



# Lake Killarney Board Regular Meeting

## Agenda

**February 1, 2023 @ 10:00 am**

City Hall Commission Chambers

401 S. Park Ave

Winter Park, FL 32789

### welcome

Agendas and all backup material supporting each agenda item are accessible via the city's website at [cityofwinterpark.org/bpm](http://cityofwinterpark.org/bpm) and include virtual meeting instructions.

### assistance & appeals

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### please note

Times are projected and subject to change.

- 
1. **Call to Order**
  2. **Consent Agenda**
    - a. [Approve the minutes of regular meeting January 04, 2023](#) 1 minute
  3. **Public Comments (for items not on the agenda): Three minutes allowed for each speaker**
  4. **Public Hearings**  
(Public participation and comment on these matters must be in-person.)
  5. **Action Items**
  6. **Non-Action Items**
    - a. [Killarney Drive Drainage Improvements](#) 10 Minutes
    - b. [Lake Killarney Board: Annexation Update](#) 10 Minutes
  7. **Staff Updates**
    - a. [Lakes Management](#) 10 Minutes
      - Water Quality
      - Hydrilla treatments
      - Algae bloom in the Cove/Canal
    - b. [Stormwater Management](#) 10 Minutes
  8. **Board Comments**
  9. **Upcoming Agenda Items**
  10. **Adjournment**



|                     |                     |              |                  |
|---------------------|---------------------|--------------|------------------|
| item type           | Consent Agenda      | meeting date | February 1, 2023 |
| prepared by         | Tatia Ghviniashvili | approved by  |                  |
| board approval      |                     |              |                  |
| strategic objective |                     |              |                  |

## subject

Approve the minutes of regular meeting January 04, 2023

## motion / recommendation

## background

## alternatives / other considerations

## fiscal impact

## ATTACHMENTS:

[Minutes.pdf](#)



# Lake Killarney Board Meeting Minutes

January 04, 2023 at 10:00 a.m.

City Hall, Commission Chambers  
401 S. Park Avenue | Winter Park, Florida

## Present

Jeanne Wall, William Voecks, David Dickerson, Carolyn Minear, John Mitchell, Jason Ellison, Joyce Cunningham; Board Coordinator Tatia Ghviniashvili.

## Staff Present

Natural Resources & Sustainability Director Gloria Eby; Assistant Director of Public Works Don Marcotte; Public Works Engineer Shannon Monahan; Lakes Division Manager Joseph Cordell; Lakes Division Administrative Coordinator Victoria Tabor.

## Also Present

Senior Environmental Specialist of Lakes Management at Orange County, Nidia Volpe.

### 1) Call to Order

Jeanne Wall called the meeting to order at 10:01 a.m.

### 2) Consent Agenda

- a. Approve minutes of regular meeting December 7, 2022

Ms. Minear highlighted a spelling error in the fourth paragraph on page four, and noted that *carb* fish should read as *carp* fish. On page three, paragraph two, Ms. Wall suggested including the request made by Mr. Ellison for staff to provide an email list of Lake Killarney residents, as well as her request for staff to provide an attendance log for all dock party neighborhood engagement events.

**Motion made by David Dickerson to approve the minutes with amendments; seconded by John Mitchell. Motion carried unanimously with a 7-0 vote.**

### 3) Public Comments (for items not on the agenda):

There were no public comments.

### 4) Public Hearings

There were no public hearings.



**5) Action Items**

**6) Non-Action Items**

**7) Staff Updates**

a. Lakes Management

October water quality testing was postponed due to conditions brought on by the hurricane, and November test results will be provided at the February meeting. A treatment was also conducted for floating vegetation in the canal.

The board was informed about a pool pollution presentation that was given to the Lake Killarney Board of Orange County on December 15. Ms. Volpe suggested inviting the presenter, Aimée Krivan, to a future meeting to give this board the same (or modified) presentation. A discussion was held and the board agreed that a presentation on pool pollution would be educational. Per board request, Ms. Volpe will provide a link to all Orange County meeting minutes, and will arrange for Ms. Krivan to present at a future date.

The email contact sheet of Lake Killarney residents has been shared with the board, along with the Natural Resources Conservation Service (NRCS) funding list. Ms. Wall made a request for staff to provide a copy of what is included under “major outfalls” within the funding list.

The board asked about the carp fish restock, which is scheduled to be completed sometime in January. Ms. Wall requested staff take pictures/videos of the restocking process and share them with the board at a future meeting. A brief discussion about the percentage of vegetation in the lake followed, with Mr. Cordell highlighting that about 20% of the lake’s entire vegetation is hydrilla.

The water elevation policy draft, hurricane preparedness plan, and the CRS review will all be provided at a future meeting when there are updates available.

b. Stormwater Management

The contract from the *Bayside Dredging Company* has been acquired, and a final executed agreement was received on January 03, 2023. Staff will provide further updates on the dredging schedule once the procurement process has been completed. The board asked a few clarifying questions about dredging, and staff noted that major outfalls will be the priority because of their direct impact on the function of the stormwater system.

Staff has been unable to get in contact with the property manager for the Killarney Estates Subdivision Property, but will continue to follow-up. As-builts for the Library and Events Center have not been received at the time of this meeting, but will be shared with the board once staff has acquired them.

Ms. Monahan and Mr. Marcotte shared an update on the stormwater outfall consolidation study, and the pipes in Killarney Estates. A map of the area was presented to indicate the existing seven outfalls while highlighting the proposed two outfalls with treatment. Staff will work with Ms. Minear to expediate the process of repairing the failing pipe near her property. The floor opened for discussion and staff answered various questions about this improvement process, Continuous Deflective Separation Technology (CDS) units and the new pipe work.

Ms. Wall suggested staff consider adding a collection box- at the end of the existing stormwater system running through Shoreview Avenue- to prevent sediment from running into the lake and creating a sandbar. Staff advised that prevention with the magnitude of this storm is not feasible and described how a baffle box (collection system) functions. A feasibility study would need to be completed before a project of this caliber could be considered and budgeted for in future five-year CIP plan.

**Motion made by Jeanne Wall for staff to conduct a feasibility study on the Shoreview Outfall Project (discussed above), and present it back to the board with an emphasis on protecting Lake Killarney; seconded by David Dickerson. Motion carried unanimously with a 7-0 vote.**

Staff has received the exfiltration inspection report for Lakeside Plaza, for which a contractor had conducted an inspection in October. The board was provided with inspection notes indicating what was completed. The maintenance contract previously requested was provided to the board in the agenda packet as well. The floor opened for questions and discussion.

Diagram of Lake Killarney, including all interconnects and outfalls, as well as the update on all stormwater management piping and equipment, will be provided in a future meeting. Per board request, staff will also include the age of stormwater infrastructure equipment in their update.

## **8) Board Comments**

Mr. Voecks commented on a letter he received from a contractor about demucking properties near the lake. He brought up concerns associated with the lack of communication around the project. Staff noted that communication happens

internally, and the safety of the lake and its environment is always considered before approving any redevelopment.

Ms. Wall shared her concerns with communication between staff and the board. She noted a past City Commission Workshop meeting where a discussion occurred about annexing the Orange County side of Lake Killarney into the City of Winter Park. She explained that staff should be more proactive with advising and updating the board with all information related to Lake Killarney and its residents.

**Motion made by Joyce Cunningham to bring before the board all information about the initiative to annex the Orange County side of Lake Killarney, including the Fairbanks corridor, into the City of Winter Park; seconded by John Mitchell. Motion carried unanimously with a 7-0 vote.**

Staff agreed to update the board on any major redevelopment of property along the shoreline of the lake.

Ms. Wall made a request to include a subheading under 'Call to Order' in the agenda to state the board name, along with the date and time of the meeting. Staff will discuss with the City Clerk to explore said modification.

- a. Discussion of Public Comments Received

## 9) Upcoming Agenda Items

- a. Upcoming Agenda Items
  - Killarney Estates Subdivision Property Management update.
  - Library and Event Center as-builts provided when acquired.
  - Dredging status update along with "major outfall" breakdown for NRCS.
  - CIP updates.
  - Water elevation policy draft update (future).
  - Hurricane preparedness plan update following City Commission Workshop.
  - CRS review update following City Commission Workshop.
  - Diagram of Lake Killarney and all associated outfalls, including Orange County.
  - Feasibility study update for Shoreview outfall project improvement plan that includes the seven outfalls (when available).
  - Presentation on pool pollution arranged by Ms. Volpe (future).
  - All minutes and information associated with the annexation of Orange County's Lake Killarney.
- b. Summary of Meeting Action Items

The board requested staff conduct a feasibility study on the Shoreview Outfall Project and present it as available. Minutes from the City Commission Workshop discussing the annexation of Orange County Lake Killarney to be shared at the next meeting, along with any other accompanying information.

All other meeting action items and requested deliverables/updates are reflected in the list above.

#### **10) Adjournment**

The meeting adjourned at 11:17 a.m.

Minutes approved by the board on\_\_\_\_\_.

/s/ Tatia Ghviniashvili, Board Coordinator



|                     |                  |              |                  |
|---------------------|------------------|--------------|------------------|
| item type           | Non-Action Items | meeting date | February 1, 2023 |
| prepared by         | Victoria Tabor   | approved by  |                  |
| board approval      |                  |              |                  |
| strategic objective |                  |              |                  |

## subject

Killarney Drive Drainage Improvements

## motion / recommendation

## background

## alternatives / other considerations

## fiscal impact

## ATTACHMENTS:

[Geosyntec Killarney Drainage Improvements 2022-12-07](#)



# KILLARNEY DRIVE DRAINAGE IMPROVEMENTS

## TECHNICAL MEMORANDUM



*Submitted by:*  
**Geosyntec Consultants, Inc.**  
**3504 Lake Lynda Drive, Suite 155**  
**Orlando, Florida 32817**

**December 2022**

**Geosyntec**   
consultants

engineers | scientists | innovators

# KILLARNEY DRIVE DRAINAGE IMPROVEMENTS

## TECHNICAL MEMORANDUM

*Prepared for*

**Orange County Public Works Department  
Roads and Drainage Division**  
4200 South John Young Parkway  
Orlando, Florida, 32803

*Prepared by*

Geosyntec Consultants, Inc.  
3504 Lake Lynda Drive, Suite 155  
Orlando, Florida, 32839

Project Number: FW8642

December 2022



# Killarney Drive Drainage Improvements

## Technical Memorandum

*Prepared for*

Orange County Public Works Department  
Roads and Drainage Division  
4200 South John Young Parkway  
Orlando, Florida, 32839

*Prepared by*

Geosyntec Consultants, Inc.  
3504 Lake Lynda Drive, Suite 155  
Orlando, Florida, 32817

The engineering material and data contained within the enclosed report was prepared by Geosyntec Consultants, Inc. for sole use by the Orange County Public Works Department Roads and Drainage Division. This report was prepared under the supervision and direction of the respective undersigned, whose seal as a registered professional engineer is affixed below.

**Mark Ellard, PE, CFM, D.WRE, ENV SP**  
Project Manager  
Florida PE# 48073



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Nick Hartshorn, PE  
Project Engineer



---

Mark Ellard, PE, CFM, D.WRE, ENV SP  
Senior Principal - Project Manager



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Karli Mahoney  
Staff Engineer

Project Number: FW8642

December 2022



## TABLE OF CONTENTS

|       |                                                             |      |
|-------|-------------------------------------------------------------|------|
| 1.    | INTRODUCTION .....                                          | 1-1  |
| 1.1   | Location.....                                               | 1-1  |
| 1.2   | Background and Purpose of Project .....                     | 1-1  |
| 1.3   | Memorandum Outline .....                                    | 1-2  |
| 2.    | DATA COLLECTION AND REVIEW .....                            | 2-1  |
| 2.1   | Topographic Data .....                                      | 2-1  |
| 2.2   | GIS Data Collection .....                                   | 2-1  |
| 2.3   | Field Investigation.....                                    | 2-3  |
| 2.4   | ERP Information.....                                        | 2-8  |
| 2.5   | Existing Drainage Infrastructure .....                      | 2-8  |
| 2.6   | FEMA Floodplains .....                                      | 2-8  |
| 2.7   | Review of Complaint Logs.....                               | 2-8  |
| 3.    | EXISTING CONDITION EVALUATION.....                          | 3-1  |
| 3.1   | Hydrologic Parameterization.....                            | 3-1  |
| 3.1.1 | Subbasin Delineation.....                                   | 3-2  |
| 3.1.2 | Soils Characterization.....                                 | 3-2  |
| 3.1.3 | Land Use Characterization .....                             | 3-2  |
| 3.1.4 | Rainfall Distribution, Depth, Duration, and Frequency ..... | 3-5  |
| 3.1.5 | Curve Number .....                                          | 3-5  |
| 3.1.6 | Time of Concentration.....                                  | 3-5  |
| 3.1.7 | Peaking Factor .....                                        | 3-6  |
| 3.2   | Hydraulic Parameterization.....                             | 3-6  |
| 3.2.1 | Node-Link Network .....                                     | 3-6  |
| 3.2.2 | Nodes.....                                                  | 3-6  |
| 3.2.3 | Links.....                                                  | 3-8  |
| 3.3   | Existing Condition Modeling Results .....                   | 3-10 |
| 3.4   | Existing Conditions Summary.....                            | 3-11 |
| 4.    | IMPROVEMENT CONCEPT ALTERNATIVES DEVELOPMENT .....          | 4-1  |
| 4.1   | Improvement Alternative 1 .....                             | 4-1  |
| 4.1.1 | Proposed Features.....                                      | 4-1  |
| 4.1.2 | Improvement Alternative 1 Stormwater Model .....            | 4-1  |
| 4.1.3 | Improvement Alternative 1 Model Results .....               | 4-4  |
| 4.1.4 | Implementation Considerations.....                          | 4-6  |

|       |                                                  |      |
|-------|--------------------------------------------------|------|
| 4.2   | Improvement Alternative 2 .....                  | 4-7  |
| 4.2.1 | Proposed Features.....                           | 4-7  |
| 4.2.2 | Improvement Alternative 2 Stormwater Model ..... | 4-7  |
| 4.2.3 | Improvement Alternative 2 Model Results .....    | 4-10 |
| 4.2.4 | Implementation Considerations.....               | 4-12 |
| 4.3   | Improvement Alternative 3 .....                  | 4-13 |
| 4.3.1 | Proposed Features.....                           | 4-13 |
| 4.3.2 | Improvement Alternative 3 Stormwater Model ..... | 4-13 |
| 4.3.3 | Improvement Alternative 3 Model Results .....    | 4-15 |
| 4.3.4 | Implementation Considerations.....               | 4-18 |
| 4.4   | Improvement Alternatives Summary .....           | 4-19 |
| 5.    | CONCLUSIONS AND RECOMMENDATIONS .....            | 5-1  |
| 5.1   | Conclusion.....                                  | 5-1  |

## LIST OF TABLES

|            |                                                                    |      |
|------------|--------------------------------------------------------------------|------|
| Table 3-1: | Flooding Level of Service Standards / Criteria .....               | 3-1  |
| Table 3-2: | Curve Number Lookup Table.....                                     | 3-5  |
| Table 3-3: | Percent Impervious and Percent DCIA Summary.....                   | 3-5  |
| Table 3-4: | Lake Killarney Peak Stages from Howell Creek Watershed Model ..... | 3-7  |
| Table 3-5: | Summary of Peak Flow Rates to Lake Killarney .....                 | 3-11 |
| Table 4-1: | Alternative 1 Summary of Peak Flow Rates to Lake Killarney .....   | 4-4  |
| Table 4-2: | Improvement Alternative 1 Node Maximum Conditions Summary .....    | 4-1  |
| Table 4-3: | Alternative 2 Summary of Peak Flow Rates into Lake Killarney ..... | 4-10 |
| Table 4-4: | Alternative 2 Node Maximum Conditions .....                        | 4-10 |
| Table 4-5: | Alternative 3 Summary of Peak Flow Rates into Lake Killarney ..... | 4-15 |
| Table 4-6: | Alternative 3 Node Maximum Conditions .....                        | 4-16 |
| Table 4-7: | Improvement Alternative Decision Matrix .....                      | 4-20 |
| Table 4-8: | Decision Matrix Evaluation Criteria .....                          | 4-20 |

## LIST OF FIGURES

|             |                                                |      |
|-------------|------------------------------------------------|------|
| Figure 1-1: | Vicinity Map .....                             | 1-3  |
| Figure 1-2: | Site Map .....                                 | 1-4  |
| Figure 2-1: | DEM Map .....                                  | 2-2  |
| Figure 2-2: | Drainage Infrastructure Map.....               | 2-9  |
| Figure 2-3: | FEMA Floodplains Map .....                     | 2-10 |
| Figure 2-4: | Drainage Complaints and Problem Area Map ..... | 2-11 |
| Figure 3-1: | Subbasin Map.....                              | 3-3  |
| Figure 3-2: | Soils and Land Use Map .....                   | 3-4  |

|                                                                                        |      |
|----------------------------------------------------------------------------------------|------|
| Figure 3-3: Simulated Boundary Conditions for 10 year, 24 hour Design Storm Event..... | 3-7  |
| Figure 3-4: Existing Condition Node-Link and LOS Evaluation Map.....                   | 3-9  |
| Figure 4-1: Improvement Alternative 1 Concept Map .....                                | 4-3  |
| Figure 4-2: Improvement Alternative 1 Model Node-Link and LOS Results Map.....         | 4-5  |
| Figure 4-3: Improvement Alternative 2 Concept Map .....                                | 4-9  |
| Figure 4-4: Improvement Alternative 2 Model Node-Link and LOS Results Map.....         | 4-11 |
| Figure 4-5: Improvement Alternative 3 Concept Map .....                                | 4-14 |
| Figure 4-6: Improvement Alternative 3 Model Node-Link and LOS Results Map.....         | 4-17 |

## LIST OF APPENDICES

|                                                             |
|-------------------------------------------------------------|
| Appendix A: ECHO UES Topographic Survey                     |
| Appendix B: Existing Conditions ICPR Input and Results      |
| Appendix C: Alternative 1 Conditions ICPR Input and Results |
| Appendix D: Alternative 2 Conditions ICPR Input and Results |
| Appendix E: Alternative 3 Conditions ICPR Input and Results |
| Appendix F: Engineer's Opinion of Probable Cost             |

# 1. INTRODUCTION

This technical memorandum represents the results of the Killarney Drive Drainage Improvements project. Geosyntec Consultants, Inc. (Geosyntec) was tasked by Orange County (County) Roads and Drainage Division to perform this project. The work was performed under the Orange County Stormwater Engineering Services Continuing Contract Y21-905B.

## 1.1 Location

The project area is located near the east end of Euston Road where it transitions to Killarney Drive, on the west side of Lake Killarney, in north Orange County (Section 2, Township 22S South, Range 29E East). The site is within the jurisdictional boundary of the St. Johns River Water Management District (SJRWMD) and within Orange County Commission District 5. The site lies within the Howell Branch Watershed and the County's Goldenrod Maintenance District. Refer to **Figure 1-1** and **Figure 1-2** for the Vicinity Map and Site Map for the project area.

## 1.2 Background and Purpose of Project

Based on the information provided by the County, there is a collapsed 12-inch pipe that at one time discharged stormwater from Euston Road and Killarney Drive to Lake Killarney. Based on County reports, due to the reduced conveyance capacity, the collapsed pipe has resulted in localized flooding that overtops the road and inundates the ground in the immediate vicinity. It is noted that the downstream end of the collapsed pipe discharges to Lake Killarney on private property. Directly north of the collapsed pipe, there is a 12-inch pipe that is an outfall for the subdivision and conveys stormwater to Lake Killarney. A County provided photograph of reported flooding and roadway overtopping is presented as Photograph 1.



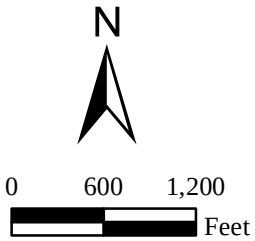
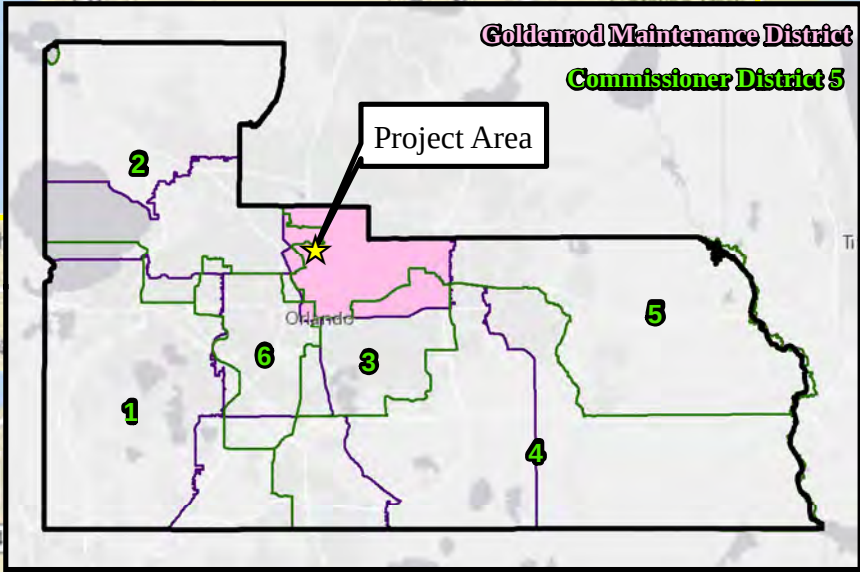
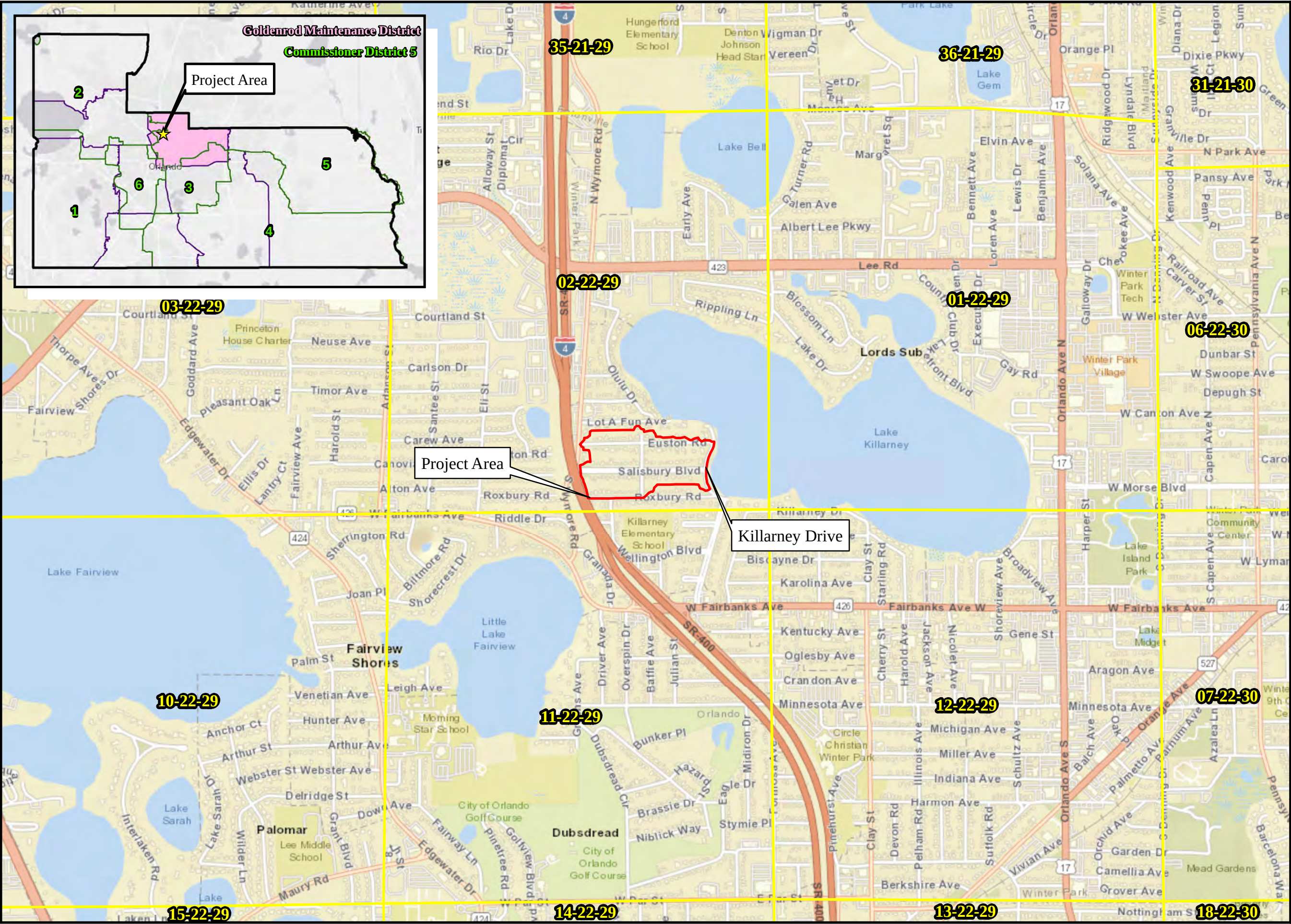
**Photograph 1: Flooding and roadway overtopping at the east end of Euston Road**

In order to address the flooding issues within the project area, the County has tasked Geosyntec with evaluating the existing conditions and developing drainage improvement concept alternatives to address the reported deficiencies. The focus of this effort will be to improve the drainage conditions in the subdivision and address level of service deficiencies.

### 1.3 Memorandum Outline

- 1) Introduction: This section includes project goals and project area background.
- 2) Data Collection and Review: This section includes a summary of relevant previous studies, historical data, topography, and data utilized to develop this memorandum.
- 3) Existing Conditions Evaluation: This section discusses the parameterization of hydrologic and hydraulic features based on the data gathered and discussed in Section 2. The existing condition hydrologic and hydraulic model creation is also discussed in this section as well as the results of the model-based drainage level of service assessment.
- 4) Improvement Concept Alternative Development: Alternatives to address level of service deficiencies identified in the existing conditions model are described in this section. Proposed improvements, notable considerations, and results from the alternatives analysis are also presented in this section.
- 5) Conclusions and Recommendations: Conclusions drawn from the data presented in this narrative are summarized and recommendations are provided for further action in this section.





- Legend**
- Section-Township-Range
  - Project Area

Sources:  
Basemaps: ESRI, 2020  
STR: Orange County, 2020

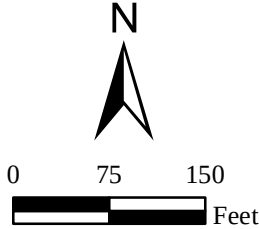
Figure 1-1

### Vicinity Map

Killarney Drive  
Drainage Improvements







**Legend**

- Project Area
- Parcels

Sources:  
Basemaps: ESRI, 2020  
Aerials: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020  
Parcels: Orange County, 2020

Figure 1-2

**Site Map**

Killarney Drive  
Drainage Improvements





## 2. DATA COLLECTION AND REVIEW

### 2.1 Topographic Data

LiDAR data dated 2018 was obtained from the State's Coastal LiDAR project from the United States Geological Survey (USGS) and was utilized to evaluate the topography of the overall area of interest. The LiDAR data was received in a digital elevation model (DEM) format and used as is without the need for any site specific updates. A digital elevation model (DEM) map is shown in **Figure 2-1**

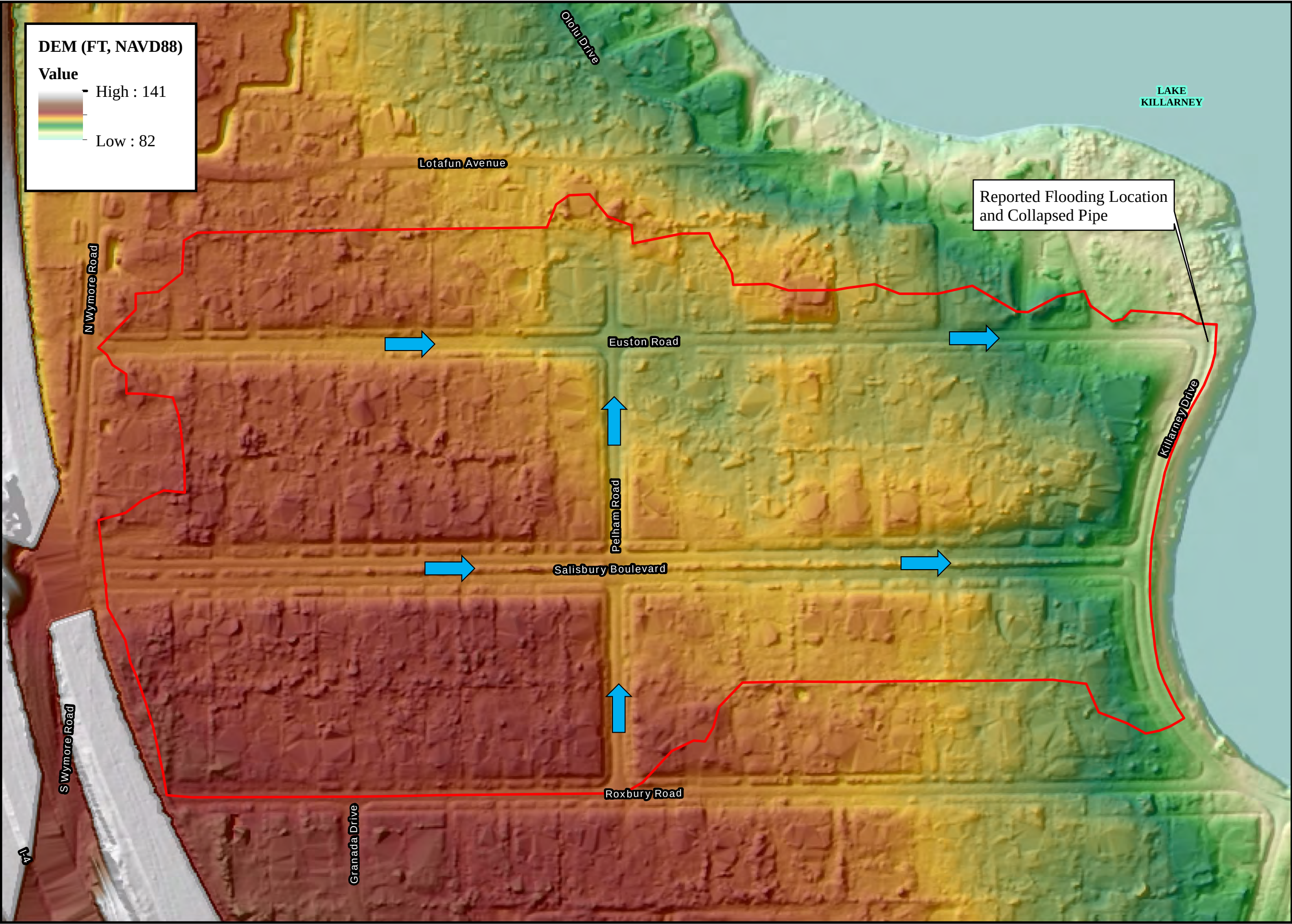
The LiDAR data was supplemented with topographic survey performed by ECHO UES, Inc. (ECHO). Survey efforts were completed in April 2022. The limits of the survey work extended from the intersection of Wymore Road and Euston Road to the west side of Lake Killarney down to the intersection of Killarney Drive and Roxbury Road. The topography was used to refine the contributing drainage area and subbasin boundaries, as well as to parameterize the drainage information in the existing conditions stormwater model. The ECHO survey deliverable is provided as **Appendix A**.

