requirements. Side yards would increase to 10'. Rear yards would increase to 25'.
- Require variation in lot sizes for all subdivisions with 40 or greater lots. No more than 40% of lots could fall within a range of 1,500 sq ft.
- Remove minimum lot size and frontage requirements.
  - This was necessary to allow for flexibility in design to facilitate variation in lot sizes. The same number of lots would be allowed but with flexibility in design of lot configuration.
- Adopt a minimum buildable area standard of 1,500 sq ft for all lots to ensure lots are buildable considering setback requirements.

Open Space Subdivision Code

Developer/Designer Feedback Summary

- Two sets of comments submitted
- Some potentially unintended outcomes
  - With 40-lot threshold for variation, it may discourage developments in the 40-50 lot range.
  - May result in even smaller and higher concentration of lots by allowing the smaller lot sizes.
- Potential improvements
  - Grant incremental bonuses for designs that achieve multiple community objectives (i.e. trail linkages, integration with park systems)
  - Consider annual compliance certifications from HOAs or easement holders verifying ongoing maintenance.
  - Tie fee-in-lieu of open space rate to City's per acre park improvement cost.

Open Space Subdivision Code

Developer/Designer Feedback Summary

- Potential improvements (cont.)
  - Outright require open space to connect to adjacent greenways/trail corridors.
  - Define minimum open space that must be usable, accessible and improved.
  - Clarify that only buildable, accessible easements may be included in net developable land.
  - Develop Open Space Subdivision Checklist

Open Space Subdivision Code

Planning Commission/Staff Recommendation

Approval for Ordinance 25-36: Amending NCC 21.10.020 Open Space Subdivision, Including Requirements for Setbacks, Lot Size Standards, and Variation

Planning Commission Goals Progress – 2025

Goal	Status
Review and update access, connectivity and intersection spacing standards.	Not Complete
Partner with Cache County, Millville and Providence on a Hwy 165 Corridor Study that explores alternatives for future HWY 165 function, access, etc. and a regional real estate economics study of future population and travel patterns to identify likely market demand for retail, services, and jobs along the corridor.	Not Complete
Partner with Cache County to develop a Nibley Town Center Master Plan. Utilize USU Landscape Architecture Department to assist with development.	In Progress
Implement Strategies of Moderate-Income Housing Plan.	Complete
Complete Development of General Plan.	Complete
Update R-M and R-PUD Zoning Standards.	Complete
Review and Update Design Standards for Commercial and Institutional Uses.	Not Complete

Other Accomplishments

- Updated Minimum Parking Standards
- Land swap for additional park space at Nibley Meadows Park
- Updated R-M/P-PUD zoning standards
- Updated Open Space Subdivision standards
- Amended fence standards
- Reviewed several applications, including 6 rezone/zone assignments, 4 development agreements, 3 commercial site plans, 2 conditional use permits, and 2 subdivision preliminary plats (and a partridge in a peer tree)

Planning Commission Goals- 2026

Recommendations for discussion

1. Review and Implement Strategies of General Plan and Moderate-Income Housing Plan.
   a. Update of Annexation Plan
2. Review and Update Nibley City's Zoning, Subdivision, Architectural Design Standards and Transportation Design Standards for consistency with General Plan, Town Center Vision, Active Transportation Plan, and Transportation Master Plan.
   a. Update access, connectivity and intersection spacing standards.
3. Partner with Cache County, Millville and Providence on a Hwy 165 Corridor Study that explores alternatives for future HWY 165 function, access, etc. and a regional real estate economics study of future population and travel patterns to identify likely market demand for retail, services, and jobs along the corridor.
4. Complete Development of Transportation Master Plan.
5. As necessary, update Nibley City Code for compliance with State Code.

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