### 2.2 GIS Data Collection

Geographic Information System (GIS) based data were collected and compiled for this project from various sources. The GIS data collected are listed below.

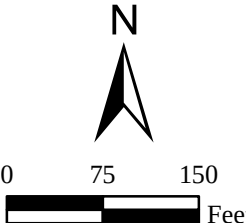
- Soil polygons from NRCS Web Soil Survey;
- Orange County aerials (2021);
- FEMA Flood Insurance Rate Map (FIRM) (2009);
- SJRWMD Land Use Cover polygons (2014);
- Orange County GIS data including jurisdictional boundaries, subdivisions boundaries, section-township-range (STR) divisions, major watershed boundaries, roads, drainage infrastructure and parcel polygons.







ORANGE  
COUNTY  
GOVERNMENT  
FLORIDA



N

0 75 150 Feet

**Legend**

Project Area

Sources:  
Lakes: Orange County, 2017  
Roads: Orange County, 2020  
DEM: Orangy County, 2018

Figure  
2-1

**DEM Map**

Killarney Drive  
Drainage Improvements



Geosyntec  
consultants



## 2.3 Field Investigation

A detailed field investigation of the project area was conducted by Geosyntec personnel on June 29, 2022, to confirm key drainage infrastructure data and drainage patterns. Representative photos from the field investigation are presented below.



**Photograph 2: Existing drainage infrastructure at the intersection of Pelham Road and Euston Road**



**Photograph 3: Accumulation of sediment and debris in inlet basket at the intersection of Pelham Road and Euston Road**





**Photograph 4: Site conditions and existing drainage infrastructure at the east end of Euston Road**



**Photograph 5: Site conditions at the east end of Euston Road looking south along Killarney Drive**





**Photograph 6: Upstream side of reported collapsed 12-inch steel pipe at the east end of Euston Road**



**Photograph 7: Site conditions looking south along Killarney Drive**





**Photograph 8: Existing drainage infrastructure at the intersection of Killarney Drive and Salisbury Boulevard**



**Photograph 9: Accumulation of sediment and debris in inlet basket at the intersection of Killarney Drive and Salisbury Boulevard**





**Photograph 10: Existing outfall location to Lake Killarney at the east end of Euston Road**



**Photograph 11: Open area north of the existing outfalls to Lake Killarney at the east end of Euston Road**

## 2.4 ERP Information

Available Environmental Resource Permit (ERP) documents for developments in the vicinity of the project area were downloaded from the SJRWMD website. The ERP documents were reviewed for drainage infrastructure, modeling, and geotechnical data pertinent to this project. It was determined that there was no data pertinent to this project within the downloaded ERP documents.

## 2.5 Existing Drainage Infrastructure

Drainage infrastructure data, digitized in GIS, were available from the County stormwater infrastructure data set. The digitized drainage infrastructure was reviewed for data relevant to this project and assimilated into the project drainage infrastructure data. Supplemental drainage infrastructure data were referenced from the ECHO survey to digitize infrastructure in the project area. Each data set is listed below.

- **Orange County Stormwater Digitized Drainage Infrastructure** – This data set consists of feature classes of drainage infrastructure digitized from available County plans and survey.
- **Field Survey Data** – This data set consists of drainage infrastructure and topographical data collected through field survey by ECHO. The data were reviewed and digitized by Geosyntec.

The existing drainage infrastructure is presented as **Figure 2-2**. The project area is served by a series of conveyance pipes and inlets. The area south of Salisbury Boulevard, north of Roxbury Road, does not have any drainage infrastructure along the roadway. Runoff collected at the intersection of Euston Road and Pelham Road is conveyed east along Euston Road until it reaches Killarney Drive where it is discharged to Lake Killarney. Although the conveyance system is designed to convey flow east towards Lake Killarney, a portion of flow from the area is reported to overtop Euston Road and flow directly into Lake Killarney.

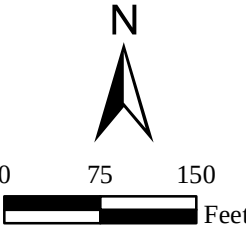
## 2.6 FEMA Floodplains

The FEMA FIRM Panel 12095C0235F (effective date September 25, 2009) was reviewed to determine if any project areas are within a FEMA designated special flood hazard area (SFHA). The project area is considered to be ‘Zone X’ or outside the floodplain. Lake Killarney is classified as ‘Zone AE’ with a base flood elevation of 84.4 feet NAVD88. Refer to **Figure 2-3** for the Floodplain Map.

## 2.7 Review of Complaint Logs

Geosyntec completed a review of complaint logs received from the County for the period of 2013 to 2021. Geosyntec reviewed the complete complaint log provided by the County and documented all relevant drainage related complaints in or near the project area. Complaints within the project area are summarized in **Figure 2-4**. Complaints are presented exactly as received by the County with no modification. Complaints listed identify multiple areas of concern, most notably near the intersection of Euston Road and Pelham Road as well as the intersection of Killarney Drive and Salisbury Boulevard. Complaints ranged from a reported sinkhole, erosion issues, drainage maintenance deficiencies, and reported flooding.





**Legend**

- Project Area
- Drainage Conveyance**
  - Pipe
- Drainage Structure**
  - Inlet/Outlet
  - Manhole

Sources:  
Aerial: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020  
Drainage: ECHO Survey, 2022

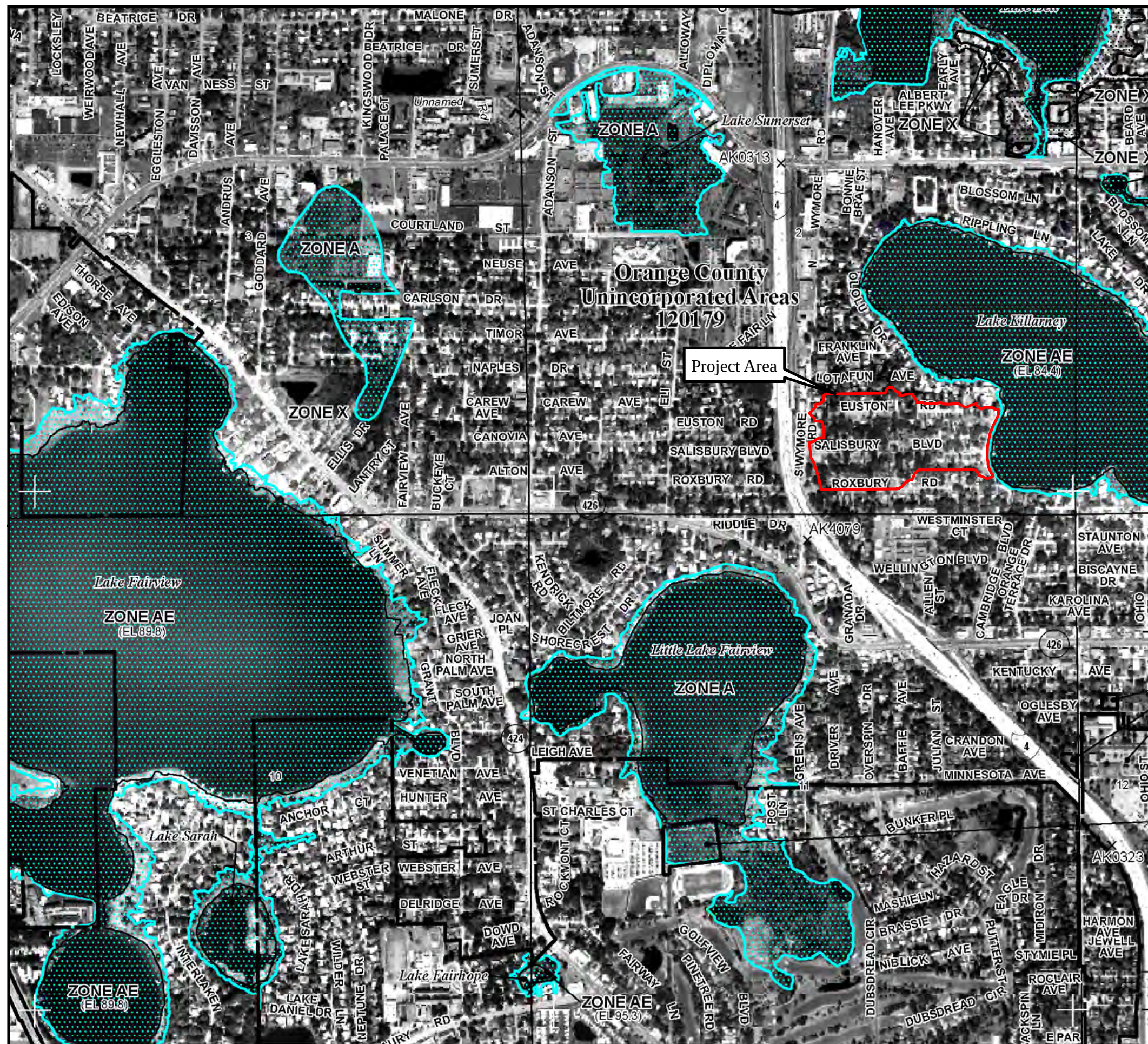
Figure  
2-2

**Drainage  
Infrastructure Map**

Killarney Drive  
Drainage Improvements







### LEGEND

**SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD EVENT**

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AD, AR, AO, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

**ZONE A** No Base Flood Elevation determined.

**ZONE AE** Base Flood Elevation determined.

**ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevation determined.

**ZONE AD** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depth determined. For areas of alluvial fan flooding, velocities also determined.

**ZONE AR** Area of special flood hazard formerly protected from the 1% annual chance flood event by a flood control system that was subsequently vacated. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.

**ZONE ARB** Areas to be protected from 1% annual chance flood event by a Federal flood protection system under construction; no Base Flood Elevation determined.

**ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevation determined.

**ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevation determined.

**FLOODWAY AREAS IN ZONE AE**

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**

**ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

**OTHER AREAS**

**ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.

**ZONE D** Areas in which flood hazards are undetermined, but possible.

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary.

0.2% annual chance floodplain boundary.

Floodway boundary.

Zone D boundary.

CBRS and OPA boundary.

Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

Base Flood Elevation line and values; elevation in feet.

Base Flood Elevation value where uniform within zone; elevation in feet.

\* Referenced to the North American Vertical Datum of 1988 (NAVD 88).

**Cross section line**

**Transect line**

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

1000-meter Universal Transverse Mercator grid ticks, zone 17

5000-foot grid values: Florida State Plane coordinate system, East Zone (FIPSZONE = 901), Transverse Mercator projection

Bench mark (see explanation in Notes to Users section of this FIRM panel)

River Mile

**MAP REPOSITORIES**

Refer to Map Repositories list on Map Index

**EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP**

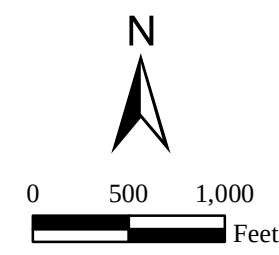
DECEMBER 6, 2000

**EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL**

SEPTEMBER 25, 2009 - to update corporate limits, to change Base Flood Elevations, to add Base Flood Elevations, to add Special Flood Hazard Areas, to change Special Flood Hazard Areas, to delete Special Flood Hazard Areas, to update map format, to add roads and road names, to incorporate previously issued Letters of Map Revision, to reflect updated topographic information, and to incorporate previously issued Letters of Map Amendment.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.



**Legend**

Project Area

Sources:  
FEMA FIRM Panel: Fema,  
2009. Panels 12095C0235F  
effective 9/25/2009

Figure  
2-3

## FEMA Floodplains Map

Killarney Drive  
Drainage Improvements





**ORANGE COUNTY GOVERNMENT FLORIDA**

**Legend**

- Complaint Location
- Project Area
- Parcels

**Sources:**  
 Aerials: Orange County, 2021  
 Roads: Orange County, 2020  
 Complaints: Orange County, 2022  
 Parcels: Orange County, 2022

**Figure 2-4**

**Complaint Log and Problem Areas Map**

Killarney Drive  
Drainage Improvements

**Geosyntec consultants**

### 3. EXISTING CONDITION EVALUATION

Existing conditions were evaluated to further develop an understanding of the drainage deficiencies reported in the project area. In the evaluation of existing drainage infrastructure, determinations regarding the flooding level of service (LOS) were based on the information provided in **Table 3-1**.

**Table 3-1: Flooding Level of Service Standards / Criteria**

| FLOODING LEVEL OF SERVICE (LOS) STANDARDS / CRITERIA |                                         |                                               |                                                  |
|------------------------------------------------------|-----------------------------------------|-----------------------------------------------|--------------------------------------------------|
| Facility                                             | Design Storm LOS                        | Physical Elevation Reference                  | Example in Project Area                          |
| Road / Storm sewer                                   | 10 year, 6 hour and<br>10 year, 24 hour | Road edge of pavement                         | Drainage infrastructure<br>along Killarney Drive |
| Stormwater Pond                                      | 25 year, 24 hour                        | Pond top of bank                              | N/A                                              |
| Structures                                           | 100 year, 24 hour                       | Apparent building<br>finished floor elevation | Residences                                       |

#### 3.1 Hydrologic Parameterization

Geosyntec developed a hydrologic and hydraulic (H&H) model to simulate different design storm events and assess flooding conditions. The existing conditions evaluation aided in the identification of areas of flooding, causes of flooding, and provided a foundation for the development of improvement alternatives intended to address identified drainage deficiencies.

The drainage area hydrologic features of interest for modeling of rainfall excess (runoff) included soil data with hydrologic group classifications indicating relative runoff infiltration capacity, land use data to provide estimated curve numbers (CN) and percent imperviousness, and subbasin delineations. The hydrologic parameters of each individual subbasin (contributing area, CN, time of concentration, etc.), were developed to simulate rainfall-derived runoff hydrographs.

Data collected from the topographic survey was utilized to parameterize the hydraulic features (e.g., pipes) that convey runoff throughout the project area. These hydraulic features were used to develop the model network schematic. The model network schematic was developed to a level of detail sufficient enough to perform the existing conditions evaluation.

Stormwater hydrology and hydraulics were simulated using ICPR4 [version 4.07.08], which is a comprehensive hydrodynamic stormwater modeling system. The ICPR model utilized the hydrology procedures presented in the Soil Conservation Service's TR-55 [NRCS TR-55, 1986]. Stormwater runoff hydrographs are generated from subbasins and then assigned to nodes in the drainage network. The nodes are used to represent specific locations in the drainage network and are connected by links, which include pipes, weirs, etc. Specific hydrologic parameters are discussed below.



### 3.1.1 Subbasin Delineation

Subbasins were delineated to determine the extent of individual drainage areas within the project area that concentrate runoff to a point of interest. The 30.6-acre contributing area was discretized into 11 subbasin areas for use in the hydrologic model. The subbasin boundaries were determined using the project DEM, drainage infrastructure data, and survey data. Refer to **Figure 3-1** for a map of the subbasins. Delineation of individual subbasins allows for a more detailed analysis and the opportunity to pinpoint specific areas with drainage deficiencies.

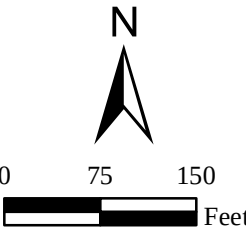
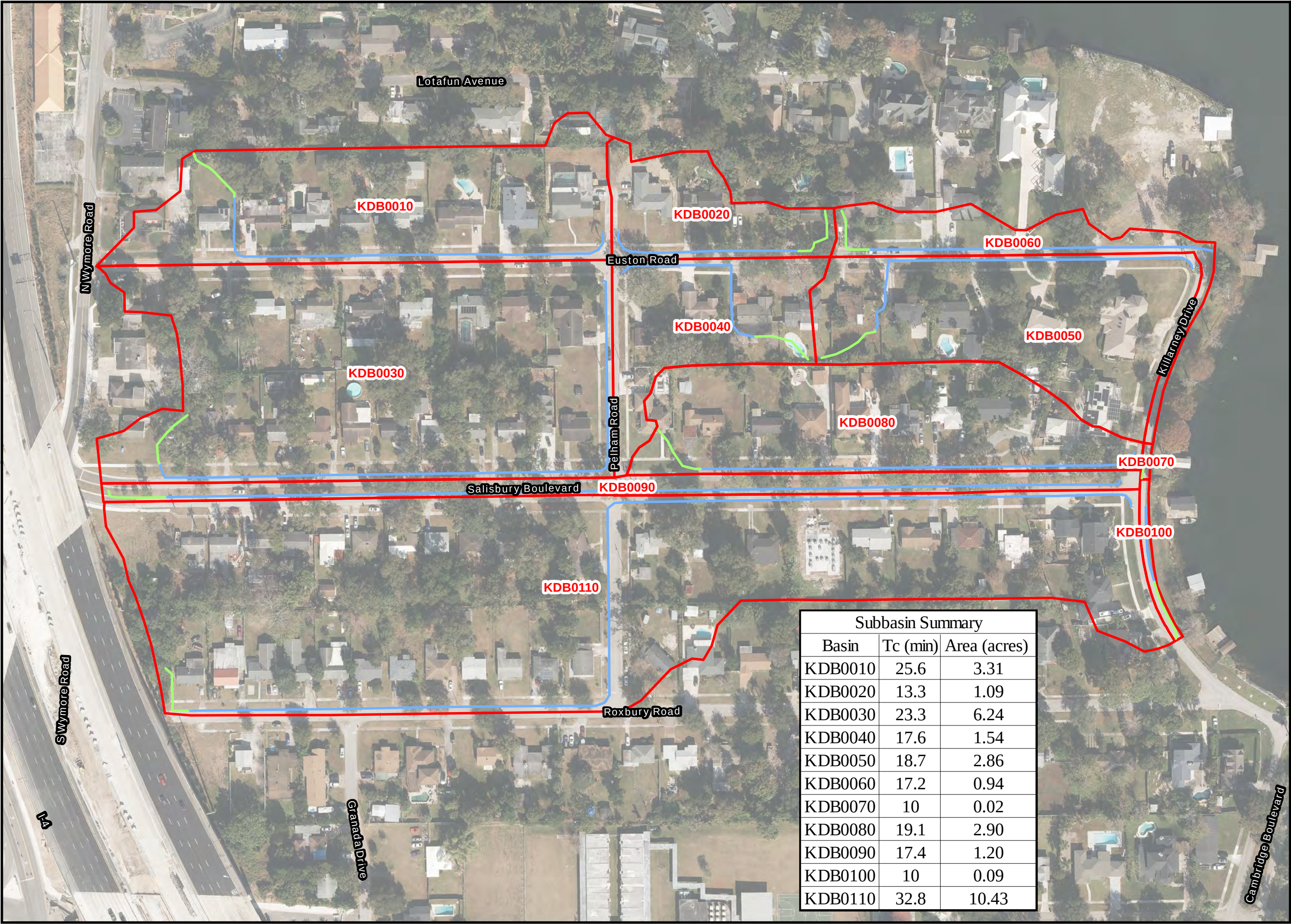
### 3.1.2 Soils Characterization

Characterizing the soils within the project area is an important step for determining infiltration capacity, stormwater runoff volumes, and identifying potential areas of percolation for modeling purposes. A GIS polygon feature class of soils data was obtained from the SCS (NRCS) Web Soil Survey for the project area. The soils are designated with various hydrological soil group (HSG) classification, 'A' through 'D', which indicate relative drainage characteristics. An 'A' soil is more freely draining (generally deeper groundwater tables and less runoff potential), and a 'D' soil is more restrictive of drainage (generally higher groundwater tables and more runoff potential). Dual classification soils ('A/D', 'B/D', and 'C/D') can have varying characteristics during the dry and wet seasons and are often conservatively categorized as HSG 'D' for design-storm based runoff estimation purposes. HSG 'A' and 'A/D' are present within the project area. Refer to **Figure 3-2** for a map of the soils in the project area.

### 3.1.3 Land Use Characterization

In addition to the soil characterization, it is also critical to perform land use characterization in conjunction with the soil information to estimate the CN and percent imperviousness in each subbasin. The land use classifications were based on the FDOT Florida Land Use, Cover and Forms Classification System (FLUCFCS) handbook (FDOT, 1999). St. John's River Water Management District land use data from 2014 was utilized in this analysis. The data was refined by Geosyntec based on on-site observations, parcel lines, and analysis of aerial photography. The contributing area is primarily medium density residential, accounting for approximately 96.1% of the project area. The remaining 3.9% of the contributing area is classified as commercial and services, which is limited to the northwest portion of the project area along North Wymore Road. Refer to **Figure 3-2** for a map of the land use in the project area.





**Legend**

- Subbasins
- Time of Concentration**
- Type**
  - Shallow Concentrated Flow
  - Sheet Flow

Sources:  
Aerial: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020

Figure 3-1

**Subbasins Map**

Killarney Drive  
Drainage Improvements





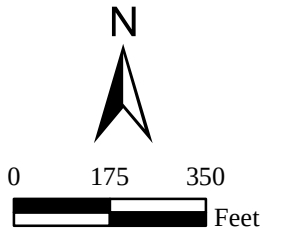
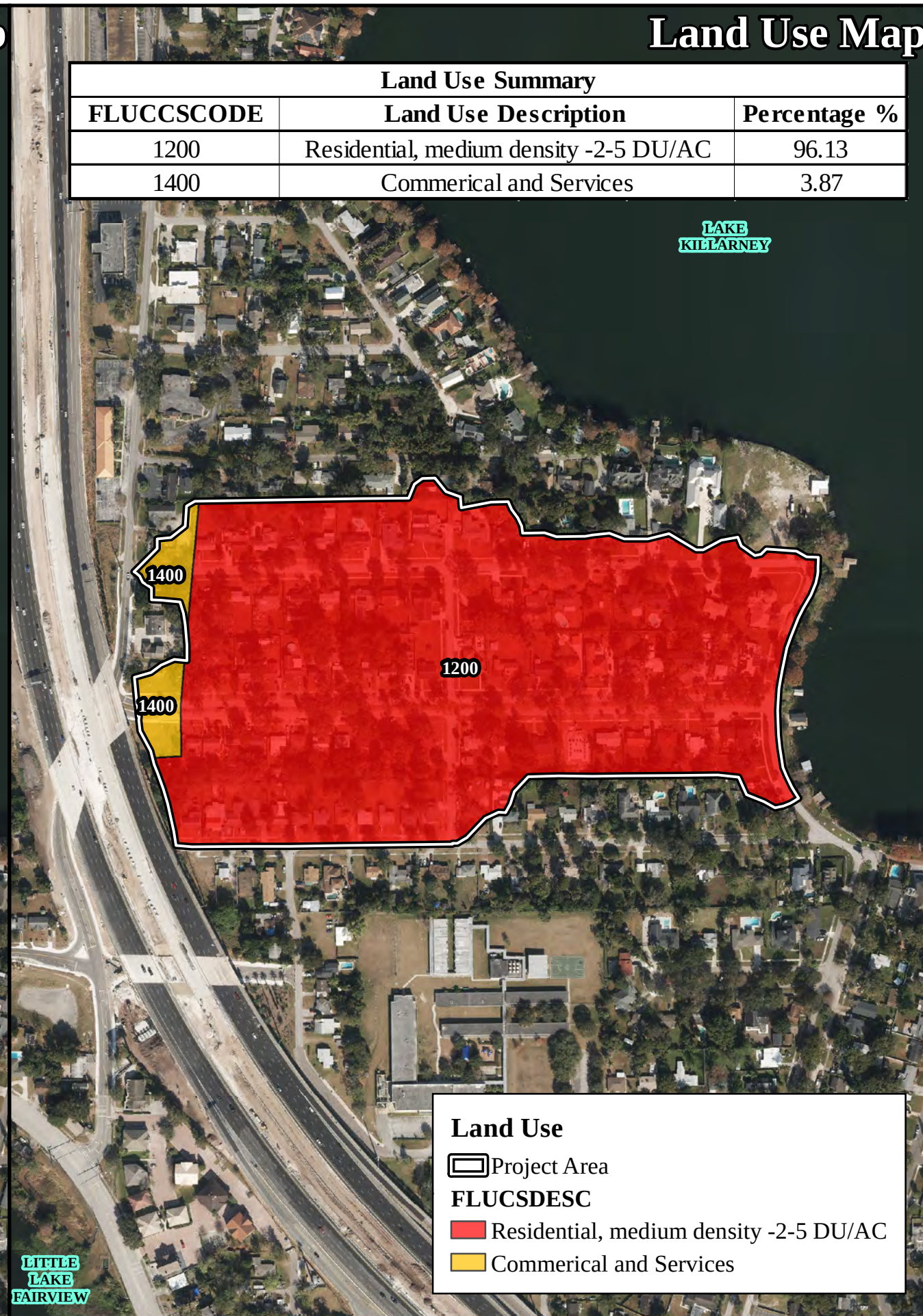
# Soils Map

| Soil Hydrologic Group Summary |                                                   |              |
|-------------------------------|---------------------------------------------------|--------------|
| Hydrologic Soil Group         | Decription                                        | Percentage % |
| A                             | Low Runoff Potential                              | 97.05        |
| A/D                           | Dual Classification, Low to High Runoff Potential | 2.95         |



# Land Use Map

| Land Use Summary |                                        |              |
|------------------|----------------------------------------|--------------|
| FLUCCSCODE       | Land Use Description                   | Percentage % |
| 1200             | Residential, medium density -2-5 DU/AC | 96.13        |
| 1400             | Commerical and Services                | 3.87         |



Sources:  
 Aerial: Orange County, 2021  
 Soils: NRCS, 2022  
 Land Use: SJRWMD, 2014  
 Lakes: Orange County, 2017

Figure 3-2

## Soils and Land Use Map

Killarney Drive Drainage Improvements





### 3.1.4 Rainfall Distribution, Depth, Duration, and Frequency

The SCS Unit Hydrograph Method was used for this project. To implement the SCS Unit Hydrograph Method, a rainfall distribution must be specified for the desired storm event as a function of time for the subbasin's unit hydrograph. Standard SCS, Florida Modified, SFWMD or SJRWMD rainfall distributions are commonly used in this region of Florida if no local distribution has been established. However, Orange County has developed its own rainfall distribution which is considered reasonable for 24-hour duration storm analysis.

The rainfall events simulated for this project are the Mean Annual, 24 hour, 10 year, 6 hour, 10 year, 24 hour, 25 year, 24 hour, and 100 year, 24 hour storms with rainfall depths of 4.5, 4.65, 7.5, 8.6, and 10.6 inches, respectively. Each of the design storm events, including the 10 year, 6 hour, were simulated using the Orange County rainfall distribution.

### 3.1.5 Curve Number

The Curve Number (CN) approach was used as the rainfall excess and runoff method. CN values were assigned to each land use and soil combination in a Curve Number Set table in the model. The CN for each sub-polygon is determined by the model by looking up the matching land use and soil combination in the Curve Number Set table. The CN lookup table is shown below (**Table 3-2**). CNs representative of open space in good condition were utilized for pervious areas rather than land use specific CNs so that impervious area was not double counted in the model.

**Table 3-2: Curve Number Lookup Table**

| Curve Number Lookup Table     |              |
|-------------------------------|--------------|
| Open Space HSG Classification | Curve Number |
| HSG A                         | 39           |
| HSG A/D                       | 80           |

Approximate impervious area percentages were estimated by Geosyntec by performing takeoff calculations at representative locations for each land use type. Approximate directly connected impervious area (DCIA) percentages were also estimated by Geosyntec by takeoff calculations. Percent impervious and percent DCIA values by land use are summarized in **Table 3-3**.

**Table 3-3: Percent Impervious and Percent DCIA Summary**

| Percent Impervious and Percent DCIA Summary |                  |        |
|---------------------------------------------|------------------|--------|
| FLUCCS                                      | % Imperviousness | % DCIA |
| 1200                                        | 37.3             | 18.9   |
| 1400                                        | 47.1             | 32.9   |

### 3.1.6 Time of Concentration

The SCS Unit Hydrograph method requires a time of concentration ( $T_c$ ) be specified for each subbasin. The  $T_c$  represents the amount of time it takes for a particle of water to travel from the hydraulically most distant point in the drainage basin to its point of interest. The  $T_c$  is computed by summing all the travel times for consecutive flow components (i.e., sheet flow, shallow



concentrated flow, and channel flow) of the subbasin conveyance system in accordance with TR-55.

Sheet flow is flow over plane surfaces of less than 100-feet. After 100-feet, sheet flow is generally assumed to become shallow concentrated flow. Shallow concentrated flow is also used for flow in very small channels such as water flowing along a street curb. Open channel flow is used for flow in ditches or pipes. Based on the analysis, only two subbasins had Tc values under 10 minutes due to short, paved flow paths or longer flow paths that are collected and channelized relatively quickly. Nine subbasins had Tc values larger than 10 minutes, ranging from 13.3 minutes to 32.8 minutes. Tc lines were digitized in GIS and are presented in **Figure 3-1**.

### 3.1.7 Peaking Factor

The SCS Unit Hydrograph Method requires a unit hydrograph peak rate factor (K') be specified. The selection of a K' depends on the geographical area and local conditions. Selection of K' were based on the procedures outlined in the document entitled "Procedure for Selection of SCS Peak Rate Factors for Use in MSSW Permit Applications", SJRWMD, April 1990. Specifically, the K' value of 256 was used in the watershed, which based on the SJRWMD 1990 report is "an average of peak rate factors determined for several measured runoff hydrographs from several basins (in addition to the Kissimmee) in central and southern Florida by the U.S. Army Corps of Engineers".

## 3.2 Hydraulic Parameterization

### 3.2.1 Node-Link Network

A model network of subbasins, nodes, and links was developed based on the digitized drainage infrastructure and the model level of detail considered necessary to meet the objectives of the Existing Conditions Analysis. The model node-link schematic is shown in **Figure 3-4**.

A total of 13 nodes and 29 links were included in the model network. It is noted that the model hydraulic features were modeled in a maintained design condition, assuming all conveyance is free of sedimentation or other flow obstructions.

### 3.2.2 Nodes

Nodes in the model are typically either defined as Stage/Area or Time/Stage. Stage/Area nodes are used to model storage areas such as stormwater pods and can also be used as junctions in channels and manholes in pipe networks. Time/Stage nodes typically represent the discharge point(s) or boundary condition(s) in the model. A total of 12 Stage/Area nodes and 1 Time/Stage node were utilized in the existing conditions model.

#### *Initial Stages*

Initial stages were set such that the model simulation would begin in static equilibrium. Initial stages were set at the lowest pipe invert connected to each drainage structure. Elevation data were obtained from the project survey.

### Warning Stages

Warning Stages were set at the elevation at which flooding of concern is expected to occur. Typically, this would include pond berm overtopping, roadway overtopping, manhole top, structure flooding elevation, etc.

### Stage vs. Area

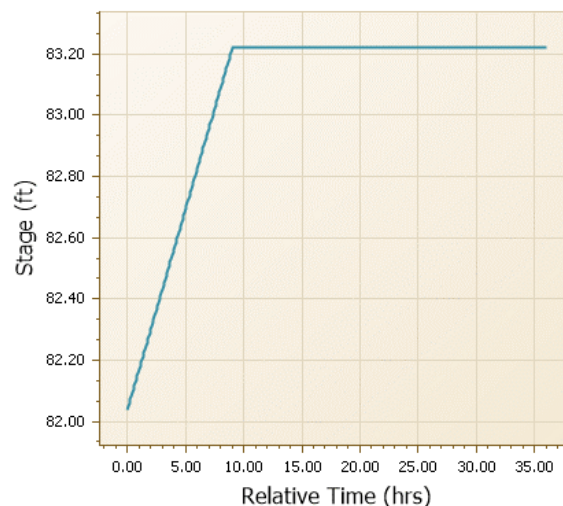
Stage vs. area relationships for each stage/area node was defined below the node initial stage and above the peak node stage from the model results for each node. This was done to accurately define the available storage in each node and prevent extrapolation or performance issues in the model. The stage vs. area information for storage nodes was extracted from the project DEM using the native ICPR4 modeling tools or obtained from project survey.

### Boundary Conditions

One Time/Stage Node (KD0130) was utilized in the model to represent Lake Killarney. The initial stage of this node was set to start at the Orange County normal high water elevation (NHWE), 82.04 feet. It was then increased to peak stages for each respective design storm event referenced from the February 2011 Howell Creek watershed model completed by CDM. For this project, the 10-yr / 6-hr peak stage was assumed to be the same as the 10-yr / 24-hr peak stage. The boundary condition was assumed to peak at approximately the same time as the nodes in the model (at approximately hour 9). Refer to **Figure 3-3** for an example time/stage graph of the boundary condition during the 10 year, 24 hour design storm event.

**Table 3-4: Lake Killarney Peak Stages from Howell Creek Watershed Model**

| Lake Killarney Peak Stages from Howell Creek Watershed Model |                      |                              |                  |                   |
|--------------------------------------------------------------|----------------------|------------------------------|------------------|-------------------|
|                                                              | Mean Annual, 24 hour | 10 year, 6 hour<br>& 24 hour | 25 year, 24 hour | 100 year, 24 hour |
| Lake Killarney                                               | 82.72                | 83.22                        | 83.92            | 85.22             |



**Figure 3-3: Simulated Boundary Conditions for 10 year, 24 hour Design Storm Event**



### 3.2.3 Links

The model simulated flow in links allowing the evaluation of conveyance effectiveness between nodes. A description of the various model links is provided below.

#### *Pipes*

Pipe links were used to represent the various pipe and culvert sections included in the model. A total of 12 pipe links were used in the existing conditions model. Pipe inverts, dimensions, geometry, and material data were referenced from the project survey. Roughness coefficients (Manning's  $n$ ) were based on material as follows:

- Rubber Pipe: 0.009
- Reinforced Concrete Pipe (RCP): 0.012
- Steel Pipe: 0.012
- Corrugated Metal Pipe (CMP): 0.022

Entrance and exit losses were assigned to pipes where appropriate based on the outlet condition at the end of the pipe. These values were assigned based on literature values, or default values were used where exact conditions were uncertain. In general, the values were applied as follows:

- Entrance Losses – a representative average value of 0.5 was used for all pipes
- Exit Losses – a value of 0 was used for open discharge, and an exit loss of 1.0 was used for discharge into a static water body (e.g., Lake Killarney).

#### *Weirs*

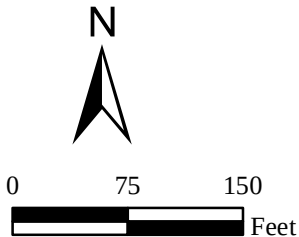
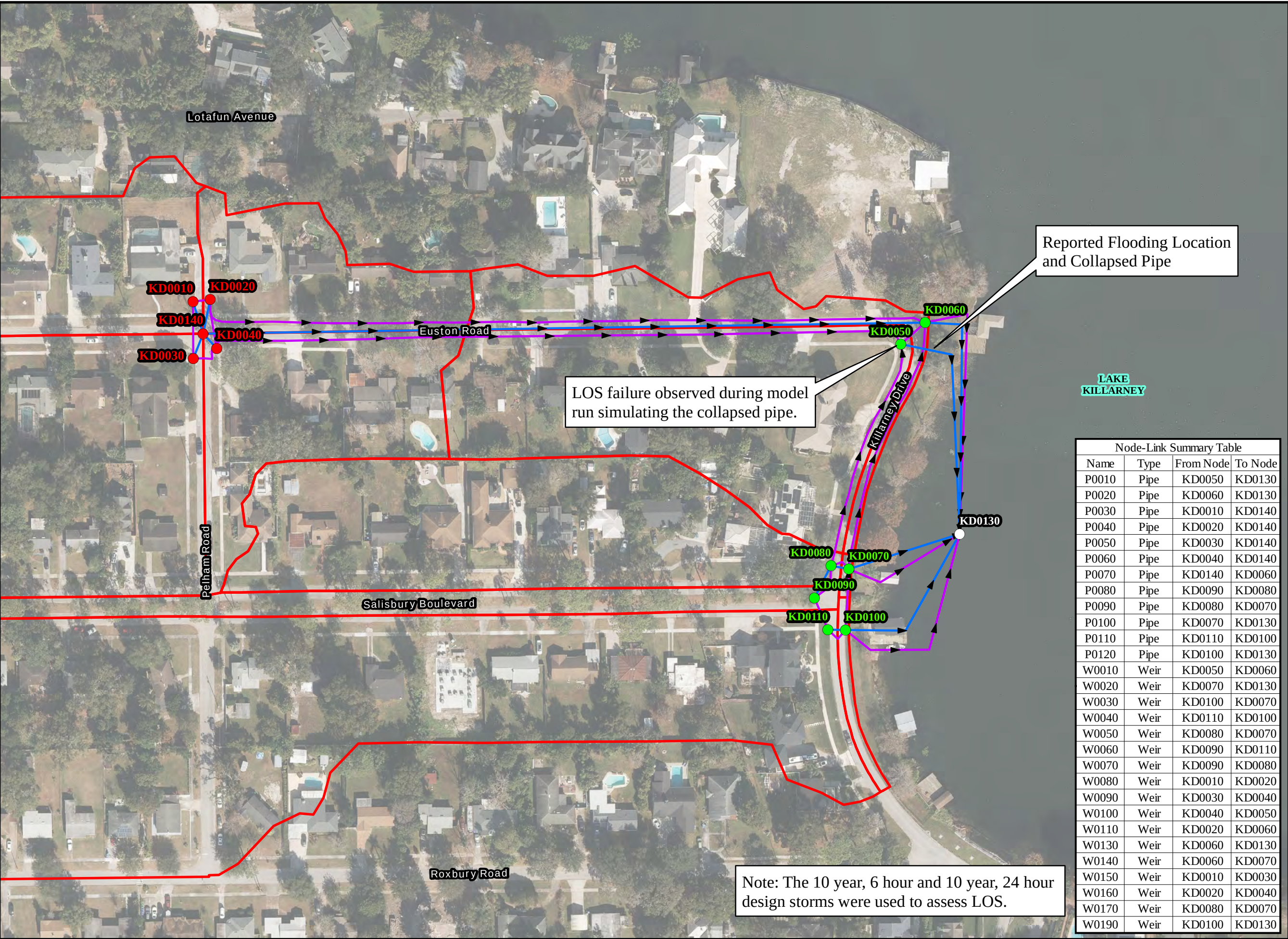
Weir links are used to represent outflow weirs at ponds, inlet characteristics to some outfall structures, and to represent overland flow. 17 weir links were used in the model for this project. The specific geometry of the weir was input into the model. Vertical weirs were used to model overtopping situations. Each weir was assigned a specific weir coefficient based on its configuration. Weir coefficients were applied as follows:

- Overland / Saddle Flow / Overtopping Roadway: 2.8

#### *Cross Sections*

Location specific irregular cross-sections are typically extracted from project DEM, topographic survey, or as-built plans for use in the model. Cross-sections are typically assigned to specific weir or channel links in the model to provide the irregular geometric properties for these links. For the case of cross-sections used in channel links, the cross-sections are used to store Manning's roughness values as well as geometric data. For this project, 17 overland weir cross sections were developed in the model.





Legend

- Subbasins
- ICPR Node
  - Passes LOS
  - Fails LOS
  - LOS N/A
- ICPR Links
  - Pipe
  - Weir

Sources:  
Aerial: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020

LAKE KILLARNEY

| Node-Link Summary Table |      |           |         |
|-------------------------|------|-----------|---------|
| Name                    | Type | From Node | To Node |
| P0010                   | Pipe | KD0050    | KD0130  |
| P0020                   | Pipe | KD0060    | KD0130  |
| P0030                   | Pipe | KD0010    | KD0140  |
| P0040                   | Pipe | KD0020    | KD0140  |
| P0050                   | Pipe | KD0030    | KD0140  |
| P0060                   | Pipe | KD0040    | KD0140  |
| P0070                   | Pipe | KD0140    | KD0060  |
| P0080                   | Pipe | KD0090    | KD0080  |
| P0090                   | Pipe | KD0080    | KD0070  |
| P0100                   | Pipe | KD0070    | KD0130  |
| P0110                   | Pipe | KD0110    | KD0100  |
| P0120                   | Pipe | KD0100    | KD0130  |
| W0010                   | Weir | KD0050    | KD0060  |
| W0020                   | Weir | KD0070    | KD0130  |
| W0030                   | Weir | KD0100    | KD0070  |
| W0040                   | Weir | KD0110    | KD0100  |
| W0050                   | Weir | KD0080    | KD0070  |
| W0060                   | Weir | KD0090    | KD0110  |
| W0070                   | Weir | KD0090    | KD0080  |
| W0080                   | Weir | KD0010    | KD0020  |
| W0090                   | Weir | KD0030    | KD0040  |
| W0100                   | Weir | KD0040    | KD0050  |
| W0110                   | Weir | KD0020    | KD0060  |
| W0130                   | Weir | KD0060    | KD0130  |
| W0140                   | Weir | KD0060    | KD0070  |
| W0150                   | Weir | KD0010    | KD0030  |
| W0160                   | Weir | KD0020    | KD0040  |
| W0170                   | Weir | KD0080    | KD0070  |
| W0190                   | Weir | KD0100    | KD0130  |

Existing Conditions  
Model Node-Link  
and LOS  
Results Map

Killarney Drive  
Drainage Improvements



Note: The 10 year, 6 hour and 10 year, 24 hour design storms were used to assess LOS.



### 3.3 Existing Condition Modeling Results

The Existing Conditions Node Maximum Conditions summary is presented in **Table 3-5**, which lists all nodes, warning stages, descriptions of warning stages, and peak stages for each of the modeled storm events. ICPR input and output reports are included as **Appendix B**.

**Table 3-5: Existing Conditions Node Maximum Conditions**

| Existing Conditions Node Maximum Conditions Summary |                           |                           |                        |                 |                  |                  |                   |
|-----------------------------------------------------|---------------------------|---------------------------|------------------------|-----------------|------------------|------------------|-------------------|
| Node                                                | Warning Stage (ft NAVD88) | Warning Stage Description | Peak Stage (ft NAVD88) |                 |                  |                  |                   |
|                                                     |                           |                           | Mean Annual, 24 hour   | 10 year, 6 hour | 10 year, 24 hour | 25 year, 24 hour | 100 year, 24 hour |
| KD0010                                              | 93.83                     | Edge of Pavement          | 91.65                  | <b>94.21</b>    | 93.45            | <b>94.69</b>     | <b>95.18</b>      |
| KD0020                                              | 93.81                     | Edge of Pavement          | 91.25                  | <b>94.21</b>    | 93.42            | <b>94.69</b>     | <b>95.17</b>      |
| KD0030                                              | 93.95                     | Edge of Pavement          | 90.06                  | <b>94.26</b>    | 93.51            | <b>94.69</b>     | <b>95.18</b>      |
| KD0040                                              | 93.86                     | Edge of Pavement          | 91.13                  | <b>94.20</b>    | 93.42            | <b>94.69</b>     | <b>95.18</b>      |
| KD0050                                              | 85.80                     | Edge of Pavement          | 83.93                  | 84.37           | 84.27            | 84.41            | <b>86.19</b>      |
| KD0060                                              | 85.39                     | Edge of Pavement          | 83.23                  | 84.74           | 84.38            | 85.09            | <b>86.00</b>      |
| KD0070                                              | 88.26                     | Edge of Pavement          | 85.33                  | 85.80           | 85.70            | 85.87            | 86.30             |
| KD0080                                              | 88.27                     | Edge of Pavement          | 85.89                  | 86.36           | 86.26            | 86.42            | 86.72             |
| KD0090                                              | 88.59                     | Edge of Pavement          | 86.49                  | 86.73           | 86.67            | 86.74            | 86.85             |
| KD0100                                              | 88.55                     | Edge of Pavement          | 86.00                  | 86.68           | 86.59            | 86.84            | 87.44             |
| KD0110                                              | 88.48                     | Edge of Pavement          | 86.20                  | 87.08           | 86.94            | 87.39            | <b>88.63</b>      |
| KD0140                                              | 93.74                     | Top of Structure          | 89.92                  | <b>94.19</b>    | 93.42            | <b>94.67</b>     | <b>95.16</b>      |

Note: **Bold red** peak stages represent nodes that exceed their warning stage. The 10 year / 6 hour and 24 hour design storms are the LOS reference storms for this project.

Results presented in **Table 3-5** indicate that the 18-inch pipe along Euston Road does not have the conveyance capacity to effectively convey stormwater runoff to Lake Killarney without water staging into the road during the 10 year / 6 hour design storm event. Node LOS results are summarized in **Figure 3-4**.

It is important to note that for the existing conditions model it was assumed that the reported collapsed pipe located at the east end of Euston Road has the conveyance capacity of a fully functioning pipe. In reality, if the pipe is collapsed, there may be flooding at node KD0050 that the model does not depict. As noted on **Figure 3-4**, an additional model simulation was run to assess the pipe under a collapsed condition. The pipe was simulated in the model as if it had 25%

of its available capacity (i.e., the pipe was 75% collapsed). Based on the results of this simulation, there would be LOS deficiencies at Node KD0050 during both the 10 year, 6 hour and 24 hour design storm events. A flood depth of approximately 0.37 feet was observed at Node KD0050 during the 10 year design storm events for the collapsed pipe model simulation.

The stages and the overland flow through the private properties presented by the model correspond with the complaints submitted to the County by local property owners. Complaints submitted acknowledge lack of collection along the road as well as the high stages observed in nodes KD0010, KD0020, KD0030, KD0040, and KD0140. A summary of LOS deficiencies based on modeling results, is presented below:

- KD0010 – an inlet located at the intersection of Euston and Pelham Road. During the 10 year, 6 hour design storm event, the peak stage was 94.21 feet, indicating a potential flooding depth of 0.38 feet.
- KD0020 – an inlet located at the intersection of Euston and Pelham Road. During the 10 year, 6 hour design storm event, the peak stage was 94.21 feet, indicating a potential flooding depth of 0.40 feet.
- KD0030 – an inlet located at the intersection of Euston and Pelham Road. During the 10 year, 6 hour design storm event, the peak stage was 94.26 feet, indicating a potential flooding depth of 0.31 feet.
- KD0040 – an inlet located at the intersection of Euston and Pelham Road. During the 10 year, 6 hour design storm event, the peak stage was 94.20 feet, indicating a potential flooding depth of 0.34 feet.
- KD0140 – a manhole located at the intersection of Euston and Pelham Road. During the 10 year, 6 hour design storm event, the peak stage was 94.19 feet, indicating a potential flooding depth of 0.45 feet.

Peak discharge rates to Lake Killarney for each design storm event are summarized in **Table 3-5**. Comparison of peak discharge rates to existing conditions is an important aspect of permitting for potential improvement concepts and is discussed in **Section 4**.

**Table 3-5: Summary of Peak Flow Rates to Lake Killarney**

| Summary of Peak Flow Rates (cfs) |                         |                    |                     |                     |                      |
|----------------------------------|-------------------------|--------------------|---------------------|---------------------|----------------------|
| Node                             | Design Storm            |                    |                     |                     |                      |
|                                  | Mean Annual,<br>24 hour | 10 year,<br>6 hour | 10 year,<br>24 hour | 25 year,<br>24 hour | 100 year,<br>24 hour |
| Lake Killarney                   | 5.63                    | 16.36              | 14.94               | 17.78               | 25.94                |

### 3.4 Existing Conditions Summary

Based on the results of the existing conditions analysis, the drainage system associated with the subdivision does not appear to meet the 10 year, 6 hour LOS criteria, specifically at the intersection



of Pelham Road and Euston Road. Model results support the observed flooding related complaints made by residents in the subdivision. The presence of observed sedimentation in portions of the drainage system as well as the reported collapsed pipe may exacerbate drainage issues beyond what is depicted by the model, which reflects a maintained design condition.

**Based on the forgoing, the development of improvement concept alternatives is warranted for the Killarney Drive drainage system.**

## 4. IMPROVEMENT CONCEPT ALTERNATIVES DEVELOPMENT

Three improvement concept alternatives were developed to address the LOS deficiencies discussed in **Section 3**. Findings from the Existing Conditions Assessment indicated that the existing drainage infrastructure in the project area, specifically along Euston Road, is not adequate to effectively convey peak flow rates associated with the design storms of interest. The proposed improvement alternatives are intended to reduce or eliminate flooding LOS deficiencies in the subdivision.

### 4.1 Improvement Alternative 1

The proposed improvements presented as Improvement Alternative 1 include upsizing the existing pipes located at the intersection of Pelham Road and Euston Road, upsizing the pipe along Euston Road, the addition of a new outfall pipe at the east end of Euston Road where it transitions into Killarney Drive, and the addition of two bioswales located along the median of Salisbury Boulevard. The intent of this design is to better capture stormwater runoff within the County-owned right-of-way and convey the water east along Euston Road until it discharges to Lake Killarney. The goal of this improvement alternative concept is to achieve a 10 year, 6 hour LOS.

#### 4.1.1 Proposed Features

This improvement concept consists of upsizing the existing drainage infrastructure and the manhole located at the intersection of Pelham Road and Euston Road from 15-inch rubber pipes to 18-inch concrete pipes, as well as upsizing the pipe along Euston Road from 18-inch corrugated metal to 24-inch concrete pipe. In addition to the upsizing of the existing drainage infrastructure, this improvement also includes abandoning the existing pipes at the intersection of Euston Road where it transitions into Killarney Drive and replacing them with a 24-inch concrete pipe that discharges to Lake Killarney.

The proposed improvement concept includes two bioswales located along the median of Salisbury Boulevard. The conceptual bioswales were assumed to be 3-feet deep with 3:1 side slopes from the road edge of pavement. Salisbury Boulevard is divided by the existing median and the paved portions on the north and south sides of the median are crowned. Stormwater runoff from the pavement surface sloped towards the median would flow directly into the bioswales via curb cuts. It is noted that the portion of the median west of Pelham Road is currently curbed; however, the portion east of Pelham Road is not curbed. Additionally, an inlet is proposed at the southeast corner of the Pelham Road and Salisbury Boulevard intersection that will intercept stormwater runoff and convey it to the proposed bioswales. Native vegetation is proposed to be planted along the bottom of the bioswales. The intent of incorporating the bioswales is to capture and promote infiltration of stormwater runoff, thereby reducing the peak discharge rate to Lake Killarney. A concept map of Improvement Alternative 1 is presented as **Figure 4-1**.

#### 4.1.2 Improvement Alternative 1 Stormwater Model

The existing condition model, discussed in **Section 3**, was used as a starting point for the stormwater model development for Improvement Alternative 1. Model modifications included modifying pipe links to reflect the proposed pipe dimensions and material shown in **Figure 4-1** as



well as adding in the bioswales along Salisbury Boulevard. A stage/area node was added to represent each bioswale. Percolation links were added to represent the infiltration from the bioswale to the groundwater. Two time/stage nodes were added to simulate the groundwater that the bioswales discharge to. Weir links were added to represent the bioswales overtopping and discharging into the downstream drainage infrastructure. The same methodology used in the existing conditions model for assigning node initial stages (e.g., structure bottom elevation) and warning stages (e.g., edge of pavement elevation) was also used for the proposed conditions model. The node-link model schematic for Improvement Alternative 1 is presented in **Figure 4-2**. Improvement Alternative 1 model files are included in **Appendix C**.

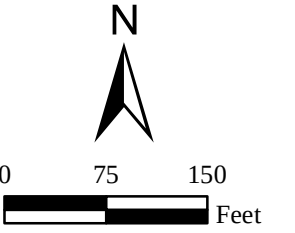
#### ***4.1.2.1 Boundary Conditions***

This improvement alternative does not modify the tailwater boundary conditions considered for the system.

#### ***4.1.2.2 Curb Inlets and Gutters***

This improvement alternative includes the addition of a proposed curb inlet at the southeast corner of the Pelham Road and Salisbury Boulevard intersection.



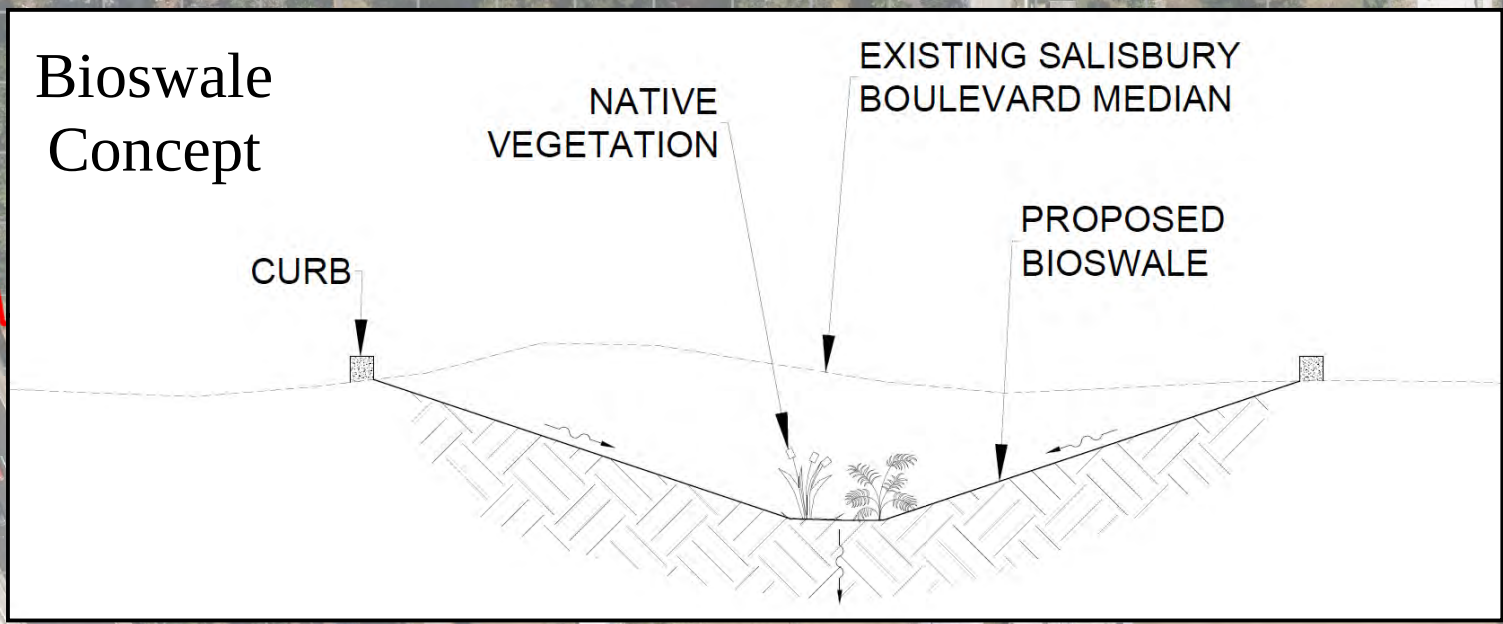
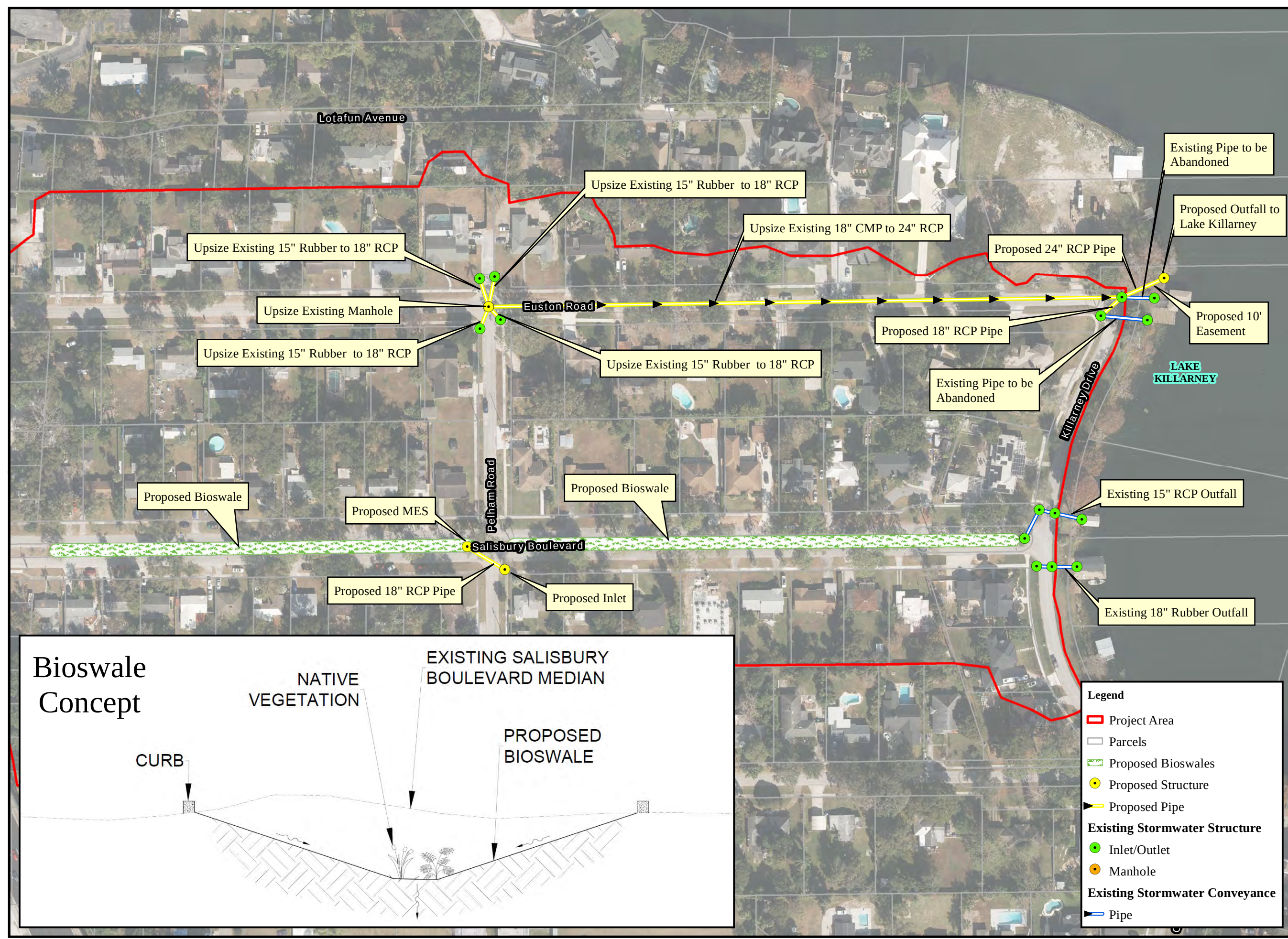


Sources:  
Aerial: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020  
Drainage: ECHO Survey, 2022  
Parcels: Orange County, 2020

Figure  
4-1

**Improvement  
Alternative 1  
Concept Map**

Killarney Drive  
Drainage Improvements



- Legend**
- Project Area
  - Parcels
  - Proposed Bioswales
  - Proposed Structure
  - Proposed Pipe
  - Existing Stormwater Structure**
    - Inlet/Outlet
    - Manhole
  - Existing Stormwater Conveyance**
    - Pipe



#### 4.1.2.3 Underground Conveyance

The proposed underground conveyance system consists of four 18-inch concrete pipes located at the intersection of Pelham Road and Euston Road that drain to a 24-inch concrete pipe along Euston Road that connects to the existing curb inlet at the east end of Euston Road and ultimately outfalls to Lake Killarney via a proposed 24-inch concrete pipe. An 18-inch pipe located at the southeast corner of the Pelham Road and Salisbury Boulevard intersection to convey the stormwater to the proposed bioswales. The existing outfalls at the east end of Euston Road, one of which is reported to be collapsed, would be abandoned.

#### 4.1.3 Improvement Alternative 1 Model Results

Model results for Improvement Alternative 1, including the Node Max Conditions summary, are presented in **Table 4-2**. ICPR input reports for this alternative are included in **Appendix C**. As seen in **Table 4-2**, all nodes achieve a 10 year, 6 hour LOS under Improvement Alternative 1.

All of the node peak stages were below the corresponding warning stage during the 10 year, 6 hour design storm, indicating that this improvement concept may achieve a 10 year, 6 hour LOS. For example, the peak stage at Node KD0010 (the curb inlet on the northwest corner of the intersection of Pelham Road and Euston Road) decreased from 94.21 feet in the existing conditions to 91.95 feet in the proposed condition, a decrease in flooding of 2.26 feet during the 10 year, 6 hour design storm event.

##### 4.1.3.1 Peak Flow Rates to Lake Killarney

A summary of peak flow rates to the boundary node representing Lake Killarney is provided in **Table 4-1** below.

**Table 4-1: Alternative 1 Summary of Peak Flow Rates to Lake Killarney**

| Summary of Peak Flow Rates (cfs) |                          |       |                     |       |                      |       |                      |       |                       |       |
|----------------------------------|--------------------------|-------|---------------------|-------|----------------------|-------|----------------------|-------|-----------------------|-------|
| Node                             | Design Storm             |       |                     |       |                      |       |                      |       |                       |       |
|                                  | Mean Annual /<br>24 Hour |       | 10 Year / 6<br>Hour |       | 10 Year / 24<br>Hour |       | 25 Year / 24<br>Hour |       | 100 Year / 24<br>Hour |       |
|                                  | Ex.                      | Prop. | Ex.                 | Prop. | Ex.                  | Prop. | Ex.                  | Prop. | Ex.                   | Prop. |
| Lake Killarney                   | 5.63                     | 4.07  | 16.36               | 13.38 | 14.94                | 12.85 | 17.78                | 17.24 | 25.94                 | 26.83 |

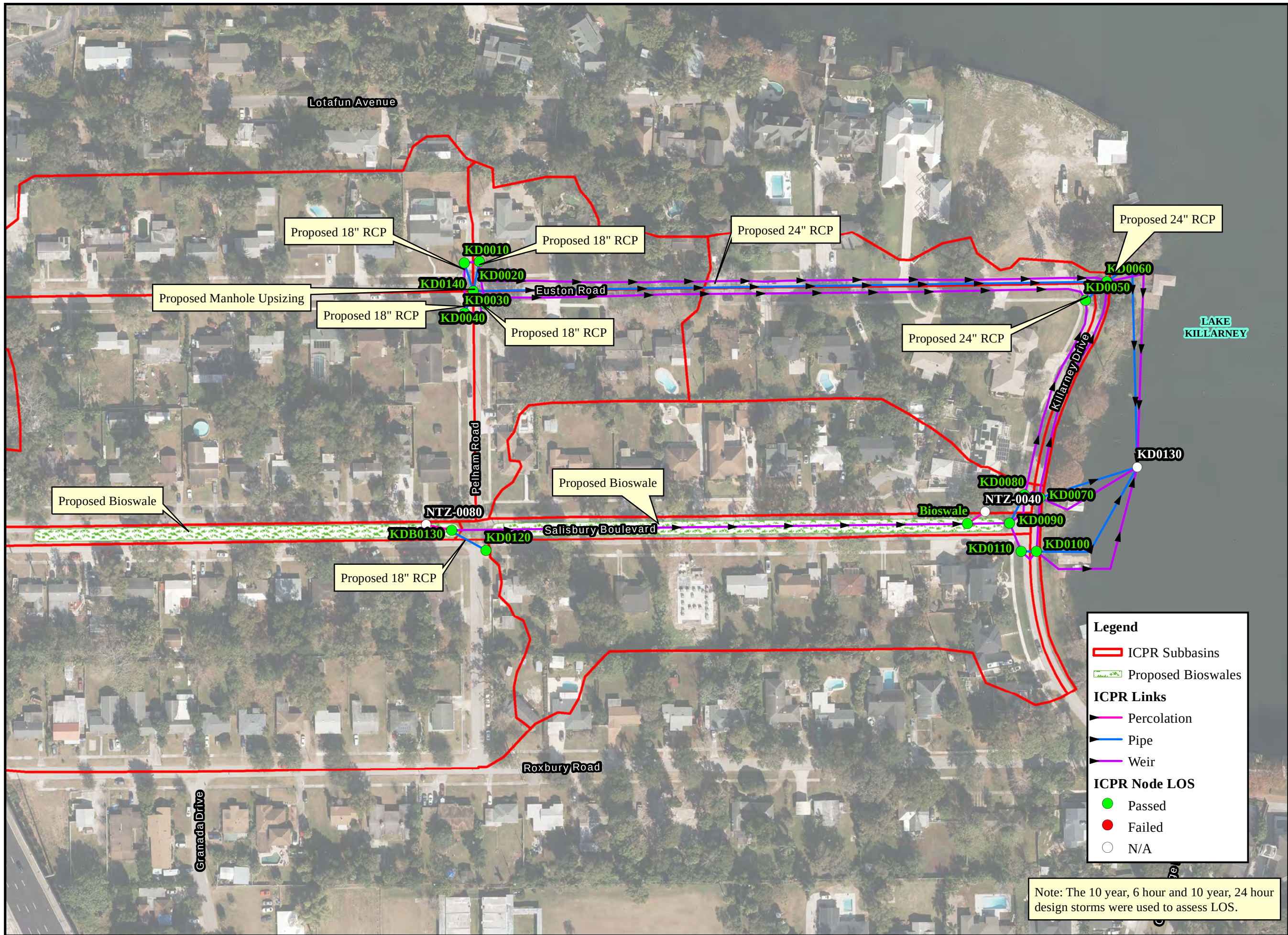
Overall, peak discharge rates to Lake Killarney showed a decrease, with a slight increase in the 100 year, 24 hour design storm.

Table 4-2: Improvement Alternative 1 Node Maximum Conditions Summary

| STAGE/AREA NODE |                  | INITIAL STAGE |                     | WARNING STAGE |                  | MEAN ANNUAL / 24 HOUR    |                          | 10 YEAR / 6 HOUR         |                          | 10 YEAR / 24 HOUR        |                          | 25 YEAR / 24 HOUR        |                          | 100 YEAR / 24 HOUR       |                          |
|-----------------|------------------|---------------|---------------------|---------------|------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| NAME            | DESCRIPTION      | ELEVATION     | DESCRIPTION         | ELEVATION     | DESCRIPTION      | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) |
| KD0010          | Drainage inlet   | 91.26         | Bottom of structure | 93.83         | Edge of pavement | 91.65                    | 91.63                    | 94.21                    | 91.95                    | 93.45                    | 91.90                    | 94.69                    | 92.00                    | 95.18                    | 92.20                    |
| KD0020          | Drainage inlet   | 91.04         | Bottom of structure | 93.81         | Edge of pavement | 91.25                    | 91.24                    | 94.21                    | 91.44                    | 93.42                    | 91.40                    | 94.69                    | 91.46                    | 95.17                    | 91.56                    |
| KD0030          | Drainage inlet   | 89.46         | Bottom of structure | 93.95         | Edge of pavement | 90.06                    | 90.02                    | 94.26                    | 90.56                    | 93.51                    | 90.44                    | 94.69                    | 90.66                    | 95.18                    | 91.20                    |
| KD0040          | Drainage inlet   | 90.89         | Bottom of structure | 93.86         | Edge of pavement | 91.13                    | 91.11                    | 94.20                    | 91.34                    | 93.42                    | 91.30                    | 94.69                    | 91.38                    | 95.18                    | 91.50                    |
| KD0050          | Drainage inlet   | 82.55         | Bottom of structure | 85.80         | Edge of pavement | 83.93                    | 83.15                    | 84.37                    | 84.05                    | 84.27                    | 83.82                    | 84.41                    | 84.35                    | 86.19                    | 86.02                    |
| KD0060          | Drainage inlet   | 82.33         | Bottom of structure | 85.39         | Edge of pavement | 83.23                    | 83.15                    | 84.74                    | 84.02                    | 84.38                    | 83.80                    | 85.09                    | 84.31                    | 86.00                    | 85.94                    |
| KD0070          | Drainage inlet   | 84.86         | Bottom of structure | 88.26         | Edge of pavement | 85.33                    | 85.23                    | 85.80                    | 85.68                    | 85.70                    | 85.99                    | 85.87                    | 86.50                    | 86.30                    | 87.52                    |
| KD0080          | Drainage inlet   | 85.43         | Bottom of structure | 88.27         | Edge of pavement | 85.89                    | 85.79                    | 86.36                    | 86.24                    | 86.26                    | 86.51                    | 86.42                    | 86.88                    | 86.72                    | 88.14                    |
| KD0090          | Drainage inlet   | 86.23         | Bottom of structure | 88.59         | Edge of pavement | 86.49                    | 86.23                    | 86.73                    | 86.79                    | 86.67                    | 86.99                    | 86.74                    | 87.28                    | 86.85                    | 88.56                    |
| KD0100          | Drainage inlet   | 85.27         | Bottom of structure | 88.55         | Edge of pavement | 86.00                    | 85.68                    | 86.68                    | 86.10                    | 86.59                    | 86.02                    | 86.84                    | 86.15                    | 87.44                    | 86.38                    |
| KD0110          | Drainage inlet   | 85.41         | Bottom of structure | 88.48         | Edge of pavement | 86.20                    | 85.84                    | 87.08                    | 86.31                    | 86.94                    | 86.21                    | 87.39                    | 86.36                    | 88.63                    | 86.65                    |
| KD0140          | Drainage manhole | 89.09         | Bottom of structure | 93.74         | Top of structure | 89.92                    | 89.80                    | 94.19                    | 90.47                    | 93.42                    | 90.34                    | 94.67                    | 90.56                    | 95.16                    | 91.00                    |

Note: **Bold red** peak stages represent nodes that exceed their warning stage. The 10 year / 6 hour design storm is the LOS reference storm for this project.





Sources:  
Aerial: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020

Figure  
4-2

**Improvement  
Alternative 1  
Model Node-Link and  
LOS Results Map**

Killarney Drive  
Drainage Improvements

Note: The 10 year, 6 hour and 10 year, 24 hour  
design storms were used to assess LOS.



#### 4.1.4 Implementation Considerations

- **Flooding Benefit** – This improvement concept reduces the extent and severity of roadway inundation in the project area. Decreased peak stages were noted at locations reported to experience frequent nuisance flooding. This improvement concept achieves a 10 year LOS based on modeling results.
- **Water Quality Benefit** – This improvement concept provides a water quality benefit by promoting infiltration of stormwater runoff at the proposed bioswales, which reduces the total pollutant load discharged to Lake Killarney.
- **Erosion and Sediment Control Benefit** – The reduction of runoff entering the residential properties has the potential to reduce erosion and sedimentation in the area.
- **Permitting** – A permit determination meeting was conducted with SJRWMD on October 14<sup>th</sup> to determine the permitting needs for the improvement concept. Based on feedback from the District, the project would likely not qualify for an exemption due to the proposed work in a surface water. Per the District, the project may qualify for a General Permit for a retrofit activity if proposed peak discharge rates are able to meet existing peak discharge rates to Lake Killarney. This was accomplished by incorporating the proposed bioswales into the improvement concept.
- **Engineering Design** – Engineering design may include collection of survey data, geotechnical testing, preparation of design plants, preparation of a cost estimate, preparation of technical specifications, and utility coordination.
- **Land Acquisition** – A 10-foot wide easement was assumed to be necessary to construct the new outfall pipe on Parcel 02-22-29-2996-06-140.
- **Constructability** – Constructability considerations associated with this improvement concept include potential utility conflicts and proximity of the proposed outfall pipe to an existing dock.
- **Project Cost Estimate** – Alternative 1 improvements are anticipated to cost approximately \$1,001,530. This cost includes construction, a 20% contingency, and design. Detailed cost information can be found in **Appendix F**.



## 4.2 Improvement Alternative 2

Improvement Alternative 2 proposes most of the same features included in Improvement Alternative 1; however, the outfall is directed south along the east side of Killarney Drive to an existing curb inlet and outfall pipe at the intersection of Killarney Drive and Salisbury Boulevard. The existing outfall that the proposed conveyance would connect to is proposed to be upsized from 15-inch to 24-inch. The goal of this improvement concept is to achieve a 10 year, 6 hour LOS.

### 4.2.1 Proposed Features

This improvement concept includes the same pipe upgrades at the intersection of Pelham Road and Euston Road as Improvement Alternative 1, as well as two proposed bioswales along the median of Salisbury Boulevard. At the east end of Euston Road, 24-inch concrete pipes are proposed to convey the runoff south along Killarney Drive to an upsized outfall at the intersection of Salisbury Boulevard and Killarney Drive. The two existing outfalls at the east end of Euston Road are proposed to be abandoned. The existing 12-inch pipe that is reported to be collapsed is proposed to be replaced with an 18-inch pipe that connects to the 24-inch pipe that conveys stormwater south along Killarney Drive. The existing 15-inch outfall at the intersection of Salisbury Boulevard and Killarney Drive is proposed to be upsized to 24-inch. A concept map of Improvement Alternative 2 is presented as **Figure 4-3**.

### 4.2.2 Improvement Alternative 2 Stormwater Model

The existing condition model, discussed in **Section 3**, was used as a starting point for the stormwater model development for Improvement Alternative 2. Model modifications included modifying pipe links to reflect the proposed pipe dimensions and material shown in **Figure 4-3** as well as adding in the bioswales along Salisbury Boulevard. A stage/area node was added to represent each bioswale. Percolation links were added to represent the infiltration from the bioswale to the groundwater. Two time/stage nodes were added to simulate the groundwater that the bioswales discharge to. Weir links were added to represent the bioswales overtopping and discharging into the downstream drainage infrastructure. The same methodology used in the existing conditions model for assigning node initial stages (e.g., structure bottom elevation) and warning stages (e.g., edge of pavement elevation) was also used for the proposed conditions model. The node-link model schematic for Improvement Alternative 2 is presented in **Figure 4-4**. Improvement Alternative 2 model files are included in **Appendix D**.

#### 4.2.2.1 Boundary Conditions

This improvement alternative does not modify the tailwater boundary conditions considered for the system.

#### 4.2.2.2 Curb Inlets and Gutters

This improvement alternative includes the addition of a proposed curb inlet at the southeast corner of the Pelham Road and Salisbury Boulevard intersection.

#### 4.2.2.3 Underground Conveyance

The proposed underground conveyance system consists of four 18-inch concrete pipes at the intersection of Pelham Road and Euston Road that drain to a 24-inch concrete pipe along Euston Road. This alternative proposes the addition of 24-inch concrete pipes on the southeast corner of Euston Road where it transitions into Killarney Drive, these pipes will convey stormwater south

down Killarney Drive to an upsized 24-inch outfall at the intersection of Salisbury Boulevard and Killarney Drive. An 18-inch pipe located at the southeast corner of the Pelham Road and Salisbury Boulevard intersection to convey the stormwater to the proposed bioswales. The existing outfalls at the east end of Euston Road, one of which is reported to be collapsed, would be abandoned.

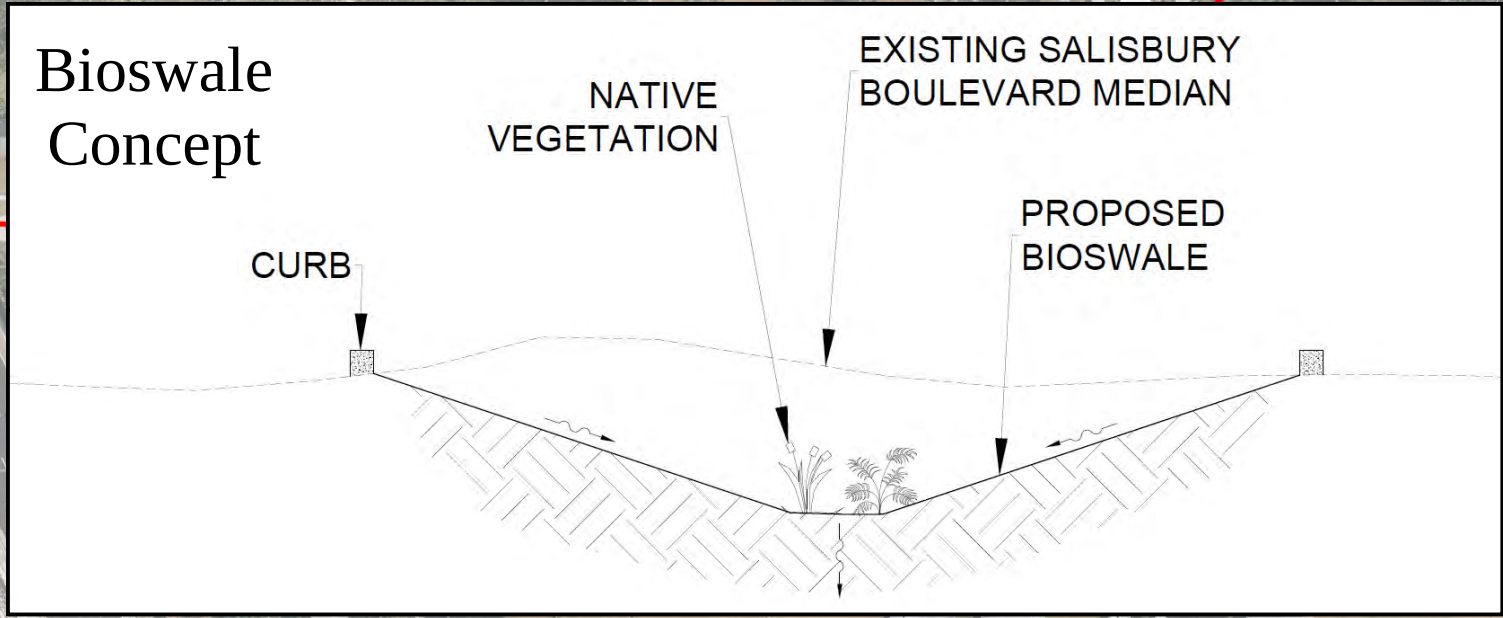
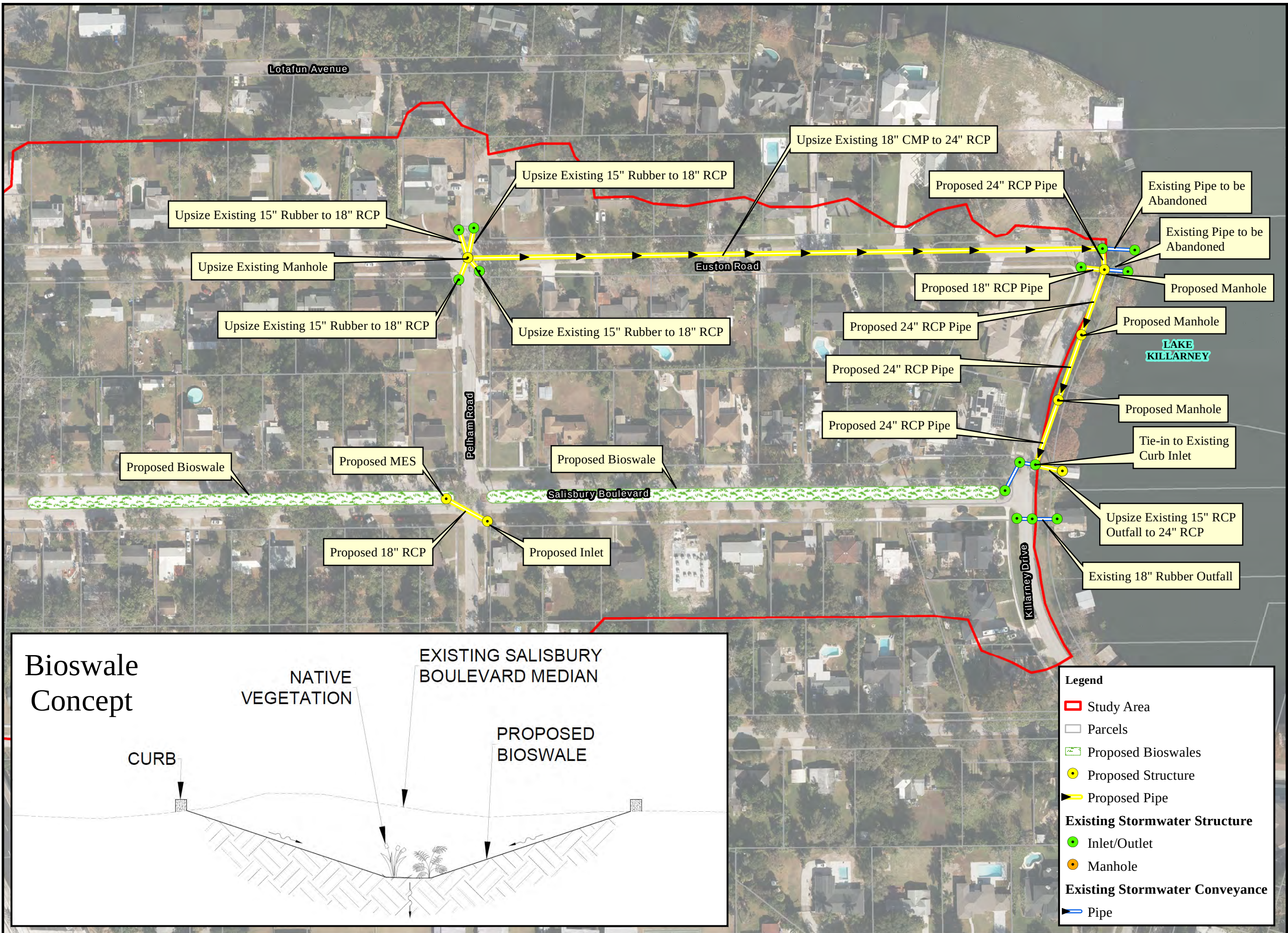


Sources:  
Aerial: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020  
Drainage: ECHO Survey, 2022  
Parcels: Orange County, 2020

Figure  
4-3

## Improvement Alternative 2 Concept Map

Killarney Drive  
Drainage Improvements





### 4.2.3 Improvement Alternative 2 Model Results

Model results for Improvement Alternative 2, including the Node Max Conditions summary, are presented in **Table 4-4**. ICPR input reports for this alternative are included in **Appendix D**. As seen in **Table 4-4**, all nodes achieve a 10 year, 6 hour LOS under Improvement Alternative 2.

All of the node peak stages were below the corresponding warning stage during the 10 year, 6 hour design storm, indicating that this improvement concept may achieve a 10 year, 6 hour LOS. For example, the peak stage at Node KD0010 (the curb inlet on the northwest corner of the intersection of Pelham Road and Euston Road) decreased from 94.21 feet in the existing conditions to 91.95 feet in the proposed condition, a decrease in flooding of 2.26 feet during the 10 year, 6 hour design storm event.

#### 4.2.3.1 Peak Flow Rates into Lake Killarney

A summary of peak flow rates to the nodes representing Lake Killarney is provided in **Table 4-3** below.

**Table 4-3: Alternative 2 Summary of Peak Flow Rates into Lake Killarney**

| Summary of Peak Flow Rates (cfs) |                          |       |                     |       |                      |       |                      |       |                       |       |
|----------------------------------|--------------------------|-------|---------------------|-------|----------------------|-------|----------------------|-------|-----------------------|-------|
| Node                             | Design Storm             |       |                     |       |                      |       |                      |       |                       |       |
|                                  | Mean Annual /<br>24 Hour |       | 10 Year / 6<br>Hour |       | 10 Year / 24<br>Hour |       | 25 Year / 24<br>Hour |       | 100 Year / 24<br>Hour |       |
|                                  | Ex.                      | Prop. | Ex.                 | Prop. | Ex.                  | Prop. | Ex.                  | Prop. | Ex.                   | Prop. |
| Lake Killarney                   | 5.63                     | 4.08  | 16.36               | 13.57 | 14.94                | 12.83 | 17.78                | 17.24 | 25.94                 | 26.87 |

Overall, peak discharge rates to Lake Killarney showed a decrease, with a slight increase in the 100 year, 24 hour design storm.

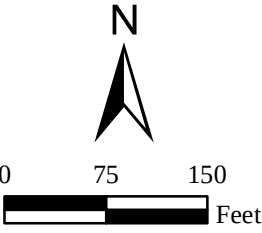
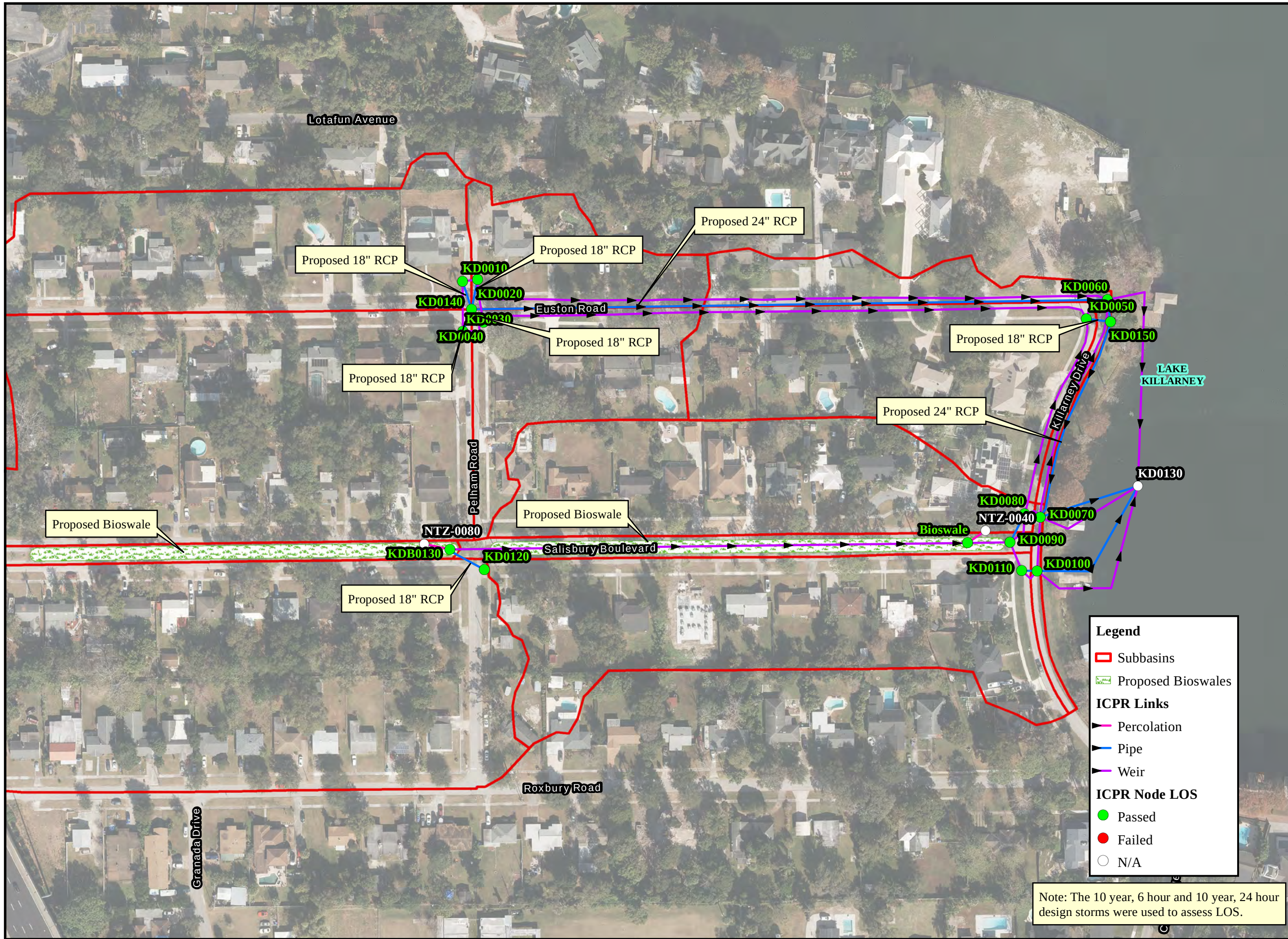


Table 4-4: Alternative 2 Node Maximum Conditions

| STAGE/AREA NODE |                  | INITIAL STAGE |                     | WARNING STAGE |                  | MEAN ANNUAL / 24 HOUR    |                          | 10 YEAR / 6 HOUR         |                          | 10 YEAR / 24 HOUR        |                          | 25 YEAR / 24 HOUR        |                          | 100 YEAR / 24 HOUR       |                          |
|-----------------|------------------|---------------|---------------------|---------------|------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| NAME            | DESCRIPTION      | ELEVATION     | DESCRIPTION         | ELEVATION     | DESCRIPTION      | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) |
| KD0010          | Drainage inlet   | 91.26         | Bottom of structure | 93.83         | Edge of pavement | 91.65                    | 91.63                    | 94.21                    | 91.95                    | 93.45                    | 91.90                    | 94.69                    | 92.00                    | 95.18                    | 92.20                    |
| KD0020          | Drainage inlet   | 91.04         | Bottom of structure | 93.81         | Edge of pavement | 91.25                    | 91.24                    | 94.21                    | 91.44                    | 93.42                    | 91.40                    | 94.69                    | 91.46                    | 95.17                    | 91.56                    |
| KD0030          | Drainage inlet   | 89.46         | Bottom of structure | 93.95         | Edge of pavement | 90.06                    | 90.02                    | 94.26                    | 90.56                    | 93.51                    | 90.44                    | 94.69                    | 90.66                    | 95.18                    | 91.20                    |
| KD0040          | Drainage inlet   | 90.89         | Bottom of structure | 93.86         | Edge of pavement | 91.13                    | 91.11                    | 94.20                    | 91.34                    | 93.42                    | 91.30                    | 94.69                    | 91.38                    | 95.18                    | 91.50                    |
| KD0050          | Drainage inlet   | 83.53         | Bottom of structure | 85.80         | Edge of pavement | 83.93                    | 85.80                    | 84.37                    | 86.07                    | 84.27                    | 86.06                    | 84.41                    | 86.13                    | 86.19                    | 86.22                    |
| KD0060          | Drainage inlet   | 82.34         | Bottom of structure | 85.39         | Edge of pavement | 83.23                    | 85.81                    | 84.74                    | 86.05                    | 84.38                    | 86.04                    | 85.09                    | 86.10                    | 86.00                    | 86.19                    |
| KD0070          | Drainage inlet   | 80.55         | Bottom of structure | 88.26         | Edge of pavement | 85.33                    | 85.75                    | 85.80                    | 85.97                    | 85.70                    | 86.01                    | 85.87                    | 86.09                    | 86.30                    | 86.21                    |
| KD0080          | Drainage inlet   | 85.43         | Bottom of structure | 88.27         | Edge of pavement | 85.89                    | 85.79                    | 86.36                    | 86.24                    | 86.26                    | 86.51                    | 86.42                    | 86.88                    | 86.72                    | 87.87                    |
| KD0090          | Drainage inlet   | 86.23         | Bottom of structure | 88.59         | Edge of pavement | 86.49                    | 86.23                    | 86.73                    | 86.79                    | 86.67                    | 86.99                    | 86.74                    | 87.28                    | 86.85                    | 88.28                    |
| KD0100          | Drainage inlet   | 85.27         | Bottom of structure | 88.55         | Edge of pavement | 86.00                    | 85.68                    | 86.68                    | 86.10                    | 86.59                    | 86.02                    | 86.84                    | 86.15                    | 87.44                    | 86.38                    |
| KD0110          | Drainage inlet   | 85.41         | Bottom of structure | 88.48         | Edge of pavement | 86.20                    | 85.84                    | 87.08                    | 86.31                    | 86.94                    | 86.21                    | 87.39                    | 86.36                    | 88.63                    | 86.65                    |
| KD0140          | Drainage manhole | 89.09         | Bottom of structure | 93.74         | Top of structure | 89.92                    | 89.80                    | 94.19                    | 90.47                    | 93.42                    | 90.34                    | 94.67                    | 90.56                    | 95.16                    | 91.00                    |

Note: **Bold red** peak stages represent nodes that exceed their warning stage. The 10 year / 6 hour design storm is the LOS reference storm for this project





Sources:  
 Aerial: Orange County, 2021  
 Lakes: Orange County, 2017  
 Roads: Orange County, 2020

Figure  
4-4

**Improvement  
Alternative 2  
Model Node-Link and  
LOS Results Map**  
 Killarney Drive  
 Drainage Improvements





#### 4.2.4 Implementation Considerations

- **Flooding Benefit** – This improvement concept reduces the extent and severity of roadway inundation in the project area. Decreased peak stages were noted at locations reported to experience frequent nuisance flooding. This improvement concept achieves a 10 year LOS based on modeling results.
- **Water Quality Benefit** – This improvement concept provides a water quality benefit by promoting infiltration of stormwater runoff at the proposed bioswales, which reduces the total pollutant load discharged to Lake Killarney.
- **Erosion and Sediment Control Benefit** – The reduction of runoff entering the residential properties has the potential to reduce erosion and sedimentation in the area.
- **Permitting** – A permit determination meeting was conducted with SJRWMD on October 14<sup>th</sup> to determine the permitting needs for the improvement concept. Based on feedback from the District, the project would likely not qualify for an exemption due to the proposed work in a surface water. Per the District, the project may qualify for a General Permit for a retrofit activity if proposed peak discharge rates are able to meet existing peak discharge rates to Lake Killarney. This was accomplished by incorporating the proposed bioswales into the improvement concept.
- **Engineering Design** – Engineering design may include collection of survey data, geotechnical testing, preparation of design plants, preparation of a cost estimate, preparation of technical specifications, and utility coordination.
- **Land Acquisition** – The improvements fall within the County right-of-way and therefore land acquisition was not considered necessary.
- **Constructability** – Constructability considerations associated with this improvement concept include potential utility conflicts.
- **Project Cost Estimate** – Alternative 2 improvements are anticipated to cost approximately \$1,181,564. This cost includes construction, a 20% contingency, and design. Detailed cost information can be found in **Appendix F**.

### 4.3 Improvement Alternative 3

Improvement Alternative 3 proposes most of the same features included in Improvement Alternative 1; however, the reportedly collapsed 12-inch pipe is proposed to be replaced with an 18-inch pipe. Additionally, rather than constructing a new outfall, the existing outfall at the east end of Euston Road is proposed to be upsized from an 18-inch pipe to a 24-inch pipe. The goal of this improvement concept is to achieve a 10 year, 6 hour LOS.

#### 4.3.1 Proposed Features

Similar to Improvement Alternative 1, this improvement concept consists of upsizing the existing drainage infrastructure and the manhole located at the intersection of Pelham Road and Euston Road from 15-inch rubber pipes to 18-inch concrete pipes, as well as upsizing the pipe along Euston Road that ultimately outfalls to Lake Killarney from 18-inch corrugated metal to 24-inch concrete pipe. Two bioswales are proposed along the median of Salisbury Boulevard to promote infiltration of stormwater runoff. Lastly, the 12-inch pipe that is reported to be collapsed, is proposed to be replaced with an 18-inch concrete pipe. A concept map of Improvement Alternative 3 is presented as **Figure 4-5**.

#### 4.3.2 Improvement Alternative 3 Stormwater Model

The existing condition model, discussed in **Section 3**, was used as a starting point for the stormwater model development for Improvement Alternative 3. Model modifications included modifying pipe links to reflect the proposed pipe dimensions and material shown in **Figure 4-5** as well as adding in the two bioswales along Salisbury Boulevard. A stage/area node was added to represent each bioswale. Percolation links were added to simulate the groundwater that the bioswales discharge to. Weir links were added to represent the bioswales overtopping and discharging into the downstream drainage infrastructure. The same methodology used in the existing conditions model for assigning node initial stages (e.g., structure bottom elevation) and warning stages (e.g., edge of pavement elevation) was also used for the proposed conditions model. The node-link model schematic for Improvement Alternative 3 is presented in **Figure 4-6**. Improvement Alternative 3 model files are included in **Appendix E**.

##### 4.3.2.1 Boundary Conditions

This improvement alternative does not modify the tailwater boundary conditions considered for the system.

##### 4.3.2.2 Curb Inlets and Gutters

This improvement alternative includes the addition of a proposed curb inlet at the southeast corner of the Pelham Road and Salisbury Boulevard intersection.

##### 4.3.2.3 Underground Conveyance

The proposed underground conveyance system consists of four 18-inch concrete pipes located at the intersection of Pelham Road and Euston Road that drain to a 24-inch concrete pipe along Euston Road that connects to the existing curb inlet at the east end of Euston Road and ultimately outfalls to Lake Killarney via a proposed 24-inch concrete pipe. An 18-inch pipe located at the southeast corner of the Pelham Road and Salisbury Boulevard intersection to convey the stormwater to the proposed bioswales. The existing 12-inch pipe that outfalls to Lake Killarney is proposed to be replaced with an 18-inch concrete pipe.

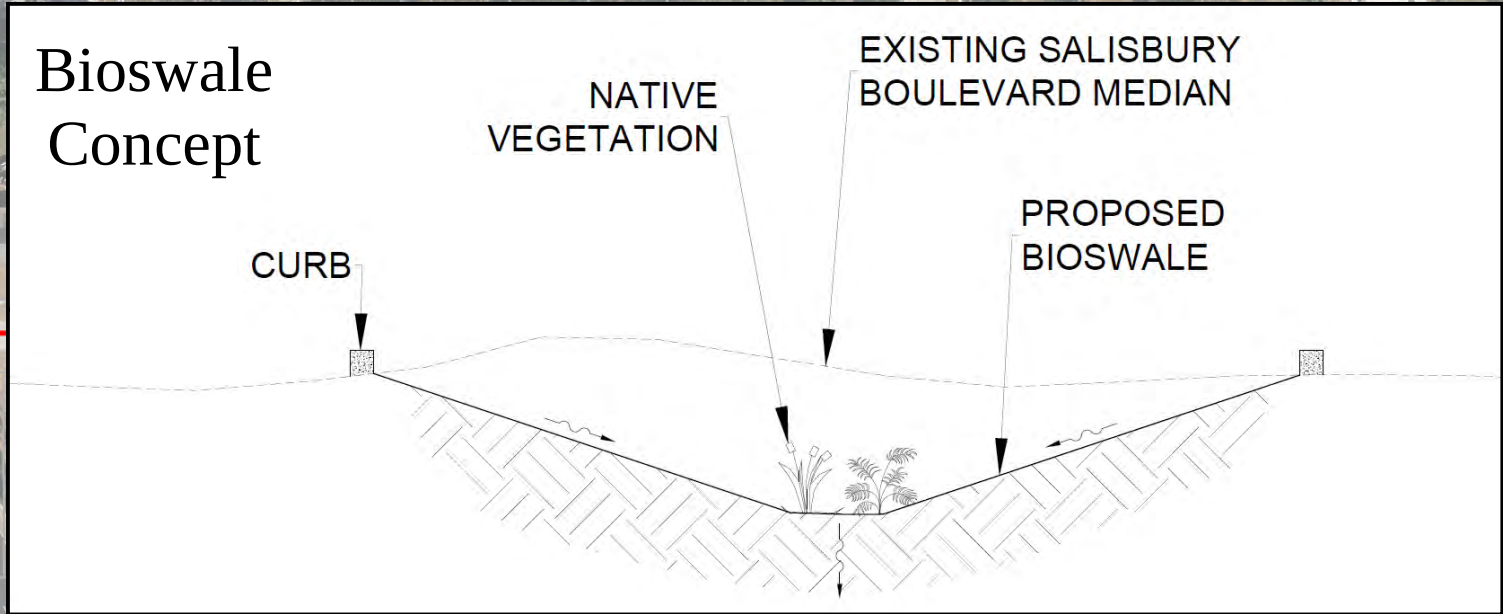
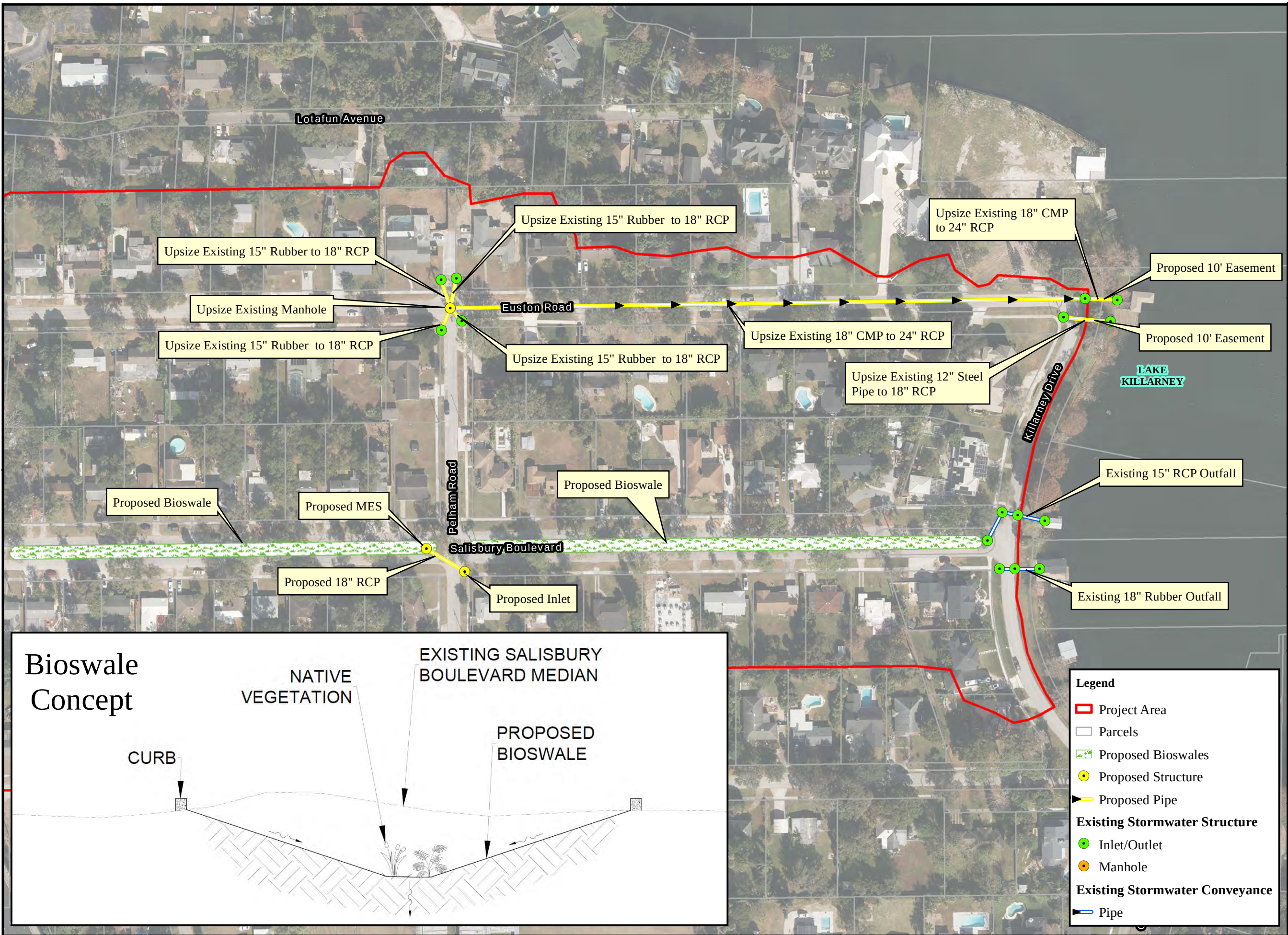


Sources:  
Aerial: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020  
Drainage: ECHO Survey, 2022  
Parcels: Orange County, 2020

Figure 4-5

### Improvement Alternative 3 Concept Map

Killarney Drive Drainage Improvements





### 4.3.3 Improvement Alternative 3 Model Results

Model results for Improvement Alternative 3, including the Node Max Conditions summary, are presented in **Table 4-6**. ICPR input reports for this alternative are included in **Appendix E**. As seen in **Table 4-6**, all nodes achieve a 10 year, 6 hour LOS under Improvement Alternative 3.

All of the node peak stages were below the corresponding warning stage during the 10 year, 6 hour design storm, indicating that this improvement concept may achieve a 10 year, 6 hour LOS. For example, the peak stage at Node KD0010 (the curb inlet on the northwest corner of the intersection of Pelham Road and Euston Road) decreased from 94.21 feet in the existing conditions to 91.95 feet in the proposed condition, a decrease in flooding of 2.26 feet during the 10 year, 6 hour design storm event.

#### 4.3.3.1 Peak Flow Rates to Lake Killarney

A summary of peak flow rates to the nodes representing Lake Killarney is provided in **Table 4-1** below.

**Table 4-5: Alternative 3 Summary of Peak Flow Rates into Lake Killarney**

| Summary of Peak Flow Rates (cfs) |                          |       |                     |       |                      |       |                      |       |                       |       |
|----------------------------------|--------------------------|-------|---------------------|-------|----------------------|-------|----------------------|-------|-----------------------|-------|
| Node                             | Design Storm             |       |                     |       |                      |       |                      |       |                       |       |
|                                  | Mean Annual /<br>24 Hour |       | 10 Year / 6<br>Hour |       | 10 Year / 24<br>Hour |       | 25 Year / 24<br>Hour |       | 100 Year / 24<br>Hour |       |
|                                  | Ex.                      | Prop. | Ex.                 | Prop. | Ex.                  | Prop. | Ex.                  | Prop. | Ex.                   | Prop. |
| Lake Killarney                   | 5.63                     | 4.07  | 16.36               | 13.42 | 14.94                | 12.84 | 17.78                | 17.24 | 25.94                 | 26.82 |

Overall, peak discharge rates to Lake Killarney showed a decrease, with a slight increase in the 100 year, 24 hour design storm.

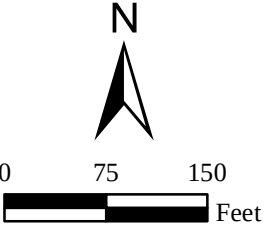
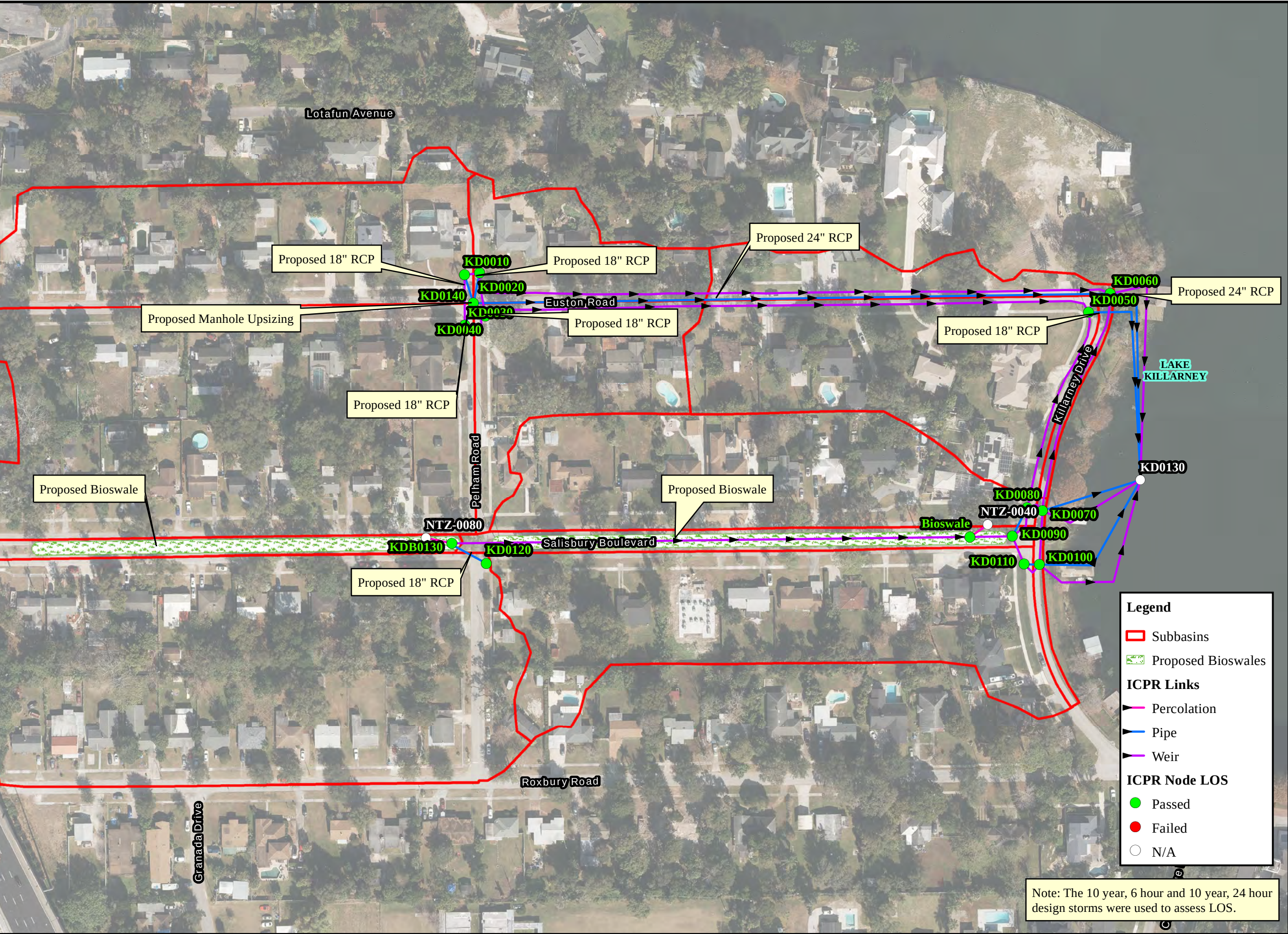


Table 4-6: Alternative 3 Node Maximum Conditions

| STAGE/AREA NODE |                  | INITIAL STAGE |                     | WARNING STAGE |                  | MEAN ANNUAL / 24 HOUR    |                          | 10 YEAR / 6 HOUR         |                          | 10 YEAR / 24 HOUR        |                          | 25 YEAR / 24 HOUR        |                          | 100 YEAR / 24 HOUR       |                          |
|-----------------|------------------|---------------|---------------------|---------------|------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| NAME            | DESCRIPTION      | ELEVATION     | DESCRIPTION         | ELEVATION     | DESCRIPTION      | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) | EXISTING PEAK STAGE (FT) | PROPOSED PEAK STAGE (FT) |
| KD0010          | Drainage inlet   | 91.26         | Bottom of structure | 93.83         | Edge of pavement | 91.65                    | 91.63                    | 94.21                    | 91.95                    | 93.45                    | 91.90                    | 94.69                    | 92.00                    | 95.18                    | 92.20                    |
| KD0020          | Drainage inlet   | 91.04         | Bottom of structure | 93.81         | Edge of pavement | 91.25                    | 91.24                    | 94.21                    | 91.44                    | 93.42                    | 91.40                    | 94.69                    | 91.46                    | 95.17                    | 91.56                    |
| KD0030          | Drainage inlet   | 89.46         | Bottom of structure | 93.95         | Edge of pavement | 90.06                    | 90.02                    | 94.26                    | 90.56                    | 93.51                    | 90.44                    | 94.69                    | 90.66                    | 95.18                    | 91.20                    |
| KD0040          | Drainage inlet   | 90.89         | Bottom of structure | 93.86         | Edge of pavement | 91.13                    | 91.11                    | 94.20                    | 91.34                    | 93.42                    | 91.30                    | 94.69                    | 91.38                    | 95.18                    | 91.50                    |
| KD0050          | Drainage inlet   | 83.53         | Bottom of structure | 85.80         | Edge of pavement | 83.93                    | 83.88                    | 84.37                    | 84.20                    | 84.27                    | 84.14                    | 84.41                    | 84.25                    | 86.19                    | 85.31                    |
| KD0060          | Drainage inlet   | 82.34         | Bottom of structure | 85.39         | Edge of pavement | 83.23                    | 83.07                    | 84.74                    | 83.81                    | 84.38                    | 83.63                    | 85.09                    | 84.18                    | 86.00                    | 85.81                    |
| KD0070          | Drainage inlet   | 80.55         | Bottom of structure | 88.26         | Edge of pavement | 85.33                    | 85.23                    | 85.80                    | 85.68                    | 85.70                    | 85.99                    | 85.87                    | 86.50                    | 86.30                    | 87.52                    |
| KD0080          | Drainage inlet   | 85.43         | Bottom of structure | 88.27         | Edge of pavement | 85.89                    | 85.79                    | 86.36                    | 86.24                    | 86.26                    | 86.51                    | 86.42                    | 86.88                    | 86.72                    | 88.14                    |
| KD0090          | Drainage inlet   | 86.23         | Bottom of structure | 88.59         | Edge of pavement | 86.49                    | 86.23                    | 86.73                    | 86.79                    | 86.67                    | 86.99                    | 86.74                    | 87.28                    | 86.85                    | 88.56                    |
| KD0100          | Drainage inlet   | 85.27         | Bottom of structure | 88.55         | Edge of pavement | 86.00                    | 85.68                    | 86.68                    | 86.10                    | 86.59                    | 86.02                    | 86.84                    | 86.15                    | 87.44                    | 86.38                    |
| KD0110          | Drainage inlet   | 85.41         | Bottom of structure | 88.48         | Edge of pavement | 86.20                    | 85.84                    | 87.08                    | 86.31                    | 86.94                    | 86.21                    | 87.39                    | 86.36                    | 88.63                    | 86.65                    |
| KD0140          | Drainage manhole | 89.09         | Bottom of structure | 93.74         | Top of structure | 89.92                    | 89.80                    | 94.19                    | 90.47                    | 93.42                    | 90.34                    | 94.67                    | 90.56                    | 95.16                    | 91.00                    |

Note: **Bold red** peak stages represent nodes that exceed their warning stage. The 10 year / 6 hour design storm is the LOS reference storm for this project.





Sources:  
Aerial: Orange County, 2021  
Lakes: Orange County, 2017  
Roads: Orange County, 2020

Figure 4-6

**Improvement  
Alternative 3  
Model Node-Link and  
LOS Results Map**

Killarney Drive  
Drainage Improvements



Note: The 10 year, 6 hour and 10 year, 24 hour design storms were used to assess LOS.



#### 4.3.4 Implementation Considerations

- **Flooding Benefit** – This improvement concept reduces the extent and severity of roadway inundation in the project area. Decreased peak stages were noted at locations reported to experience frequent nuisance flooding. This improvement concept achieves a 10 year LOS based on modeling results.
- **Water Quality Benefit** – This improvement concept provides a water quality benefit by promoting infiltration of stormwater runoff at the proposed bioswales, which reduces the total pollutant load discharged to Lake Killarney.
- **Erosion and Sediment Control Benefit** – The reduction of runoff entering the residential properties has the potential to reduce erosion and sedimentation in the area.
- **Permitting** – A permit determination meeting was conducted with SJRWMD on October 14<sup>th</sup> to determine the permitting needs for the improvement concept. Based on feedback from the District, the project would likely not qualify for an exemption due to the proposed work in a surface water. Per the District, the project may qualify for a General Permit for a retrofit activity if proposed peak discharge rates are able to meet existing peak discharge rates to Lake Killarney. This was accomplished by incorporating the proposed bioswales into the improvement concept.
- **Engineering Design** – Engineering design may include collection of survey data, geotechnical testing, preparation of design plants, preparation of a cost estimate, preparation of technical specifications, and utility coordination.
- **Land Acquisition** – A 10-foot wide easement was assumed to be necessary to construct the two new outfall pipes on Parcel 02-22-29-2996-06-140.
- **Constructability** – Constructability considerations associated with this improvement concept include potential utility conflicts and proximity of the two proposed outfall pipes to an existing dock.
- **Project Cost Estimate** – Alternative 3 improvements are anticipated to cost approximately \$1,009,341. This cost includes construction, a 20% contingency, and design. Detailed cost information can be found in **Appendix F**.

## 4.4 Improvement Alternatives Summary

Improvement alternative concepts were developed to address LOS deficiencies in the project area. The three improvement alternatives presented in this section are summarized below.

- **Improvement Alternative 1** – Improvement Alternative 1 includes upsizing the existing underground drainage infrastructure to increase the capacity, as well as abandoning the reported collapsed pipe and replacing it with a new outfall to Lake Killarney. This improvement also includes the addition of two bioswales along Salisbury Boulevard. This improvement concept achieved a 10 year, 6 hour LOS based on modeling results. Alternative 1 may require additional treatment and attenuation measures. The preliminary estimate of probable cost for Alternative 1 is \$1,001,530.
- **Improvement Alternative 2** – Improvement Alternative 2 includes upsizing the pipes at the intersection of Pelham Road and Euston Road; however, rather than discharging to Lake Killarney at the east end of Euston Road, the runoff is redirected south to an existing outfall at the intersection of Salisbury Boulevard and Killarney Drive. This improvement also includes the addition of two bioswales along Salisbury Boulevard. This improvement concept achieved a 10 year, 6 hour LOS based on modeling results. Alternative 2 may require additional treatment and attenuation measures. The preliminary estimate of probable cost for Alternative 2 is \$1,181,564.
- **Improvement Alternative 3** – Improvement Alternative 3 includes upsizing the pipes at the intersection of Pelham Road and Euston Road; however, rather than proposing a new outfall location, both of the existing outfalls at the east end of Euston Road are proposed to be upgraded, including the 12-inch pipe that is reported to be collapsed. This improvement also includes the addition of two bioswales along Salisbury Boulevard. This improvement concept achieved a 10 year, 6 hour LOS based on modeling results. The preliminary estimate of probable cost for Alternative 3 is \$1,009,341.

For comparison purposes, an Improvement Alternative Decision Matrix was prepared to rank the improvement alternatives. This decision matrix is presented in **Table 4-7**. A summary of the different evaluation criteria used in the decision matrix is presented as **Table 4-8**. As seen in **Table 4-7**, Improvement Alternative 1 is ranked the highest based on the listed decision criteria, followed by Improvement Alternative 2.



**Table 4-7: Improvement Alternative Decision Matrix**

| Improvement Alternative Decision Matrix |                                                                                                                                                    |                                                                                                                                                                           |                                                                                                                                                                             |
|-----------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Description                             | 1                                                                                                                                                  | 2                                                                                                                                                                         | 3                                                                                                                                                                           |
|                                         | Includes upsizing existing drainage infrastructure, a new outfall to Lake Killarney, abandoning the collapsed pipe, and addition of two bioswales. | Includes upsizing existing drainage infrastructure, abandoning the existing outfalls and conveying runoff south to an upsized outfall, and the addition of two bioswales. | Includes upsizing existing drainage infrastructure, upsizing the two existing outfalls to Lake Killarney at the east end of Euston Road, and the addition of two bioswales. |
| Estimated Construction Cost             | \$1,001,530                                                                                                                                        | \$1,181,564                                                                                                                                                               | \$1,009,341                                                                                                                                                                 |
| Construction Cost Score                 | 5                                                                                                                                                  | 2                                                                                                                                                                         | 4                                                                                                                                                                           |
| Constructability Score                  | 3                                                                                                                                                  | 2                                                                                                                                                                         | 3                                                                                                                                                                           |
| Maintenance Score                       | 5                                                                                                                                                  | 5                                                                                                                                                                         | 5                                                                                                                                                                           |
| Longevity Score                         | 5                                                                                                                                                  | 5                                                                                                                                                                         | 5                                                                                                                                                                           |
| Permitting Feasibility Score            | 4                                                                                                                                                  | 4                                                                                                                                                                         | 4                                                                                                                                                                           |
| Design Effectiveness Score              | 5                                                                                                                                                  | 5                                                                                                                                                                         | 5                                                                                                                                                                           |
| Total Score                             | 27                                                                                                                                                 | 23                                                                                                                                                                        | 26                                                                                                                                                                          |
| <b>Rank</b>                             | <b>1</b>                                                                                                                                           | <b>3</b>                                                                                                                                                                  | <b>2</b>                                                                                                                                                                    |

**Table 4-8: Decision Matrix Evaluation Criteria**

| Evaluation Criteria    |                                                               |                            |                             |
|------------------------|---------------------------------------------------------------|----------------------------|-----------------------------|
| Criteria               | Description                                                   | Score = 1                  | Score = 5                   |
| Construction Cost      | Estimated total cost to implement the improvement alternative | Most expensive             | Least expensive             |
| Constructability       | Anticipated complexity of construction efforts                | Most difficult             | Least difficult             |
| Maintenance            | Anticipated maintenance intensity over the lifespan           | Most maintenance intensive | Least Maintenance intensive |
| Longevity              | Lifespan of the improvement alternative                       | Shortest lifespan          | Longest lifespan            |
| Permitting Feasibility | Anticipated difficulty to obtain necessary permitting         | Most difficult             | Least difficult             |
| Design Effectiveness   | How effective is the improvement at addressing deficiencies   | Least effective            | Most effective              |

## 5. CONCLUSIONS AND RECOMMENDATIONS

### 5.1 Conclusion

Geosyntec was tasked by Orange County Public Works Roads and Drainage Division to perform detailed existing conditions analysis to evaluate the existing drainage infrastructure and to validate reported drainage deficiencies around Killarney Drive. Additionally, the existing conditions model was leveraged to conceptualize cost effective and feasible engineering alternatives to mitigate flooding in the project area. The engineering alternatives were focused on reducing the LOS deficiencies during the 10 year, 6 hour design storm event as well as addressing the complaints from local residents.

An existing conditions analysis was performed by Geosyntec to assess the current performance of the roadway collection and conveyance system. Based on modeling results, drainage infrastructure located at the intersection of Pelham Road and Euston Road are insufficiently sized to effectively convey stormwater runoff from the road. It is important to note that in the existing conditions model, the reported collapsed pipe at the end of Euston Road was assumed to have the conveyance capacity of a fully functioning pipe. If the pipe is collapsed, there may be additional flooding that the model would not depict. As discussed in **Section 3.3**, a model simulation was performed to assess the impact of reduced conveyance capacity for the reported collapsed pipe on LOS results. Based on the results of this simulation, there would be LOS deficiencies at Node KD0050 during both the 10 year, 6 hour and 24 hour design storm events. A flood depth of approximately 0.37 feet was observed at Node KD0050 during the 10 year design storm events during the collapsed pipe model simulation.

Three (3) improvement alternatives were developed to quantitatively address LOS deficiencies documented in the project area. The three (3) improvement alternatives are summarized below:

- **Improvement Alternative 1** – Improvement Alternative 1 includes upsizing the existing drainage infrastructure at the intersection of Pelham Road and Euston Drive and the addition of two bioswales along the median of Salisbury Boulevard. A new outfall pipe is proposed at the east end of Euston Road that would discharge to Lake Killarney. The two existing outfalls at the east end of Euston Road are proposed to be abandoned. This improvement concept achieved a 10 year, 6 hour LOS. The preliminary estimate of probable cost for Alternative 1 is \$1,001,530.
- **Improvement Alternative 2** – Improvement Alternative 2 includes the same pipe upgrades at the intersection of Pelham Road and Euston Road as Improvement Alternative 1, as well as the addition of the bioswales along Salisbury Boulevard. At the east end of Euston Road, 24-inch concrete pipes are proposed to convey the runoff south along Killarney Drive to an existing outfall at the intersection of Salisbury Boulevard and Killarney Drive. The two existing outfalls at the east end of Euston Road are proposed to be abandoned. The existing 12-inch pipe that is reported to be collapsed is proposed to be replaced with an 18-inch pipe that connects to the 24-inch pipe that conveys stormwater south along Killarney Drive. This improvement concept achieved a 10 year, 6 hour LOS. The preliminary estimate of probable cost for Alternative 2 is \$1,181,564.



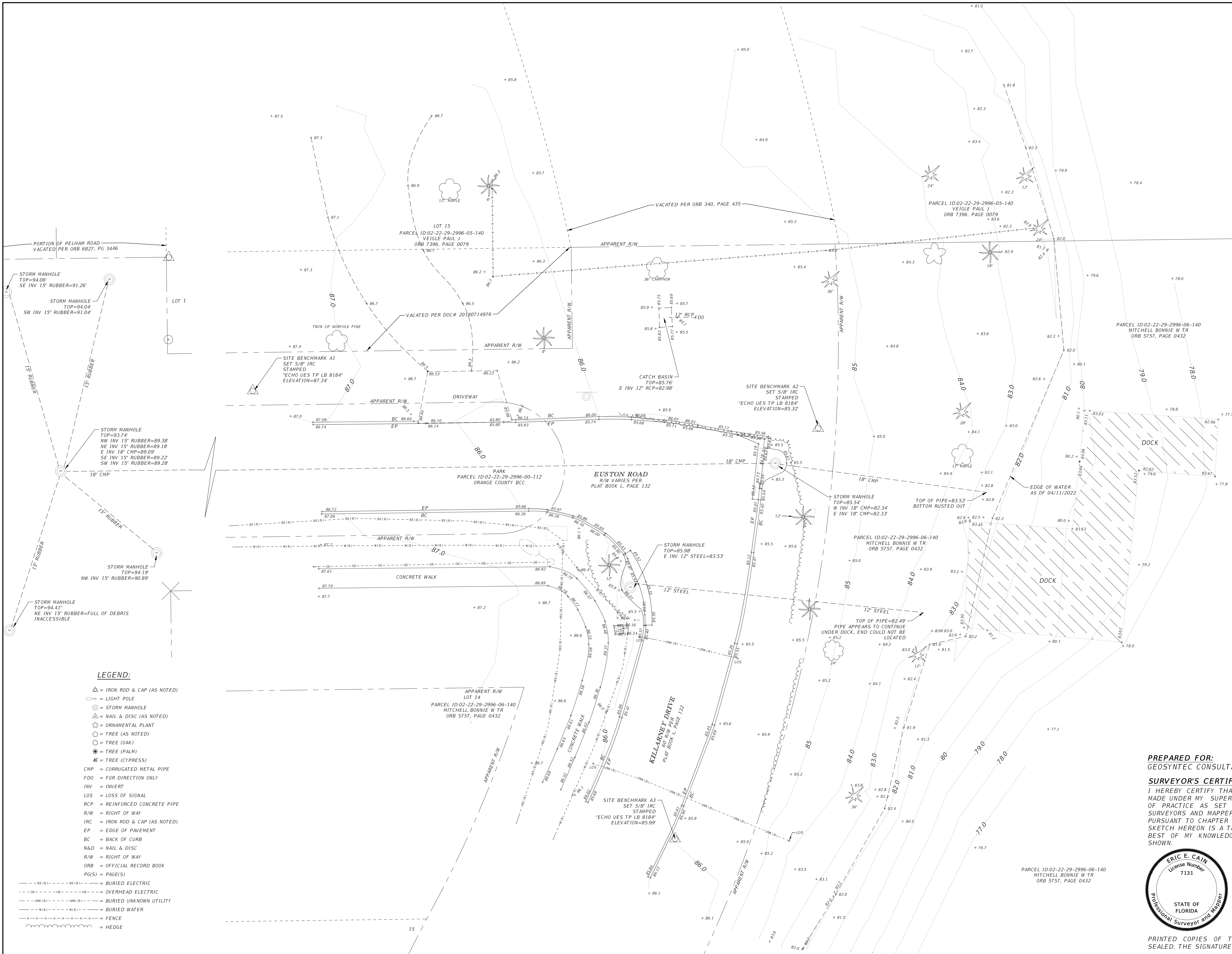
- **Improvement Alternative 3** – Improvement Alternative 3 includes the same pipe upgrades at the intersection of Pelham Road and Euston Road as Improvement Alternative 1, as well as upsizing the pipe along Euston Road that ultimately outfalls to Lake Killarney from 18-inch corrugated metal to 24-inch concrete pipe and the addition of two bioswales along Salisbury Boulevard. The 12-inch pipe that is reported to be collapsed, is proposed to be replaced with an 18-inch concrete pipe. This improvement concept achieved a 10 year, 6 hour LOS. The preliminary estimate of probable cost for Alternative 3 is \$1,009,341.

All three improvement concepts are viable alternatives for achieving a 10 year, 6 hour LOS in the study area and resulted in relatively similar flood reduction benefits. Improvement Alternative 1 and Improvement Alternative 3 had similar estimated costs, while Improvement Alternative 2 was more expensive due to the additional drainage infrastructure necessary to convey stormwater south to the intersection of Killarney Drive and Salisbury Boulevard. **Improvement Alternative 1 required slightly less easement acquisition compared to Improvement Alternative 3, while Improvement Alternative 2 did not require easement acquisition. Based on the foregoing information, Geosyntec recommends that the County consider Improvement Alternative 1 for the flood reduction benefit.** Should easement acquisition from the property owner not be feasible to construct Improvement Alternative 1, Improvement Alternative 2 can be substituted to achieve the project goals.

# **APPENDIX A**

## **ECHO UES Topographic Survey**





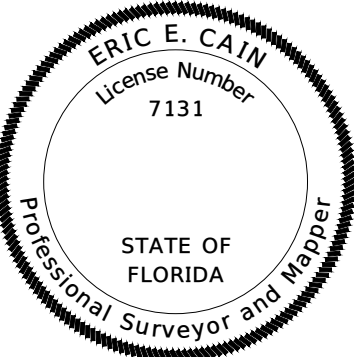
**SURVEYOR'S REPORT:**

1. THIS SURVEY DOES NOT DETERMINE OWNERSHIP OF THE LANDS SHOWN HEREON.
2. MEASUREMENT METHODS USED FOR THIS SURVEY MEET STANDARDS OF PRACTICE FOR LAND SURVEYING CHAPTER 5J-17 REQUIREMENTS. DIMENSIONS ARE SHOWN IN UNITED STATES STANDARD SURVEY FEET AND DECIMALS THEREOF UNLESS OTHERWISE NOTED.
3. THIS SURVEY WAS PERFORMED WITHOUT BENEFIT OF AN ABSTRACT, TITLE SEARCH, TITLE OPINION OR TITLE COMMITMENT. A TITLE SEARCH MAY REVEAL ADDITIONAL INFORMATION AFFECTING THE PARCEL AS SHOWN.
4. EASEMENTS OR RIGHTS OF WAY THAT APPEAR ON RECORDED PLANS OR THAT HAVE BEEN FURNISHED TO THE SURVEYOR BY OTHERS HAVE BEEN INCORPORATED INTO THIS DRAWING WITH APPROPRIATE NOTATION. OTHER EASEMENTS MAY BE DISCOVERED BY A SEARCH OF THE PUBLIC RECORDS.
5. RIGHT OF WAY INFORMATION SHOWN HEREON WAS DETERMINED BY FOUND MONUMENTATION, RECORDED PLATS, AND INFORMATION OBTAINED ON THE ORANGE COUNTY PROPERTY APPRAISERS WEB SITE. NO RIGHT OF WAY DOCUMENTATION WAS PROVIDED BY CLIENT.
6. FEATURES SHOWN BY SYMBOL AS INDICATED IN THE LEGEND ARE NOT TO SCALE.
7. THE HORIZONTAL POSITIONS FOR ALL FEATURES SHOWN ON THE MAP ARE RELATIVE TO THE FLORIDA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM OF 1983/2011 ADJUSTMENT (NAD 83/11), ZONE 901, FLORIDA EAST. HORIZONTAL CONTROL WAS ESTABLISHED USING THE FLORIDA DEPARTMENT OF TRANSPORTATION'S (FDOT) FLORIDA PERMANENT REFERENCE NETWORK (FRPN), A REAL TIME KINEMATIC (RTK) GLOBAL POSITIONING SYSTEM (GPS).
8. VERTICAL INFORMATION SHOWN HEREON REFERS TO AN ORANGE COUNTY BENCHMARK DESIGNATED U-54, BEING A CHISELED SQUARE ON THE CENTERLINE OF THE CURB INLET ON THE EAST SIDE OF OLOLU DRIVE, 30 +/- NORTH OF FRANKLIN AVENUE, AT THE WEST SIDE OF LAKE KILLARNEY, ELEVATION BEING 91.112' AND AN ORANGE COUNTY BENCHMARK DESIGNATED L844009 BEING A SQUARE CUT IN THE SOUTH WEST CORNER OF A DROP INLET AT THE SOUTHEAST CORNER OF FRANKLIN AVENUE AND WYMORE ROAD, ELEVATION BEING 96.799'; BOTH BENCHES IN NORTH AMERICAN VERTICAL DATUM 88. ALL SET CONTROL WAS ELATED BY COMPLETING A CLOSED LOOP BENCH RUN FROM THE ABOVEVENTIONED PRIMARY VERTICAL CONTROL POINTS. SAID BENCH RUN CLOSURE IS ACCURATE TO A STANDARD OF 0.05 TIMES THE SQUARE ROOT OF THE BENCHRUN DISTANCE IN MILES.
9. IMPROVEMENTS & TOPOGRAPHIC FEATURES SHOWN HEREON ARE LIMITED TO AREAS PER SPECIFIC INSTRUCTIONS OF THE CLIENT.
10. SUBSURFACE UTILITIES DEPICTED HEREON ARE THE HORIZONTAL LOCATIONS OF PAINT MARKS AND FLAGS PLACED BY SUBSURFACE UTILITY ENGINEERING FIELD TECHNICIANS. THE MARKS WERE DETERMINED USING SURFACE GEOPHYSICAL EQUIPMENT INCLUDING BUT NOT LIMITED TO GROUND PENETRATING RADAR (GPR) AND/OR ELECTROMAGNETIC LOCATORS. UTILITY CHARACTERISTICS, METHODS OF INSTALLATION, SOIL CONDITIONS AND THE SURROUNDING ENVIRONMENT ALL MAY ADVERSELY IMPACT THE RESULTS OF ANY UTILITY INVESTIGATION. FOR THESE REASONS THE LOCATIONS OF THE SUBSURFACE UTILITIES SHOULD BE CONSIDERED APPROXIMATE UNLESS CLEARLY EXPOSED AND VISUALLY VERIFIED AT SPECIFIC LOCATIONS. NO GUARANTEE IS MADE THAT ALL UTILITIES WILL BE FOUND AND IDENTIFIED.
11. ALL SUBSURFACE UTILITY ENGINEERING WORK PERFORMED WAS DONE IN ACCORDANCE WITH THE AMERICAN SOCIETY OF CIVIL ENGINEERS' (ASCE) STANDARD GUIDELINE FOR THE COLLECTION AND DEPICTION OF EXISTING SUBSURFACE UTILITY DATA (ASCE/CI 38-02). QUALITY LEVELS SHOWN IN THE SURVEY ARE REFERENCED TO ASCE/CI 38-02.
12. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN REPRESENT ALL UTILITIES IN THE AREA, WHETHER IN SERVICE OR ABANDONED, OR THAT THE UNDERGROUND UTILITIES ARE IN THE EXACT LOCATION SHOWN, BUT DOES CERTIFY THAT THEY HAVE BEEN LOCATED AS ACCURATELY AS POSSIBLE FROM AVAILABLE INFORMATION.
13. THE SURVEY MAP AND REPORT OR THE COPIES THEREOF ARE NOT VALID WITHOUT THE SIGNATURE AND SEAL OF A FLORIDA LICENSED SURVEYOR AND MAPPER.
14. ADDITIONS OR DELETIONS TO SURVEY MAPS OR REPORTS BY OTHER THAN THE SIGNING PARTY OR PARTIES IS PROHIBITED WITHOUT WRITTEN CONSENT OF THE SIGNING PARTY OR PARTIES.
15. THE LAST DATE OF FIELD EFFORT WAS 04/11/2022.

**PREPARED FOR:**  
GEOSYNTEC CONSULTANTS, INC.

**SURVEYOR'S CERTIFICATION**

I HEREBY CERTIFY THAT A SURVEY OF THE PROPERTY SHOWN HEREON WAS MADE UNDER MY SUPERVISION AND THAT THE SURVEY MEETS THE STANDARDS OF PRACTICE AS SET FORTH BY THE FLORIDA BOARD OF PROFESSIONAL SURVEYORS AND MAPPERS IN CHAPTER 5J-17, FLORIDA ADMINISTRATIVE CODE, PURSUANT TO CHAPTER 472.027 OF THE FLORIDA STATUTES AND THAT THE SKETCH HEREON IS A TRUE AND ACCURATE REPRESENTATION THEREOF TO THE BEST OF MY KNOWLEDGE AND BELIEF, SUBJECT TO NOTES AND NOTATIONS SHOWN.



THIS DOCUMENT HAS BEEN DIGITALLY  
SIGNED AND SEALED BY:

ERIC E. CAIN  
FLORIDA PROFESSIONAL SURVEYOR &  
MAPPER LS 7131

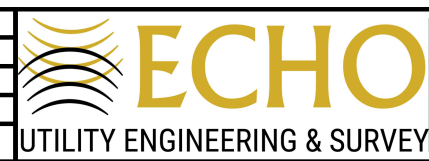
PRINTED COPIES OF THIS DOCUMENT ARE NOT CONSIDERED SIGNED AND SEALED. THE SIGNATURE MUST BE VERIFIED ON THE ELECTRONIC DOCUMENT.

**Topographical Survey**

**Lake Killarney Drainage Improvements**

Geosyntec Consultants, Inc.

|                                         |     |            |          |    |      |          |    |      |  |
|-----------------------------------------|-----|------------|----------|----|------|----------|----|------|--|
|                                         |     |            |          |    |      |          |    |      |  |
| ADDED SECOND SHEET AND CLIENT REVISIONS | JLG | 04/28/2022 |          |    |      |          |    |      |  |
| REVISION                                | BY  | DATE       | REVISION | BY | DATE | REVISION | BY | DATE |  |



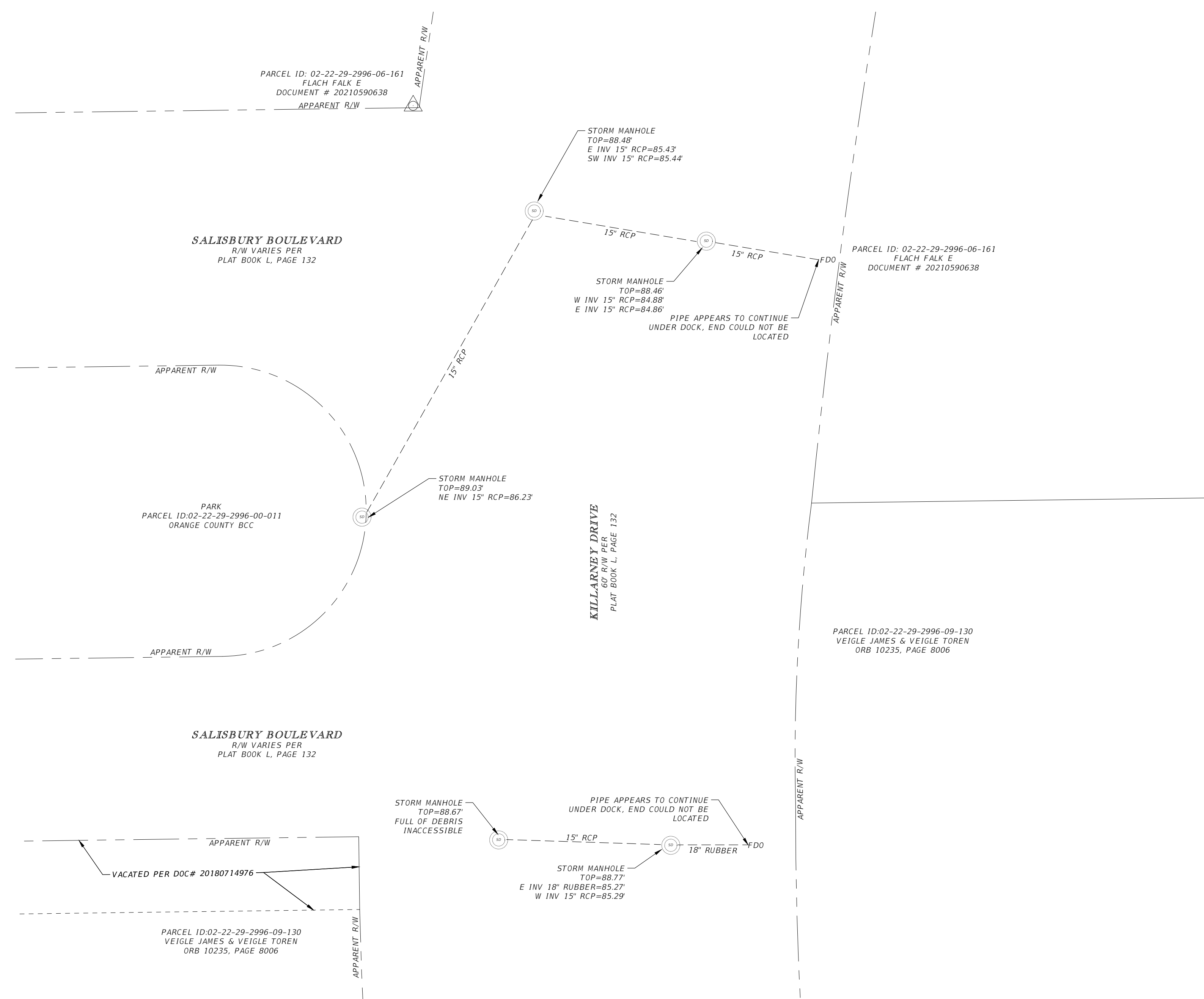
ECHO UES, INC.  
CERTIFICATION OF AUTHORIZATION 8184  
400 STATE ROAD 434, SUITE 1024  
OVIDEO, FLORIDA 32765  
888.778.ECHO | [www.echoues.com](http://www.echoues.com)

DATE: 04/20/2022  
PROJECT NUMBER: 22-070  
OFFICE: JLG  
CHECKED: EC

SCALE:  
1"=10'

SHEET 010F 02





|                             |                                             |                                         |     |            |          |    |      |                                                                                                                                      |                                                                                                                                                                                         |                        |                  |                |
|-----------------------------|---------------------------------------------|-----------------------------------------|-----|------------|----------|----|------|--------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------|------------------|----------------|
| <i>Topographical Survey</i> | <i>Lake Killarney Drainage Improvements</i> |                                         |     |            |          |    |      | <br><b>ECHO</b><br>UTILITY ENGINEERING & SURVEY | ECHO UES, INC.<br>CERTIFICATION OF AUTHORIZATION 8184<br>400 STATE ROAD 434, SUITE 1024<br>OVIEDO, FLORIDA 32765<br>888.778.ECHO   <a href="http://www.echoues.com">www.echoues.com</a> | DATE: 04/20/2022       | SCALE:<br>1"=10' | SHEET 02 OF 02 |
|                             |                                             |                                         |     |            |          |    |      |                                                                                                                                      |                                                                                                                                                                                         | PROJECT NUMBER: 22-070 |                  |                |
|                             |                                             |                                         |     |            |          |    |      |                                                                                                                                      |                                                                                                                                                                                         | OFFICE: JLG            |                  |                |
|                             |                                             | ADDED SECOND SHEET AND CLIENT REVISIONS | JLG | 04/28/2022 |          |    |      |                                                                                                                                      |                                                                                                                                                                                         | CHECKED: EC            |                  |                |
|                             |                                             | REVISION                                | BY  | DATE       | REVISION | BY | DATE |                                                                                                                                      |                                                                                                                                                                                         |                        |                  |                |
|                             |                                             |                                         |     |            |          |    |      |                                                                                                                                      |                                                                                                                                                                                         |                        |                  |                |



## **APPENDIX B**

### **Existing Conditions ICPR Input and Results**

**Manual Basin: KDB0010**

Scenario: Scenario1  
Node: KD0010  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 25.6000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 3.3147 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.3293    | 1400            | A         |               |                       |                      |
| 2.9854    | 1200            | A         |               |                       |                      |

Comment:

**Manual Basin: KDB0020**

Scenario: Scenario1  
Node: KD0020  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 13.3000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 1.0956 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 1.0956    | 1200            | A         |               |                       |                      |

Comment:

**Manual Basin: KDB0030**

Scenario: Scenario1  
Node: KD0030  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 23.3000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 6.2464 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient | Reference ET |
|-----------|-----------------|-----------|---------------|------------------|--------------|
|-----------|-----------------|-----------|---------------|------------------|--------------|



| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.2357    | 1400            | A/D       |               |                       |                      |
| 0.0114    | 1200            | A/D       |               |                       |                      |
| 5.6956    | 1200            | A         |               |                       |                      |
| 0.3037    | 1400            | A         |               |                       |                      |

Comment:

Manual Basin: KDB0040

Scenario: Scenario1  
Node: KD0040  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 17.6000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 1.5426 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 1.5426    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin: KDB0050

Scenario: Scenario1  
Node: KD0050  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 18.7000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 2.8650 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 2.8650    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin: KDB0060

Scenario: Scenario1  
 Node: KD0060  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 17.2000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.9439 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.9439    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin: KDB0070

Scenario: Scenario1  
 Node: KD0070  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.0201 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0201    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin: KDB0080

Scenario: Scenario1  
 Node: KD0080  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 19.1000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 2.9007 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 2.9007    | 1200            | A         |               |                       |                      |



Comment:

Manual Basin: KDB0090

Scenario: Scenario1  
Node: KD0090  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 17.4000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 1.2095 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0793    | 1400            | A/D       |               |                       |                      |
| 0.0252    | 1200            | A/D       |               |                       |                      |
| 1.1050    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin: KDB0100

Scenario: Scenario1  
Node: KD0100  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 10.0000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 0.0978 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0978    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin: KDB0110

Scenario: Scenario1  
Node: KD0110  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number

Time of Concentration: 32.8000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 10.4384 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 9.8652    | 1200            | A         |               |                       |                      |
| 0.0164    | 7400            | A         |               |                       |                      |
| 0.3071    | 1200            | A/D       |               |                       |                      |
| 0.2496    | 1400            | A/D       |               |                       |                      |

Comment:

Node: KD0010

Scenario: Scenario1  
 Type: Stage/Area  
 Base Flow: 0.00 cfs  
 Initial Stage: 91.26 ft  
 Warning Stage: 93.83 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.74      | 0.0001    | 6          |
| 94.00      | 0.0123    | 537        |
| 94.50      | 0.0377    | 1644       |
| 95.00      | 0.0940    | 4094       |
| 95.50      | 0.2666    | 11612      |
| 96.00      | 0.3725    | 16225      |
| 96.50      | 0.4731    | 20606      |
| 97.00      | 0.6497    | 28300      |
| 97.50      | 0.8768    | 38194      |
| 98.00      | 1.1886    | 51775      |
| 98.50      | 1.5262    | 66481      |
| 99.00      | 1.8675    | 81350      |
| 99.50      | 2.3948    | 104319     |
| 100.00     | 3.1627    | 137769     |
| 100.50     | 3.2942    | 143494     |
| 101.00     | 3.2980    | 143659     |
| 101.50     | 3.3017    | 143823     |
| 102.00     | 3.3017    | 143823     |
| 91.26      | 0.0001    | 4          |

Comment:

Node: KD0020

Scenario: Scenario1



Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 91.04 ft  
Warning Stage: 93.81 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.69      | 0.0001    | 6          |
| 94.00      | 0.0165    | 719        |
| 94.50      | 0.0902    | 3931       |
| 95.00      | 0.2587    | 11269      |
| 95.50      | 0.4545    | 19800      |
| 96.00      | 0.6323    | 27544      |
| 96.50      | 0.8147    | 35488      |
| 97.00      | 0.9005    | 39225      |
| 97.50      | 0.9930    | 43256      |
| 98.00      | 1.0240    | 44606      |
| 98.50      | 1.0596    | 46156      |
| 99.00      | 1.0892    | 47444      |
| 99.50      | 1.0899    | 47477      |
| 100.00     | 1.0899    | 47477      |
| 91.04      | 0.0001    | 4          |

Comment:

Node: KD0030

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 89.46 ft  
Warning Stage: 93.95 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.90      | 0.0004    | 19         |
| 94.00      | 0.0026    | 113        |
| 94.50      | 0.0337    | 1469       |
| 95.00      | 0.0743    | 3238       |
| 95.50      | 0.1195    | 5206       |
| 96.00      | 0.1717    | 7481       |
| 96.50      | 0.2352    | 10244      |
| 97.00      | 0.3287    | 14319      |
| 97.50      | 0.4821    | 21000      |
| 98.00      | 0.7853    | 34206      |
| 98.50      | 1.2544    | 54644      |
| 99.00      | 1.8396    | 80131      |
| 99.50      | 2.5953    | 113050     |
| 100.00     | 3.6783    | 160225     |
| 100.50     | 5.1390    | 223856     |
| 101.00     | 5.9345    | 258506     |
| 101.50     | 6.2012    | 270125     |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 102.00     | 6.2334    | 271525     |
| 102.50     | 6.2389    | 271768     |
| 103.00     | 6.2389    | 271768     |
| 89.46      | 0.0001    | 4          |

Comment:

Node: KD0040

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 90.89 ft  
Warning Stage: 93.86 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.78      | 0.0003    | 13         |
| 94.00      | 0.0069    | 300        |
| 94.50      | 0.2124    | 9250       |
| 95.00      | 0.5624    | 24500      |
| 95.50      | 0.8441    | 36769      |
| 96.00      | 1.0701    | 46613      |
| 96.50      | 1.2400    | 54012      |
| 97.00      | 1.4136    | 61575      |
| 97.50      | 1.4708    | 64069      |
| 98.00      | 1.5177    | 66112      |
| 98.50      | 1.5431    | 67218      |
| 99.00      | 1.5431    | 67218      |
| 90.89      | 0.0001    | 4          |

Comment:

Node: KD0050

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 83.53 ft  
Warning Stage: 85.80 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 85.80      | 0.0003    | 13         |
| 86.00      | 0.0057    | 250        |
| 86.50      | 0.0412    | 1794       |
| 87.00      | 0.0857    | 3731       |
| 87.50      | 0.1570    | 6837       |
| 88.00      | 0.2323    | 10119      |
| 88.50      | 0.3046    | 13269      |



| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 89.00      | 0.3840    | 16725      |
| 89.50      | 0.4518    | 19681      |
| 90.00      | 0.5187    | 22594      |
| 90.50      | 0.6155    | 26812      |
| 91.00      | 0.7145    | 31125      |
| 91.50      | 0.9039    | 39375      |
| 92.00      | 1.0744    | 46800      |
| 92.50      | 1.2377    | 53913      |
| 93.00      | 1.3982    | 60906      |
| 93.50      | 1.5565    | 67800      |
| 94.00      | 1.6832    | 73319      |
| 94.50      | 1.8242    | 79463      |
| 95.00      | 2.0265    | 88275      |
| 95.50      | 2.4935    | 108619     |
| 96.00      | 2.7769    | 120963     |
| 96.50      | 2.8370    | 123581     |
| 97.00      | 2.8568    | 124444     |
| 97.50      | 2.8658    | 124833     |
| 98.00      | 2.8658    | 124833     |
| 83.53      | 0.0001    | 4          |

Comment:

Node: KD0060

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 82.33 ft  
Warning Stage: 85.39 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 85.38      | 0.0001    | 6          |
| 85.50      | 0.0012    | 51         |
| 86.00      | 0.0209    | 912        |
| 86.50      | 0.0729    | 3175       |
| 87.00      | 0.1126    | 4906       |
| 87.50      | 0.1486    | 6475       |
| 88.00      | 0.1921    | 8369       |
| 88.50      | 0.2324    | 10125      |
| 89.00      | 0.2663    | 11600      |
| 89.50      | 0.2822    | 12294      |
| 90.00      | 0.3096    | 13487      |
| 90.50      | 0.3568    | 15544      |
| 91.00      | 0.3887    | 16931      |
| 91.50      | 0.4161    | 18125      |
| 92.00      | 0.4396    | 19150      |
| 92.50      | 0.4946    | 21544      |
| 93.00      | 0.5627    | 24513      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.50      | 0.6353    | 27675      |
| 94.00      | 0.6510    | 28356      |
| 94.50      | 0.6855    | 29863      |
| 95.00      | 0.7640    | 33281      |
| 95.50      | 0.8533    | 37169      |
| 96.00      | 0.9044    | 39394      |
| 96.50      | 0.9281    | 40426      |
| 97.00      | 0.9281    | 40426      |
| 82.33      | 0.0001    | 4          |

Comment:

Node: KD0070

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 84.86 ft  
Warning Stage: 88.26 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.07      | 0.0001    | 6          |
| 88.50      | 0.0115    | 500        |
| 89.00      | 0.0194    | 844        |
| 89.50      | 0.0194    | 847        |
| 90.00      | 0.0194    | 847        |
| 84.86      | 0.0001    | 4          |

Comment:

Node: KD0080

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 85.43 ft  
Warning Stage: 88.27 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.14      | 0.0001    | 6          |
| 88.50      | 0.0086    | 375        |
| 89.00      | 0.0232    | 1013       |
| 89.50      | 0.0390    | 1700       |
| 90.00      | 0.0600    | 2613       |
| 90.50      | 0.0796    | 3469       |
| 91.00      | 0.1013    | 4412       |
| 91.50      | 0.1286    | 5600       |
| 92.00      | 0.1805    | 7862       |



| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 92.50      | 0.2299    | 10012      |
| 93.00      | 0.2682    | 11681      |
| 93.50      | 0.3151    | 13725      |
| 94.00      | 0.3753    | 16350      |
| 94.50      | 0.4322    | 18825      |
| 95.00      | 0.5119    | 22300      |
| 95.50      | 0.6672    | 29062      |
| 96.00      | 1.0996    | 47900      |
| 96.50      | 1.7020    | 74138      |
| 97.00      | 2.1503    | 93669      |
| 97.50      | 2.6237    | 114288     |
| 98.00      | 2.8439    | 123881     |
| 98.50      | 2.8970    | 126191     |
| 99.00      | 2.9006    | 126351     |
| 99.50      | 2.9006    | 126351     |
| 85.43      | 0.0001    | 4          |

Comment:

Node: KD0090

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 86.23 ft  
Warning Stage: 88.59 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.56      | 0.0001    | 6          |
| 89.00      | 0.0066    | 287        |
| 89.50      | 0.0362    | 1575       |
| 90.00      | 0.0558    | 2431       |
| 90.50      | 0.0773    | 3369       |
| 91.00      | 0.0924    | 4025       |
| 91.50      | 0.1072    | 4669       |
| 92.00      | 0.1244    | 5419       |
| 92.50      | 0.1474    | 6419       |
| 93.00      | 0.1690    | 7363       |
| 93.50      | 0.1881    | 8194       |
| 94.00      | 0.2109    | 9188       |
| 94.50      | 0.2390    | 10412      |
| 95.00      | 0.2667    | 11619      |
| 95.50      | 0.3263    | 14212      |
| 96.00      | 0.3917    | 17062      |
| 96.50      | 0.4689    | 20425      |
| 97.00      | 0.5640    | 24569      |
| 97.50      | 0.6383    | 27806      |
| 98.00      | 0.6754    | 29419      |
| 98.50      | 0.7636    | 33263      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 99.00      | 0.8871    | 38644      |
| 99.50      | 1.1054    | 48150      |
| 100.00     | 1.2062    | 52544      |
| 100.50     | 1.2093    | 52677      |
| 101.00     | 1.2093    | 52677      |
| 86.23      | 0.0001    | 4          |

Comment:

Node: KD0100

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 85.27 ft  
Warning Stage: 88.55 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.33      | 0.0001    | 6          |
| 88.50      | 0.0029    | 125        |
| 89.00      | 0.0892    | 3888       |
| 89.50      | 0.0939    | 4090       |
| 90.00      | 0.0939    | 4090       |
| 85.27      | 0.0001    | 4          |

Comment:

Node: KD0110

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 85.41 ft  
Warning Stage: 88.48 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.43      | 0.0001    | 6          |
| 88.50      | 0.0016    | 69         |
| 89.00      | 0.0819    | 3569       |
| 89.50      | 0.1573    | 6850       |
| 90.00      | 0.2369    | 10319      |
| 90.50      | 0.3037    | 13231      |
| 91.00      | 0.3726    | 16231      |
| 91.50      | 0.4599    | 20031      |
| 92.00      | 0.5632    | 24531      |
| 92.50      | 0.6903    | 30069      |
| 93.00      | 0.7876    | 34306      |
| 93.50      | 0.9026    | 39319      |



| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 94.00      | 0.9929    | 43250      |
| 94.50      | 1.1335    | 49375      |
| 95.00      | 1.2346    | 53781      |
| 95.50      | 1.3394    | 58344      |
| 96.00      | 1.4477    | 63063      |
| 96.50      | 1.6566    | 72162      |
| 97.00      | 1.9140    | 83375      |
| 97.50      | 2.4310    | 105894     |
| 98.00      | 3.1290    | 136300     |
| 98.50      | 3.6278    | 158025     |
| 99.00      | 4.0667    | 177144     |
| 99.50      | 4.4568    | 194138     |
| 100.00     | 4.8031    | 209225     |
| 100.50     | 5.2101    | 226950     |
| 101.00     | 6.3395    | 276150     |
| 101.50     | 8.7461    | 380981     |
| 102.00     | 10.0429   | 437469     |
| 102.50     | 10.3046   | 448869     |
| 103.00     | 10.3987   | 452969     |
| 103.50     | 10.4089   | 453412     |
| 104.00     | 10.4089   | 453412     |
| 85.41      | 0.0001    | 4          |

Comment:

Node: KD0130

Scenario: Scenario1  
Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 82.04 ft  
Warning Stage: 0.00 ft  
Boundary Stage: KD0130

| Year | Month | Day | Hour     | Stage [ft] |
|------|-------|-----|----------|------------|
| 0    | 0     | 0   | 0.0000   | 82.04      |
| 0    | 0     | 0   | 999.0000 | 82.04      |

Comment:

Node: KD0140

Scenario: Scenario1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 89.09 ft  
Warning Stage: 93.74 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 89.09      | 0.0001    | 4          |
| 93.74      | 0.0001    | 4          |

Comment:

| Pipe Link: P0010 |           |                    | Upstream | Downstream          |
|------------------|-----------|--------------------|----------|---------------------|
| Scenario:        | Scenario1 | Invert:            | 83.53 ft | Invert: 83.28 ft    |
| From Node:       | KD0050    | Manning's N:       | 0.0120   | Manning's N: 0.0120 |
| To Node:         | KD0130    | Geometry: Circular |          | Geometry: Circular  |
| Link Count:      | 1         | Max Depth:         | 1.00 ft  | Max Depth: 1.00 ft  |
| Flow Direction:  | Both      | Bottom Clip        |          |                     |
| Damping:         | 0.0000 ft | Default:           | 0.00 ft  | Default: 0.00 ft    |
| Length:          | 49.77 ft  | Op Table:          |          | Op Table:           |
| FHWA Code:       | 1         | Ref Node:          |          | Ref Node:           |
| Entr Loss Coef:  | 0.50      | Manning's N:       | 0.0000   | Manning's N: 0.0000 |
| Exit Loss Coef:  | 1.00      | Top Clip           |          |                     |
| Bend Loss Coef:  | 0.00      | Default:           | 0.00 ft  | Default: 0.00 ft    |
| Bend Location:   | 0.00 dec  | Op Table:          |          | Op Table:           |
| Energy Switch:   | Energy    | Ref Node:          |          | Ref Node:           |
|                  |           | Manning's N:       | 0.0000   | Manning's N: 0.0000 |

Comment: downstream invert estimated from 0.5% slope

| Pipe Link: P0020 |           |                    | Upstream | Downstream          |
|------------------|-----------|--------------------|----------|---------------------|
| Scenario:        | Scenario1 | Invert:            | 82.33 ft | Invert: 81.97 ft    |
| From Node:       | KD0060    | Manning's N:       | 0.0220   | Manning's N: 0.0220 |
| To Node:         | KD0130    | Geometry: Circular |          | Geometry: Circular  |
| Link Count:      | 1         | Max Depth:         | 1.50 ft  | Max Depth: 1.50 ft  |
| Flow Direction:  | Both      | Bottom Clip        |          |                     |
| Damping:         | 0.0000 ft | Default:           | 0.00 ft  | Default: 0.00 ft    |
| Length:          | 72.27 ft  | Op Table:          |          | Op Table:           |
| FHWA Code:       | 6         | Ref Node:          |          | Ref Node:           |
| Entr Loss Coef:  | 0.50      | Manning's N:       | 0.0000   | Manning's N: 0.0000 |
| Exit Loss Coef:  | 1.00      | Top Clip           |          |                     |
| Bend Loss Coef:  | 0.00      | Default:           | 0.00 ft  | Default: 0.00 ft    |
| Bend Location:   | 0.00 dec  | Op Table:          |          | Op Table:           |
| Energy Switch:   | Energy    | Ref Node:          |          | Ref Node:           |
|                  |           | Manning's N:       | 0.0000   | Manning's N: 0.0000 |

Comment: downstream invert estimated from 0.5% slope

| Pipe Link: P0030 |           |                    | Upstream | Downstream          |
|------------------|-----------|--------------------|----------|---------------------|
| Scenario:        | Scenario1 | Invert:            | 91.26 ft | Invert: 89.38 ft    |
| From Node:       | KD0010    | Manning's N:       | 0.0090   | Manning's N: 0.0090 |
| To Node:         | KD0140    | Geometry: Circular |          | Geometry: Circular  |



|                 |          |              |         |              |         |
|-----------------|----------|--------------|---------|--------------|---------|
| Link Count:     | 1        | Max Depth:   | 1.25 ft | Max Depth:   | 1.25 ft |
| Flow Direction: | Both     | Bottom Clip  |         |              |         |
| Damping:        | 0.0000   | Default:     | 0.00 ft | Default:     | 0.00 ft |
| Length:         | 45.50 ft | Op Table:    |         | Op Table:    |         |
| FHWA Code:      | 1        | Ref Node:    |         | Ref Node:    |         |
| Entr Loss Coef: | 0.50     | Manning's N: | 0.0000  | Manning's N: | 0.0000  |
| Exit Loss Coef: | 0.00     | Top Clip     |         |              |         |
| Bend Loss Coef: | 0.00     | Default:     | 0.00 ft | Default:     | 0.00 ft |
| Bend Location:  | 0.00 dec | Op Table:    |         | Op Table:    |         |
| Energy Switch:  | Energy   | Ref Node:    |         | Ref Node:    |         |
|                 |          | Manning's N: | 0.0000  | Manning's N: | 0.0000  |

Comment:

|                         |                     |                     |
|-------------------------|---------------------|---------------------|
| Pipe Link: P0040        | Upstream            | Downstream          |
| Scenario: Scenario1     | Invert: 91.04 ft    | Invert: 89.18 ft    |
| From Node: KD0020       | Manning's N: 0.0090 | Manning's N: 0.0090 |
| To Node: KD0140         | Geometry: Circular  | Geometry: Circular  |
| Link Count: 1           | Max Depth: 1.25 ft  | Max Depth: 1.25 ft  |
| Flow Direction: Both    | Bottom Clip         |                     |
| Damping: 0.0000         | Default: 0.00 ft    | Default: 0.00 ft    |
| Length: 47.00 ft        | Op Table:           | Op Table:           |
| FHWA Code: 1            | Ref Node:           | Ref Node:           |
| Entr Loss Coef: 0.50    | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Exit Loss Coef: 0.00    | Top Clip            |                     |
| Bend Loss Coef: 0.00    | Default: 0.00 ft    | Default: 0.00 ft    |
| Bend Location: 0.00 dec | Op Table:           | Op Table:           |
| Energy Switch: Energy   | Ref Node:           | Ref Node:           |
|                         | Manning's N: 0.0000 | Manning's N: 0.0000 |

Comment:

|                         |                     |                     |
|-------------------------|---------------------|---------------------|
| Pipe Link: P0050        | Upstream            | Downstream          |
| Scenario: Scenario1     | Invert: 89.46 ft    | Invert: 89.28 ft    |
| From Node: KD0030       | Manning's N: 0.0090 | Manning's N: 0.0090 |
| To Node: KD0140         | Geometry: Circular  | Geometry: Circular  |
| Link Count: 1           | Max Depth: 1.25 ft  | Max Depth: 1.25 ft  |
| Flow Direction: Both    | Bottom Clip         |                     |
| Damping: 0.0000         | Default: 0.00 ft    | Default: 0.00 ft    |
| Length: 36.60 ft        | Op Table:           | Op Table:           |
| FHWA Code: 1            | Ref Node:           | Ref Node:           |
| Entr Loss Coef: 0.50    | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Exit Loss Coef: 0.00    | Top Clip            |                     |
| Bend Loss Coef: 0.00    | Default: 0.00 ft    | Default: 0.00 ft    |
| Bend Location: 0.00 dec | Op Table:           | Op Table:           |
| Energy Switch: Energy   | Ref Node:           | Ref Node:           |
|                         | Manning's N: 0.0000 | Manning's N: 0.0000 |

Comment: upstream invert estimated from 0.5% slope

| Pipe Link: P0060 |           | Upstream            | Downstream          |
|------------------|-----------|---------------------|---------------------|
| Scenario:        | Scenario1 | Invert: 90.89 ft    | Invert: 89.22 ft    |
| From Node:       | KD0040    | Manning's N: 0.0090 | Manning's N: 0.0090 |
| To Node:         | KD0140    | Geometry: Circular  | Geometry: Circular  |
| Link Count:      | 1         | Max Depth: 1.25 ft  | Max Depth: 1.25 ft  |
| Flow Direction:  | Both      | Bottom Clip         |                     |
| Damping:         | 0.0000 ft | Default: 0.00 ft    | Default: 0.00 ft    |
| Length:          | 27.00 ft  | Op Table:           | Op Table:           |
| FHWA Code:       | 1         | Ref Node:           | Ref Node:           |
| Entr Loss Coef:  | 0.50      | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Exit Loss Coef:  | 0.00      | Top Clip            |                     |
| Bend Loss Coef:  | 0.00      | Default: 0.00 ft    | Default: 0.00 ft    |
| Bend Location:   | 0.00 dec  | Op Table:           | Op Table:           |
| Energy Switch:   | Energy    | Ref Node:           | Ref Node:           |
|                  |           | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Comment:         |           |                     |                     |

| Pipe Link: P0070 |           | Upstream            | Downstream          |
|------------------|-----------|---------------------|---------------------|
| Scenario:        | Scenario1 | Invert: 89.09 ft    | Invert: 82.34 ft    |
| From Node:       | KD0140    | Manning's N: 0.0220 | Manning's N: 0.0220 |
| To Node:         | KD0060    | Geometry: Circular  | Geometry: Circular  |
| Link Count:      | 1         | Max Depth: 1.50 ft  | Max Depth: 1.50 ft  |
| Flow Direction:  | Both      | Bottom Clip         |                     |
| Damping:         | 0.0000 ft | Default: 0.00 ft    | Default: 0.00 ft    |
| Length:          | 977.80 ft | Op Table:           | Op Table:           |
| FHWA Code:       | 6         | Ref Node:           | Ref Node:           |
| Entr Loss Coef:  | 0.50      | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Exit Loss Coef:  | 0.00      | Top Clip            |                     |
| Bend Loss Coef:  | 0.00      | Default: 0.00 ft    | Default: 0.00 ft    |
| Bend Location:   | 0.00 dec  | Op Table:           | Op Table:           |
| Energy Switch:   | Energy    | Ref Node:           | Ref Node:           |
|                  |           | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Comment:         |           |                     |                     |

| Pipe Link: P0080 |           | Upstream            | Downstream          |
|------------------|-----------|---------------------|---------------------|
| Scenario:        | Scenario1 | Invert: 86.23 ft    | Invert: 85.44 ft    |
| From Node:       | KD0090    | Manning's N: 0.0120 | Manning's N: 0.0120 |
| To Node:         | KD0080    | Geometry: Circular  | Geometry: Circular  |
| Link Count:      | 1         | Max Depth: 1.25 ft  | Max Depth: 1.25 ft  |
| Flow Direction:  | Both      | Bottom Clip         |                     |
| Damping:         | 0.0000 ft | Default: 0.00 ft    | Default: 0.00 ft    |
| Length:          | 49.10 ft  | Op Table:           | Op Table:           |
| FHWA Code:       | 1         | Ref Node:           | Ref Node:           |
| Entr Loss Coef:  | 0.50      | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Exit Loss Coef:  | 0.00      | Top Clip            |                     |
| Bend Loss Coef:  | 0.00      | Default: 0.00 ft    | Default: 0.00 ft    |
| Bend Location:   | 0.00 dec  | Op Table:           | Op Table:           |



Energy Switch: Energy

Ref Node:  
Manning's N: 0.0000

Ref Node:  
Manning's N: 0.0000

Comment:

Pipe Link: P0090

|                         | Upstream            | Downstream          |
|-------------------------|---------------------|---------------------|
| Scenario: Scenario1     | Invert: 85.43 ft    | Invert: 84.88 ft    |
| From Node: KD0080       | Manning's N: 0.0120 | Manning's N: 0.0120 |
| To Node: KD0070         | Geometry: Circular  | Geometry: Circular  |
| Link Count: 1           | Max Depth: 1.25 ft  | Max Depth: 1.25 ft  |
| Flow Direction: Both    | Bottom Clip         |                     |
| Damping: 0.0000 ft      | Default: 0.00 ft    | Default: 0.00 ft    |
| Length: 24.50 ft        | Op Table:           | Op Table:           |
| FHWA Code: 1            | Ref Node:           | Ref Node:           |
| Entr Loss Coef: 0.50    | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Exit Loss Coef: 0.00    | Top Clip            |                     |
| Bend Loss Coef: 0.00    | Default: 0.00 ft    | Default: 0.00 ft    |
| Bend Location: 0.00 dec | Op Table:           | Op Table:           |
| Energy Switch: Energy   | Ref Node:           | Ref Node:           |
|                         | Manning's N: 0.0000 | Manning's N: 0.0000 |

Comment:

Pipe Link: P0100

|                         | Upstream            | Downstream          |
|-------------------------|---------------------|---------------------|
| Scenario: Scenario1     | Invert: 84.86 ft    | Invert: 84.55 ft    |
| From Node: KD0070       | Manning's N: 0.0120 | Manning's N: 0.0120 |
| To Node: KD0130         | Geometry: Circular  | Geometry: Circular  |
| Link Count: 1           | Max Depth: 1.25 ft  | Max Depth: 1.25 ft  |
| Flow Direction: Both    | Bottom Clip         |                     |
| Damping: 0.0000 ft      | Default: 0.00 ft    | Default: 0.00 ft    |
| Length: 62.67 ft        | Op Table:           | Op Table:           |
| FHWA Code: 1            | Ref Node:           | Ref Node:           |
| Entr Loss Coef: 0.50    | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Exit Loss Coef: 1.00    | Top Clip            |                     |
| Bend Loss Coef: 0.00    | Default: 0.00 ft    | Default: 0.00 ft    |
| Bend Location: 0.00 dec | Op Table:           | Op Table:           |
| Energy Switch: Energy   | Ref Node:           | Ref Node:           |
|                         | Manning's N: 0.0000 | Manning's N: 0.0000 |

Comment: downstream invert estimated from 0.5% slope

Pipe Link: P0110

|                      | Upstream            | Downstream          |
|----------------------|---------------------|---------------------|
| Scenario: Scenario1  | Invert: 85.41 ft    | Invert: 85.29 ft    |
| From Node: KD0110    | Manning's N: 0.0120 | Manning's N: 0.0120 |
| To Node: KD0100      | Geometry: Circular  | Geometry: Circular  |
| Link Count: 1        | Max Depth: 1.25 ft  | Max Depth: 1.25 ft  |
| Flow Direction: Both | Bottom Clip         |                     |

|                 |           |              |         |              |         |
|-----------------|-----------|--------------|---------|--------------|---------|
| Damping:        | 0.0000 ft | Default:     | 0.00 ft | Default:     | 0.00 ft |
| Length:         | 23.70 ft  | Op Table:    |         | Op Table:    |         |
| FHWA Code:      | 1         | Ref Node:    |         | Ref Node:    |         |
| Entr Loss Coef: | 0.50      | Manning's N: | 0.0000  | Manning's N: | 0.0000  |
| Exit Loss Coef: | 0.00      | Top Clip     |         |              |         |
| Bend Loss Coef: | 0.00      | Default:     | 0.00 ft | Default:     | 0.00 ft |
| Bend Location:  | 0.00 dec  | Op Table:    |         | Op Table:    |         |
| Energy Switch:  | Energy    | Ref Node:    |         | Ref Node:    |         |
|                 |           | Manning's N: | 0.0000  | Manning's N: | 0.0000  |

Comment: upstream invert estimated from 0.5% slope

| Pipe Link: P0120        | Upstream            | Downstream          |
|-------------------------|---------------------|---------------------|
| Scenario: Scenario1     | Invert: 85.27 ft    | Invert: 84.86 ft    |
| From Node: KD0100       | Manning's N: 0.0090 | Manning's N: 0.0090 |
| To Node: KD0130         | Geometry: Circular  | Geometry: Circular  |
| Link Count: 1           | Max Depth: 1.50 ft  | Max Depth: 1.50 ft  |
| Flow Direction: Both    | Bottom Clip         |                     |
| Damping: 0.0000 ft      | Default: 0.00 ft    | Default: 0.00 ft    |
| Length: 81.60 ft        | Op Table:           | Op Table:           |
| FHWA Code: 1            | Ref Node:           | Ref Node:           |
| Entr Loss Coef: 0.50    | Manning's N: 0.0000 | Manning's N: 0.0000 |
| Exit Loss Coef: 1.00    | Top Clip            |                     |
| Bend Loss Coef: 0.00    | Default: 0.00 ft    | Default: 0.00 ft    |
| Bend Location: 0.00 dec | Op Table:           | Op Table:           |
| Energy Switch: Energy   | Ref Node:           | Ref Node:           |
|                         | Manning's N: 0.0000 | Manning's N: 0.0000 |

Comment:

| Weir Link: W0010                  | Bottom Clip            |  |
|-----------------------------------|------------------------|--|
| Scenario: Scenario1               | Default: 0.00 ft       |  |
| From Node: KD0050                 | Op Table:              |  |
| To Node: KD0060                   | Ref Node:              |  |
| Link Count: 1                     | Top Clip               |  |
| Flow Direction: Both              | Default: 0.00 ft       |  |
| Damping: 0.0000 ft                | Op Table:              |  |
| Weir Type: Broad Crested Vertical | Ref Node:              |  |
| Geometry Type: Irregular          | Discharge Coefficients |  |
| Invert: 86.13 ft                  | Weir Default: 2.800    |  |
| Control Elevation: 86.13 ft       | Weir Table:            |  |
| Cross Section: X-0010W            | Orifice Default: 0.600 |  |
|                                   | Orifice Table:         |  |

Comment:



|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0020                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0070                 | Default: 0.00 ft       |
| To Node: KD0130                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 88.21 ft                  | Discharge Coefficients |
| Control Elevation: 88.21 ft       | Weir Default: 2.800    |
| Cross Section: X-0020W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0030                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0100                 | Default: 0.00 ft       |
| To Node: KD0070                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 88.38 ft                  | Discharge Coefficients |
| Control Elevation: 88.38 ft       | Weir Default: 2.800    |
| Cross Section: X-0030W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0040                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0110                 | Default: 0.00 ft       |
| To Node: KD0100                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 88.78 ft                  | Discharge Coefficients |
| Control Elevation: 88.78 ft       | Weir Default: 2.800    |
| Cross Section: X-0040W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0050                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0080                 | Default: 0.00 ft       |
| To Node: KD0070                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 88.37 ft                  | Discharge Coefficients |
| Control Elevation: 88.37 ft       | Weir Default: 2.800    |
| Cross Section: X-0050W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0060                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0090                 | Default: 0.00 ft       |
| To Node: KD0110                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 88.88 ft                  | Discharge Coefficients |
| Control Elevation: 88.88 ft       | Weir Default: 2.800    |
| Cross Section: X-0060W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0070                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0090                 | Default: 0.00 ft       |
| To Node: KD0080                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 88.81 ft                  | Discharge Coefficients |
| Control Elevation: 88.81 ft       | Weir Default: 2.800    |
| Cross Section: X-0070W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |



|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0080                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0010                 | Default: 0.00 ft       |
| To Node: KD0020                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 93.95 ft                  | Discharge Coefficients |
| Control Elevation: 93.95 ft       | Weir Default: 2.800    |
| Cross Section: X-0080W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0090                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0030                 | Default: 0.00 ft       |
| To Node: KD0040                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 94.19 ft                  | Discharge Coefficients |
| Control Elevation: 94.19 ft       | Weir Default: 2.800    |
| Cross Section: X-0090W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0100                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0040                 | Default: 0.00 ft       |
| To Node: KD0050                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 94.95 ft                  | Discharge Coefficients |
| Control Elevation: 94.95 ft       | Weir Default: 2.800    |
| Cross Section: X-0100W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0110                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0020                 | Default: 0.00 ft       |
| To Node: KD0060                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 95.00 ft                  | Discharge Coefficients |
| Control Elevation: 95.00 ft       | Weir Default: 2.800    |
| Cross Section: X-0110W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0130                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0060                 | Default: 0.00 ft       |
| To Node: KD0130                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 85.79 ft                  | Discharge Coefficients |
| Control Elevation: 85.79 ft       | Weir Default: 2.800    |
| Cross Section: X-0130W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0140                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0060                 | Default: 0.00 ft       |
| To Node: KD0070                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 88.09 ft                  | Discharge Coefficients |
| Control Elevation: 88.09 ft       | Weir Default: 2.800    |
| Cross Section: X-0140W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |



|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0150                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0010                 | Default: 0.00 ft       |
| To Node: KD0030                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 94.20 ft                  | Discharge Coefficients |
| Control Elevation: 94.20 ft       | Weir Default: 2.800    |
| Cross Section: X-0150W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0160                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0020                 | Default: 0.00 ft       |
| To Node: KD0040                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 94.16 ft                  | Discharge Coefficients |
| Control Elevation: 94.16 ft       | Weir Default: 2.800    |
| Cross Section: X-0160W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

|                                   |                        |
|-----------------------------------|------------------------|
| Weir Link: W0170                  |                        |
| Scenario: Scenario1               | Bottom Clip            |
| From Node: KD0080                 | Default: 0.00 ft       |
| To Node: KD0070                   | Op Table:              |
| Link Count: 1                     | Ref Node:              |
| Flow Direction: Both              | Top Clip               |
| Damping: 0.0000 ft                | Default: 0.00 ft       |
| Weir Type: Broad Crested Vertical | Op Table:              |
| Geometry Type: Irregular          | Ref Node:              |
| Invert: 88.20 ft                  | Discharge Coefficients |
| Control Elevation: 88.20 ft       | Weir Default: 2.800    |
| Cross Section: X-0170W            | Weir Table:            |
|                                   | Orifice Default: 0.600 |
|                                   | Orifice Table:         |
| Comment:                          |                        |

Weir Link: W0190

Scenario: Scenario1  
 From Node: KD0100  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both  
 Damping: 0.0000 ft  
 Weir Type: Broad Crested Vertical  
 Geometry Type: Irregular  
 Invert: 88.54 ft  
 Control Elevation: 88.54 ft  
 Cross Section: X-0190W

Bottom Clip

Default: 0.00 ft  
 Op Table:  
 Ref Node:

Top Clip

Default: 0.00 ft  
 Op Table:  
 Ref Node:

Discharge Coefficients

Weir Default: 2.800  
 Weir Table:  
 Orifice Default: 0.600  
 Orifice Table:

Comment:

Simulation: 100Y\_24H

Scenario: Scenario1  
 Run Date/Time: 5/23/2022 2:40:48 PM  
 Program Version: ICPR4 4.07.08

General

Run Mode: Normal

|                       | Year            | Month                       | Day               | Hour [hr] |
|-----------------------|-----------------|-----------------------------|-------------------|-----------|
| Start Time:           | 0               | 0                           | 0                 | 0.0000    |
| End Time:             | 0               | 0                           | 0                 | 36.0000   |
|                       | Hydrology [sec] | Surface Hydraulics<br>[sec] | Groundwater [sec] |           |
| Min Calculation Time: | 60.0000         | 0.1000                      | 900.0000          |           |
| Max Calculation Time: |                 | 30.0000                     |                   |           |

Output Time Increments

Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |



|                     |
|---------------------|
| Restart File        |
| Save Restart: False |

## Resources & Lookup Tables

| Resources               | Lookup Tables              |
|-------------------------|----------------------------|
| Rainfall Folder:        | Boundary Stage Set: 100_24 |
| Reference ET Folder:    | Extern Hydrograph Set:     |
| Unit Hydrograph Folder: | Curve Number Set: CN       |
|                         | Green-Ampt Set:            |
|                         | Vertical Layers Set:       |
|                         | Impervious Set: Impervious |
|                         | Roughness Set:             |
|                         | Crop Coef Set:             |
|                         | Fillable Porosity Set:     |
|                         | Conductivity Set:          |
|                         | Leakage Set:               |

## Tolerances & Options

|                                 |                                 |
|---------------------------------|---------------------------------|
| Time Marching: SAOR             | IA Recovery Time: 24.0000 hr    |
| Max Iterations: 6               | ET for Manual Basins: False     |
| Over-Relax Weight Fact: 0.5 dec |                                 |
| dZ Tolerance: 0.0010 ft         | Smp/Man Basin Rain Opt: Global  |
|                                 | OF Region Rain Opt: Global      |
| Max dZ: 1.0000 ft               | Rainfall Name: ~ORANGE          |
| Link Optimizer Tol: 0.0001 ft   | Rainfall Amount: 10.60 in       |
|                                 | Storm Duration: 24.0000 hr      |
| Edge Length Option: Automatic   |                                 |
| Dflt Damping (2D): 0.0050 ft    | Dflt Damping (1D): 0.0050 ft    |
| Min Node Srf Area (2D): 100 ft2 | Min Node Srf Area (1D): 100 ft2 |
| Energy Switch (2D): Energy      | Energy Switch (1D): Energy      |

|          |
|----------|
| Comment: |
|----------|

## Simulation: 10Y\_24H

|                                     |
|-------------------------------------|
| Scenario: Scenario1                 |
| Run Date/Time: 5/23/2022 2:41:07 PM |
| Program Version: ICPR4 4.07.08      |

## General

|                                                                                   |
|-----------------------------------------------------------------------------------|
| Run Mode: Normal                                                                  |
| <div> <div>Year</div> <div>Month</div> <div>Day</div> <div>Hour [hr]</div> </div> |

Start Time: 0 0 0 0.0000  
End Time: 0 0 0 36.0000

|                       | Hydrology [sec] | Surface Hydraulics<br>[sec] | Groundwater [sec] |
|-----------------------|-----------------|-----------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                      | 900.0000          |
| Max Calculation Time: |                 | 30.0000                     |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph  
Folder:

##### Lookup Tables

Boundary Stage Set: 10\_24  
Extern Hydrograph Set:  
Curve Number Set: CN  
  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

#### Tolerances & Options

Time Marching: SAOR  
Max Iterations: 6  
Over-Relax Weight 0.5 dec  
Fact:  
dZ Tolerance: 0.0010 ft

IA Recovery Time: 24.0000 hr  
ET for Manual Basins: False  
  
Smp/Man Basin Rain Global  
Opt:



Max dZ: 1.0000 ft  
Link Optimizer Tol: 0.0001 ft

Edge Length Option: Automatic

Dflt Damping (2D): 0.0050 ft  
Min Node Srf Area 100 ft2  
(2D):  
Energy Switch (2D): Energy

OF Region Rain Opt: Global  
Rainfall Name: ~ORANGE  
Rainfall Amount: 7.50 in  
Storm Duration: 24.0000 hr

Dflt Damping (1D): 0.0050 ft  
Min Node Srf Area 100 ft2  
(1D):  
Energy Switch (1D): Energy

Comment:

Simulation: 10Y\_6H

Scenario: Scenario1  
Run Date/Time: 5/23/2022 2:41:27 PM  
Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics<br>[sec] | Groundwater [sec] |
|-----------------------|-----------------|-----------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                      | 900.0000          |
| Max Calculation Time: |                 | 30.0000                     |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

## Resources & Lookup Tables

| Resources               | Lookup Tables              |
|-------------------------|----------------------------|
| Rainfall Folder:        | Boundary Stage Set: 10_6   |
| Reference ET Folder:    | Extern Hydrograph Set:     |
| Unit Hydrograph Folder: | Curve Number Set: CN       |
|                         | Green-Ampt Set:            |
|                         | Vertical Layers Set:       |
|                         | Impervious Set: Impervious |
|                         | Roughness Set:             |
|                         | Crop Coef Set:             |
|                         | Fillable Porosity Set:     |
|                         | Conductivity Set:          |
|                         | Leakage Set:               |

## Tolerances & Options

|                               |                              |
|-------------------------------|------------------------------|
| Time Marching: SAOR           | IA Recovery Time: 24.0000 hr |
| Max Iterations: 6             | ET for Manual Basins: False  |
| Over-Relax Weight: 0.5 dec    |                              |
| Fact:                         |                              |
| dZ Tolerance: 0.0010 ft       | Smp/Man Basin Rain: Global   |
|                               | Opt:                         |
| Max dZ: 1.0000 ft             | OF Region Rain Opt: Global   |
| Link Optimizer Tol: 0.0001 ft | Rainfall Name: ~ORANGE       |
|                               | Rainfall Amount: 4.65 in     |
| Edge Length Option: Automatic | Storm Duration: 6.0000 hr    |
| Dflt Damping (2D): 0.0050 ft  | Dflt Damping (1D): 0.0050 ft |
| Min Node Srf Area: 100 ft2    | Min Node Srf Area: 100 ft2   |
| (2D):                         | (1D):                        |
| Energy Switch (2D): Energy    | Energy Switch (1D): Energy   |

Comment:

Simulation: 25Y\_24H

Scenario: Scenario1  
Run Date/Time: 5/23/2022 2:41:48 PM  
Program Version: ICPR4 4.07.08

## General

Run Mode: Normal

|             | Year            | Month              | Day               | Hour [hr] |
|-------------|-----------------|--------------------|-------------------|-----------|
| Start Time: | 0               | 0                  | 0                 | 0.0000    |
| End Time:   | 0               | 0                  | 0                 | 36.0000   |
|             | Hydrology [sec] | Surface Hydraulics | Groundwater [sec] |           |

|                       |         |         |          |
|-----------------------|---------|---------|----------|
|                       |         | [sec]   |          |
| Min Calculation Time: | 60.0000 | 0.1000  | 900.0000 |
| Max Calculation Time: |         | 30.0000 |          |

## Output Time Increments

### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

### Restart File

Save Restart: False

## Resources & Lookup Tables

### Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph  
Folder:

### Lookup Tables

Boundary Stage Set: 25\_24  
Extern Hydrograph Set:  
Curve Number Set: CN  
  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

## Tolerances & Options

Time Marching: SAOR  
Max Iterations: 6  
Over-Relax Weight 0.5 dec  
Fact:  
dZ Tolerance: 0.0010 ft  
  
Max dZ: 1.0000 ft  
Link Optimizer Tol: 0.0001 ft  
  
Edge Length Option: Automatic

IA Recovery Time: 24.0000 hr  
ET for Manual Basins: False  
  
Smp/Man Basin Rain Global  
Opt:  
OF Region Rain Opt: Global  
Rainfall Name: ~ORANGE  
Rainfall Amount: 8.60 in  
Storm Duration: 24.0000 hr



Dflt Damping (2D): 0.0050 ft  
 Min Node Srf Area 100 ft2  
 (2D):  
 Energy Switch (2D): Energy

Dflt Damping (1D): 0.0050 ft  
 Min Node Srf Area 100 ft2  
 (1D):  
 Energy Switch (1D): Energy

Comment:

Simulation: MA\_24H

Scenario: Scenario1  
 Run Date/Time: 5/23/2022 2:42:10 PM  
 Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics<br>[sec] | Groundwater [sec] |
|-----------------------|-----------------|-----------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                      | 900.0000          |
| Max Calculation Time: |                 | 30.0000                     |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:

##### Lookup Tables

Boundary Stage Set: MA\_24

Reference ET Folder:  
Unit Hydrograph  
Folder:

Extern Hydrograph Set:  
Curve Number Set: CN  
  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

#### Tolerances & Options

Time Marching: SAOR  
Max Iterations: 6  
Over-Relax Weight: 0.5 dec  
Fact:  
dZ Tolerance: 0.0010 ft  
  
Max dZ: 1.0000 ft  
Link Optimizer Tol: 0.0001 ft  
  
Edge Length Option: Automatic  
  
Dflt Damping (2D): 0.0050 ft  
Min Node Srf Area: 100 ft2  
(2D):  
Energy Switch (2D): Energy

IA Recovery Time: 24.0000 hr  
ET for Manual Basins: False  
  
Smp/Man Basin Rain: Global  
Opt:  
OF Region Rain Opt: Global  
Rainfall Name: ~ORANGE  
Rainfall Amount: 4.50 in  
Storm Duration: 24.0000 hr  
  
Dflt Damping (1D): 0.0050 ft  
Min Node Srf Area: 100 ft2  
(1D):  
Energy Switch (1D): Energy

Comment:

Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0010    | 100Y_24H | 3.11           | 9.1833                 | 10.60               | 4.67              | 3.3147    | 54.9                    | 38.27    | 20.29  |
| KDB0010    | 10Y_24H  | 1.60           | 10.0333                | 7.50                | 2.63              | 3.3147    | 56.8                    | 38.27    | 20.29  |
| KDB0010    | 10Y_6H   | 1.85           | 2.6667                 | 4.65                | 1.16              | 3.3147    | 61.0                    | 38.27    | 20.29  |
| KDB0010    | 25Y_24H  | 2.10           | 9.2000                 | 8.60                | 3.31              | 3.3147    | 55.9                    | 38.27    | 20.29  |
| KDB0010    | MA_24H   | 0.59           | 9.1000                 | 4.50                | 1.10              | 3.3147    | 61.3                    | 38.27    | 20.29  |

Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0020    | 100Y_24H | 1.14           | 9.0500                 | 10.60               | 4.57              | 1.0956    | 54.2                    | 37.30    | 18.90  |
| KDB0020    | 10Y_24H  | 0.58           | 9.0667                 | 7.50                | 2.55              | 1.0956    | 56.0                    | 37.30    | 18.90  |
| KDB0020    | 10Y_6H   | 0.70           | 2.5500                 | 4.65                | 1.10              | 1.0956    | 60.0                    | 37.30    | 18.90  |
| KDB0020    | 25Y_24H  | 0.77           | 9.0667                 | 8.60                | 3.22              | 1.0956    | 55.2                    | 37.30    | 18.90  |
| KDB0020    | MA_24H   | 0.19           | 9.0167                 | 4.50                | 1.04              | 1.0956    | 60.4                    | 37.30    | 18.90  |

Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0030    | 100Y_24H | 6.19           | 9.1667                 | 10.60               | 4.79              | 6.2464    | 55.8                    | 38.15    | 20.11  |
| KDB0030    | 10Y_24H  | 3.23           | 9.1667                 | 7.50                | 2.72              | 6.2464    | 57.7                    | 38.15    | 20.11  |
| KDB0030    | 10Y_6H   | 3.85           | 2.6333                 | 4.65                | 1.22              | 6.2464    | 61.9                    | 38.15    | 20.11  |
| KDB0030    | 25Y_24H  | 4.21           | 9.1667                 | 8.60                | 3.42              | 6.2464    | 56.9                    | 38.15    | 20.11  |
| KDB0030    | MA_24H   | 1.22           | 9.0833                 | 4.50                | 1.15              | 6.2464    | 62.2                    | 38.15    | 20.11  |

Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0040    | 100Y_24H | 1.54           | 9.1000                 | 10.60               | 4.57              | 1.5426    | 54.2                    | 37.30    | 18.90  |
| KDB0040    | 10Y_24H  | 0.78           | 9.1167                 | 7.50                | 2.54              | 1.5426    | 56.0                    | 37.30    | 18.90  |
| KDB0040    | 10Y_6H   | 0.92           | 2.5833                 | 4.65                | 1.10              | 1.5426    | 60.0                    | 37.30    | 18.90  |
| KDB0040    | 25Y_24H  | 1.03           | 9.1167                 | 8.60                | 3.22              | 1.5426    | 55.2                    | 37.30    | 18.90  |
| KDB0040    | MA_24H   | 0.27           | 9.0333                 | 4.50                | 1.04              | 1.5426    | 60.4                    | 37.30    | 18.90  |

Manual Basin Runoff Summary [Scenario1]

| Basin | Sim Name | Max Flow | Time to | Total | Total | Area [ac] | Equivalent | % Imperv | % DCIA |
|-------|----------|----------|---------|-------|-------|-----------|------------|----------|--------|
|-------|----------|----------|---------|-------|-------|-----------|------------|----------|--------|



| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0050    | 100Y_24H | 2.83           | 9.1167                 | 10.60               | 4.57              | 2.8650    | 54.2                    | 37.30    | 18.90  |
| KDB0050    | 10Y_24H  | 1.43           | 9.1333                 | 7.50                | 2.55              | 2.8650    | 56.0                    | 37.30    | 18.90  |
| KDB0050    | 10Y_6H   | 1.67           | 2.6000                 | 4.65                | 1.10              | 2.8650    | 60.0                    | 37.30    | 18.90  |
| KDB0050    | 25Y_24H  | 1.90           | 9.1167                 | 8.60                | 3.22              | 2.8650    | 55.2                    | 37.30    | 18.90  |
| KDB0050    | MA_24H   | 0.49           | 9.0333                 | 4.50                | 1.04              | 2.8650    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0060    | 100Y_24H | 0.94           | 9.1000                 | 10.60               | 4.57              | 0.9439    | 54.2                    | 37.30    | 18.90  |
| KDB0060    | 10Y_24H  | 0.48           | 9.1167                 | 7.50                | 2.55              | 0.9439    | 56.0                    | 37.30    | 18.90  |
| KDB0060    | 10Y_6H   | 0.56           | 2.5833                 | 4.65                | 1.10              | 0.9439    | 60.0                    | 37.30    | 18.90  |
| KDB0060    | 25Y_24H  | 0.63           | 9.1000                 | 8.60                | 3.22              | 0.9439    | 55.2                    | 37.30    | 18.90  |
| KDB0060    | MA_24H   | 0.16           | 9.0333                 | 4.50                | 1.04              | 0.9439    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0070    | 100Y_24H | 0.02           | 9.0333                 | 10.60               | 4.57              | 0.0201    | 54.2                    | 37.30    | 18.90  |
| KDB0070    | 10Y_24H  | 0.01           | 9.0333                 | 7.50                | 2.54              | 0.0201    | 56.0                    | 37.30    | 18.90  |
| KDB0070    | 10Y_6H   | 0.01           | 2.5333                 | 4.65                | 1.10              | 0.0201    | 60.0                    | 37.30    | 18.90  |
| KDB0070    | 25Y_24H  | 0.01           | 9.0333                 | 8.60                | 3.22              | 0.0201    | 55.2                    | 37.30    | 18.90  |
| KDB0070    | MA_24H   | 0.00           | 9.0000                 | 4.50                | 1.04              | 0.0201    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0080    | 100Y_24H | 2.85           | 9.1167                 | 10.60               | 4.57              | 2.9007    | 54.2                    | 37.30    | 18.90  |
| KDB0080    | 10Y_24H  | 1.44           | 9.1333                 | 7.50                | 2.55              | 2.9007    | 56.0                    | 37.30    | 18.90  |
| KDB0080    | 10Y_6H   | 1.68           | 2.6000                 | 4.65                | 1.10              | 2.9007    | 60.0                    | 37.30    | 18.90  |
| KDB0080    | 25Y_24H  | 1.91           | 9.1333                 | 8.60                | 3.22              | 2.9007    | 55.2                    | 37.30    | 18.90  |
| KDB0080    | MA_24H   | 0.50           | 9.0333                 | 4.50                | 1.04              | 2.9007    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow | Total Rainfall | Total Runoff [in] | Area [ac] | Equivalent Curve | % Imperv | % DCIA |
|------------|----------|----------------|------------------|----------------|-------------------|-----------|------------------|----------|--------|
|------------|----------|----------------|------------------|----------------|-------------------|-----------|------------------|----------|--------|

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0090    | 100Y_24H | 1.31           | 9.0833                 | 10.60               | 4.95              | 1.2095    | 56.9                    | 37.94    | 19.82  |
| KDB0090    | 10Y_24H  | 0.70           | 9.1000                 | 7.50                | 2.84              | 1.2095    | 58.9                    | 37.94    | 19.82  |
| KDB0090    | 10Y_6H   | 0.88           | 2.5833                 | 4.65                | 1.29              | 1.2095    | 63.0                    | 37.94    | 19.82  |
| KDB0090    | 25Y_24H  | 0.91           | 9.1000                 | 8.60                | 3.55              | 1.2095    | 58.0                    | 37.94    | 19.82  |
| KDB0090    | MA_24H   | 0.27           | 9.0333                 | 4.50                | 1.22              | 1.2095    | 63.3                    | 37.94    | 19.82  |

#### Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0100    | 100Y_24H | 0.10           | 9.0333                 | 10.60               | 4.57              | 0.0978    | 54.2                    | 37.30    | 18.90  |
| KDB0100    | 10Y_24H  | 0.05           | 9.0333                 | 7.50                | 2.54              | 0.0978    | 56.0                    | 37.30    | 18.90  |
| KDB0100    | 10Y_6H   | 0.07           | 2.5333                 | 4.65                | 1.10              | 0.0978    | 60.0                    | 37.30    | 18.90  |
| KDB0100    | 25Y_24H  | 0.07           | 9.0333                 | 8.60                | 3.22              | 0.0978    | 55.2                    | 37.30    | 18.90  |
| KDB0100    | MA_24H   | 0.02           | 9.0000                 | 4.50                | 1.04              | 0.0978    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin Runoff Summary [Scenario1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0110    | 100Y_24H | 9.54           | 9.2833                 | 10.60               | 4.80              | 10.4384   | 55.8                    | 37.53    | 19.23  |
| KDB0110    | 10Y_24H  | 5.13           | 10.0667                | 7.50                | 2.72              | 10.4384   | 57.7                    | 37.53    | 19.23  |
| KDB0110    | 10Y_6H   | 5.63           | 2.7500                 | 4.65                | 1.22              | 10.4384   | 61.8                    | 37.53    | 19.23  |
| KDB0110    | 25Y_24H  | 6.58           | 10.0500                | 8.60                | 3.42              | 10.4384   | 56.9                    | 37.53    | 19.23  |
| KDB0110    | MA_24H   | 1.94           | 9.1833                 | 4.50                | 1.15              | 10.4384   | 62.2                    | 37.53    | 19.23  |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0010    | 100Y_24H | 93.83              | 95.18          | 0.0010                   | 4.57                   | 3.54                    | 6751                   |
| KD0010    | 10Y_24H  | 93.83              | 93.45          | -0.0010                  | 1.60                   | 1.65                    | 100                    |
| KD0010    | 10Y_6H   | 93.83              | 94.21          | 0.0010                   | 1.97                   | 2.05                    | 998                    |
| KD0010    | 25Y_24H  | 93.83              | 94.69          | -0.0010                  | 3.62                   | 3.86                    | 2585                   |
| KD0010    | MA_24H   | 93.83              | 91.65          | -0.0009                  | 0.59                   | 0.59                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|---------------------|------------------------|-------------------------|------------------------|
|-----------|----------|--------------------|----------------|---------------------|------------------------|-------------------------|------------------------|

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0020    | 100Y_24H | 93.81              | 95.17          | -0.0010                  | 3.43                   | 3.05                    | 14250                  |
| KD0020    | 10Y_24H  | 93.81              | 93.42          | -0.0010                  | 0.58                   | 1.10                    | 100                    |
| KD0020    | 10Y_6H   | 93.81              | 94.21          | -0.0010                  | 1.30                   | 1.24                    | 2040                   |
| KD0020    | 25Y_24H  | 93.81              | 94.69          | -0.0010                  | 3.14                   | 1.52                    | 6724                   |
| KD0020    | MA_24H   | 93.81              | 91.25          | -0.0010                  | 0.19                   | 0.19                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0030    | 100Y_24H | 93.95              | 95.18          | -0.0012                  | 6.19                   | 8.21                    | 3939                   |
| KD0030    | 10Y_24H  | 93.95              | 93.51          | -0.0010                  | 3.23                   | 3.15                    | 100                    |
| KD0030    | 10Y_6H   | 93.95              | 94.26          | 0.0010                   | 3.85                   | 3.70                    | 815                    |
| KD0030    | 25Y_24H  | 93.95              | 94.69          | -0.0010                  | 4.21                   | 6.09                    | 2155                   |
| KD0030    | MA_24H   | 93.95              | 90.06          | 0.0010                   | 1.22                   | 1.22                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0040    | 100Y_24H | 93.86              | 95.18          | -0.0010                  | 6.66                   | 4.26                    | 28812                  |
| KD0040    | 10Y_24H  | 93.86              | 93.42          | -0.0010                  | 0.78                   | 1.76                    | 100                    |
| KD0040    | 10Y_6H   | 93.86              | 94.20          | -0.0010                  | 1.25                   | 1.75                    | 3946                   |
| KD0040    | 25Y_24H  | 93.86              | 94.69          | -0.0010                  | 3.88                   | 2.05                    | 15090                  |
| KD0040    | MA_24H   | 93.86              | 91.13          | -0.0008                  | 0.27                   | 0.27                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0050    | 100Y_24H | 85.80              | 86.19          | -0.0010                  | 4.42                   | 4.42                    | 848                    |
| KD0050    | 10Y_24H  | 85.80              | 84.27          | -0.0009                  | 1.43                   | 1.43                    | 100                    |
| KD0050    | 10Y_6H   | 85.80              | 84.37          | 0.0010                   | 1.67                   | 1.67                    | 100                    |
| KD0050    | 25Y_24H  | 85.80              | 84.41          | -0.0010                  | 1.90                   | 1.89                    | 100                    |
| KD0050    | MA_24H   | 85.80              | 83.93          | 0.0009                   | 0.49                   | 0.49                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|---------------------|------------------------|-------------------------|------------------------|
|-----------|----------|--------------------|----------------|---------------------|------------------------|-------------------------|------------------------|



| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0060    | 100Y_24H | 85.39              | 86.00          | 0.0010                   | 9.07                   | 9.07                    | 929                    |
| KD0060    | 10Y_24H  | 85.39              | 84.38          | 0.0010                   | 6.38                   | 6.38                    | 844                    |
| KD0060    | 10Y_6H   | 85.39              | 84.74          | 0.0010                   | 6.58                   | 6.58                    | 846                    |
| KD0060    | 25Y_24H  | 85.39              | 85.09          | 0.0010                   | 6.68                   | 6.68                    | 836                    |
| KD0060    | MA_24H   | 85.39              | 83.23          | 0.0010                   | 2.43                   | 2.43                    | 846                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0070    | 100Y_24H | 88.26              | 86.30          | -0.0010                  | 4.18                   | 4.18                    | 100                    |
| KD0070    | 10Y_24H  | 88.26              | 85.70          | 0.0010                   | 2.15                   | 2.15                    | 100                    |
| KD0070    | 10Y_6H   | 88.26              | 85.80          | 0.0010                   | 2.58                   | 2.58                    | 100                    |
| KD0070    | 25Y_24H  | 88.26              | 85.87          | 0.0010                   | 2.83                   | 2.83                    | 100                    |
| KD0070    | MA_24H   | 88.26              | 85.33          | -0.0010                  | 0.77                   | 0.77                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0080    | 100Y_24H | 88.27              | 86.72          | -0.0010                  | 4.16                   | 4.16                    | 100                    |
| KD0080    | 10Y_24H  | 88.27              | 86.26          | 0.0010                   | 2.14                   | 2.14                    | 100                    |
| KD0080    | 10Y_6H   | 88.27              | 86.36          | 0.0010                   | 2.57                   | 2.57                    | 100                    |
| KD0080    | 25Y_24H  | 88.27              | 86.42          | 0.0010                   | 2.82                   | 2.82                    | 100                    |
| KD0080    | MA_24H   | 88.27              | 85.89          | 0.0010                   | 0.77                   | 0.77                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0090    | 100Y_24H | 88.59              | 86.85          | 0.0010                   | 1.31                   | 1.31                    | 100                    |
| KD0090    | 10Y_24H  | 88.59              | 86.67          | 0.0009                   | 0.70                   | 0.70                    | 100                    |
| KD0090    | 10Y_6H   | 88.59              | 86.73          | -0.0010                  | 0.88                   | 0.88                    | 100                    |
| KD0090    | 25Y_24H  | 88.59              | 86.74          | 0.0008                   | 0.91                   | 0.91                    | 100                    |
| KD0090    | MA_24H   | 88.59              | 86.49          | 0.0010                   | 0.27                   | 0.27                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|---------------------|------------------------|-------------------------|------------------------|
|-----------|----------|--------------------|----------------|---------------------|------------------------|-------------------------|------------------------|

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0100    | 100Y_24H | 88.55              | 87.44          | 0.0010                   | 9.58                   | 9.58                    | 139                    |
| KD0100    | 10Y_24H  | 88.55              | 86.59          | -0.0010                  | 5.18                   | 5.18                    | 139                    |
| KD0100    | 10Y_6H   | 88.55              | 86.68          | -0.0010                  | 5.68                   | 5.68                    | 139                    |
| KD0100    | 25Y_24H  | 88.55              | 86.84          | -0.0010                  | 6.64                   | 6.64                    | 139                    |
| KD0100    | MA_24H   | 88.55              | 86.00          | -0.0010                  | 1.96                   | 1.96                    | 137                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0110    | 100Y_24H | 88.48              | 88.63          | -0.0010                  | 9.54                   | 9.49                    | 951                    |
| KD0110    | 10Y_24H  | 88.48              | 86.94          | -0.0010                  | 5.13                   | 5.13                    | 100                    |
| KD0110    | 10Y_6H   | 88.48              | 87.08          | -0.0010                  | 5.63                   | 5.63                    | 100                    |
| KD0110    | 25Y_24H  | 88.48              | 87.39          | 0.0010                   | 6.58                   | 6.58                    | 100                    |
| KD0110    | MA_24H   | 88.48              | 86.20          | 0.0010                   | 1.94                   | 1.94                    | 100                    |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0130    | 100Y_24H | 0.00               | 85.22          | 0.0029                   | 25.89                  | 0.07                    | 0                      |
| KD0130    | 10Y_24H  | 0.00               | 83.22          | 0.0011                   | 14.96                  | 0.01                    | 0                      |
| KD0130    | 10Y_6H   | 0.00               | 83.22          | 0.0011                   | 16.35                  | 0.03                    | 0                      |
| KD0130    | 25Y_24H  | 0.00               | 83.92          | 0.0017                   | 17.79                  | 0.03                    | 0                      |
| KD0130    | MA_24H   | 0.00               | 82.72          | 0.0006                   | 5.64                   | 0.00                    | 0                      |

#### Node Max Conditions [Scenario1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0140    | 100Y_24H | 93.74              | 95.16          | -0.0012                  | 6.43                   | 5.98                    | 784                    |
| KD0140    | 10Y_24H  | 93.74              | 93.42          | -0.0011                  | 6.71                   | 5.94                    | 832                    |
| KD0140    | 10Y_6H   | 93.74              | 94.19          | 0.0010                   | 6.66                   | 6.08                    | 833                    |
| KD0140    | 25Y_24H  | 93.74              | 94.67          | -0.0011                  | 6.58                   | 6.13                    | 815                    |
| KD0140    | MA_24H   | 93.74              | 89.92          | 0.0010                   | 2.27                   | 2.27                    | 832                    |

#### Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0010     | 100Y_24H | 3.70           | 0.00           | -0.17                    | 4.71                  | 4.71                  | 4.71                   |
| P0010     | 10Y_24H  | 1.43           | 0.00           | -0.01                    | 2.29                  | 3.60                  | 2.94                   |
| P0010     | 10Y_6H   | 1.67           | 0.00           | -0.01                    | 2.39                  | 3.78                  | 3.08                   |
| P0010     | 25Y_24H  | 1.89           | 0.00           | -0.09                    | 2.58                  | 3.57                  | 3.07                   |
| P0010     | MA_24H   | 0.49           | 0.00           | -0.01                    | 1.70                  | 2.64                  | 2.17                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0020     | 100Y_24H | 5.85           | -0.07          | -0.22                    | 3.31                  | 3.31                  | 3.31                   |
| P0020     | 10Y_24H  | 6.38           | -0.01          | -0.02                    | 3.61                  | 4.06                  | 3.83                   |
| P0020     | 10Y_6H   | 6.58           | -0.03          | 0.04                     | 3.72                  | 5.31                  | 4.51                   |
| P0020     | 25Y_24H  | 6.68           | -0.03          | -0.23                    | 3.78                  | 3.78                  | 3.78                   |
| P0020     | MA_24H   | 2.43           | 0.00           | 0.01                     | 2.19                  | 2.75                  | 2.47                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0030     | 100Y_24H | 1.66           | 0.00           | 0.69                     | 2.29                  | 6.74                  | 4.26                   |
| P0030     | 10Y_24H  | 1.65           | 0.00           | 0.10                     | 2.30                  | 6.69                  | 4.23                   |
| P0030     | 10Y_6H   | 1.70           | 0.00           | -0.19                    | 2.31                  | 7.02                  | 4.42                   |
| P0030     | 25Y_24H  | 1.71           | 0.00           | -0.18                    | 2.29                  | 6.73                  | 4.25                   |
| P0030     | MA_24H   | 0.59           | 0.00           | 0.01                     | 1.83                  | 6.59                  | 4.17                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0040     | 100Y_24H | 1.58           | 0.00           | -0.73                    | 2.17                  | 1.28                  | 1.50                   |
| P0040     | 10Y_24H  | 1.10           | 0.00           | -0.96                    | 2.23                  | 0.90                  | 1.54                   |
| P0040     | 10Y_6H   | 1.19           | 0.00           | 0.66                     | 2.24                  | 0.97                  | 1.55                   |
| P0040     | 25Y_24H  | 1.52           | 0.00           | 0.71                     | 2.21                  | 1.24                  | 1.53                   |
| P0040     | MA_24H   | 0.19           | 0.00           | 0.01                     | 1.44                  | 0.42                  | 0.85                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|



| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0050     | 100Y_24H | 3.68           | 0.00           | -0.23                    | 3.00                  | 3.00                  | 3.00                   |
| P0050     | 10Y_24H  | 3.15           | 0.00           | 0.05                     | 2.57                  | 2.67                  | 2.57                   |
| P0050     | 10Y_6H   | 3.69           | 0.00           | -0.08                    | 3.01                  | 3.01                  | 3.01                   |
| P0050     | 25Y_24H  | 3.66           | 0.00           | -0.22                    | 2.98                  | 2.98                  | 2.98                   |
| P0050     | MA_24H   | 1.22           | 0.00           | -0.01                    | 2.08                  | 2.69                  | 2.06                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0060     | 100Y_24H | 1.89           | 0.00           | -1.37                    | 2.51                  | 1.54                  | 1.95                   |
| P0060     | 10Y_24H  | 1.76           | 0.00           | -1.57                    | 2.57                  | 1.44                  | 2.00                   |
| P0060     | 10Y_6H   | 1.75           | 0.00           | -1.34                    | 2.54                  | 1.42                  | 1.98                   |
| P0060     | 25Y_24H  | 1.76           | 0.00           | -1.39                    | 2.54                  | 1.43                  | 1.98                   |
| P0060     | MA_24H   | 0.27           | 0.00           | 0.00                     | 1.63                  | 0.62                  | 1.01                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0070     | 100Y_24H | 5.98           | 0.00           | -0.01                    | 3.38                  | 3.38                  | 3.38                   |
| P0070     | 10Y_24H  | 5.94           | 0.00           | -0.01                    | 3.36                  | 3.36                  | 3.36                   |
| P0070     | 10Y_6H   | 6.08           | 0.00           | 0.01                     | 3.44                  | 3.44                  | 3.44                   |
| P0070     | 25Y_24H  | 6.13           | 0.00           | 0.01                     | 3.47                  | 3.47                  | 3.47                   |
| P0070     | MA_24H   | 2.27           | 0.00           | 0.01                     | 2.26                  | 2.08                  | 2.17                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0080     | 100Y_24H | 1.31           | 0.00           | -0.01                    | 2.15                  | 1.07                  | 1.61                   |
| P0080     | 10Y_24H  | 0.70           | 0.00           | -0.01                    | 1.82                  | 0.83                  | 1.32                   |
| P0080     | 10Y_6H   | 0.88           | 0.00           | -0.01                    | 1.94                  | 0.92                  | 1.43                   |
| P0080     | 25Y_24H  | 0.91           | 0.00           | 0.01                     | 1.95                  | 0.88                  | 1.42                   |
| P0080     | MA_24H   | 0.27           | 0.00           | 0.01                     | 1.43                  | 0.68                  | 1.06                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0090     | 100Y_24H | 4.16           | 0.00           | -0.01                    | 3.39                  | 6.18                  | 4.23                   |
| P0090     | 10Y_24H  | 2.14           | 0.00           | 0.01                     | 2.48                  | 6.08                  | 4.16                   |
| P0090     | 10Y_6H   | 2.57           | 0.00           | 0.01                     | 2.63                  | 6.31                  | 4.32                   |
| P0090     | 25Y_24H  | 2.82           | 0.00           | -0.01                    | 2.71                  | 6.15                  | 4.21                   |
| P0090     | MA_24H   | 0.77           | 0.00           | -0.01                    | 1.88                  | 4.98                  | 3.43                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0100     | 100Y_24H | 4.18           | 0.00           | -0.09                    | 3.41                  | 4.86                  | 4.13                   |
| P0100     | 10Y_24H  | 2.15           | 0.00           | -0.01                    | 2.46                  | 3.77                  | 3.11                   |
| P0100     | 10Y_6H   | 2.58           | 0.00           | 0.01                     | 2.60                  | 4.02                  | 3.31                   |
| P0100     | 25Y_24H  | 2.83           | 0.00           | -0.01                    | 2.67                  | 4.16                  | 3.41                   |
| P0100     | MA_24H   | 0.77           | 0.00           | 0.01                     | 1.84                  | 2.92                  | 2.38                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0110     | 100Y_24H | 9.49           | 0.00           | 0.01                     | 7.74                  | 7.74                  | 7.74                   |
| P0110     | 10Y_24H  | 5.13           | 0.00           | 0.01                     | 4.18                  | 4.18                  | 4.18                   |
| P0110     | 10Y_6H   | 5.63           | 0.00           | 0.01                     | 4.58                  | 4.58                  | 4.58                   |
| P0110     | 25Y_24H  | 6.58           | 0.00           | 0.01                     | 5.37                  | 5.37                  | 5.37                   |
| P0110     | MA_24H   | 1.94           | 0.00           | 0.01                     | 2.38                  | 2.70                  | 2.54                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0120     | 100Y_24H | 9.58           | 0.00           | 0.02                     | 5.42                  | 6.88                  | 6.15                   |
| P0120     | 10Y_24H  | 5.18           | 0.00           | -0.01                    | 3.14                  | 5.95                  | 4.51                   |
| P0120     | 10Y_6H   | 5.68           | 0.00           | -0.01                    | 3.30                  | 5.95                  | 4.51                   |
| P0120     | 25Y_24H  | 6.64           | 0.00           | 0.01                     | 3.76                  | 5.95                  | 4.53                   |
| P0120     | MA_24H   | 1.96           | 0.00           | 0.02                     | 2.29                  | 4.63                  | 3.46                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0010     | 100Y_24H | 0.72           | 0.00           | 0.01                     | 0.56                  | 0.56                  | 0.56                   |
| W0010     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0020     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0030     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0040     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|



| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0050     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0060     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0070     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0080     | 100Y_24H | 2.15           | -0.10          | 0.72                     | 0.50                  | 0.50                  | 0.50                   |
| W0080     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 10Y_6H   | 0.76           | 0.00           | -0.11                    | 0.52                  | 0.52                  | 0.52                   |
| W0080     | 25Y_24H  | 2.35           | 0.00           | 2.26                     | 0.52                  | 0.52                  | 0.52                   |
| W0080     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0090     | 100Y_24H | 5.22           | 0.00           | 3.60                     | 0.74                  | 0.74                  | 0.74                   |
| W0090     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 10Y_6H   | 0.43           | 0.00           | 0.00                     | 0.59                  | 0.59                  | 0.59                   |
| W0090     | 25Y_24H  | 2.93           | 0.00           | -2.51                    | 0.72                  | 0.72                  | 0.72                   |
| W0090     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0100     | 100Y_24H | 2.08           | 0.00           | 0.00                     | 1.17                  | 1.17                  | 1.17                   |
| W0100     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0110     | 100Y_24H | 1.68           | 0.00           | 0.00                     | 1.03                  | 1.03                  | 1.03                   |
| W0110     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0130     | 100Y_24H | 3.62           | 0.00           | 0.01                     | 1.03                  | 1.03                  | 1.03                   |
| W0130     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0140     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0150     | 100Y_24H | 0.00           | -1.51          | 1.48                     | -0.72                 | -0.72                 | -0.72                  |
| W0150     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 10Y_6H   | 0.00           | -0.25          | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 25Y_24H  | 0.00           | -1.57          | 1.57                     | -0.70                 | -0.70                 | -0.70                  |
| W0150     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0160     | 100Y_24H | 0.40           | -0.60          | 0.18                     | 0.42                  | 0.42                  | 0.42                   |
| W0160     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 10Y_6H   | 0.06           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 25Y_24H  | 0.31           | -0.37          | 0.17                     | 0.40                  | 0.40                  | 0.40                   |
| W0160     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0170     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link Min/Max Conditions [Scenario1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|
|-----------|----------|----------------|----------------|--------------------|-----------------------|-----------------------|------------------------|



| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0190     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

## **APPENDIX C**

### **Alternative 1 ICPR Input and Results**

Manual Basin: KDB0010

Scenario: ALT1  
Node: KD0010  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 25.6000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 3.3147 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.3293    | 1400            | A         |               |                       |                      |
| 2.9854    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0010    | 100Y_24H | 3.11           | 9.1833                 | 10.60               | 4.67              | 3.3147    | 54.9                    | 38.27    | 20.29  |
| KDB0010    | 10Y_24H  | 1.60           | 10.0333                | 7.50                | 2.63              | 3.3147    | 56.8                    | 38.27    | 20.29  |
| KDB0010    | 10Y_6H   | 1.85           | 2.6667                 | 4.65                | 1.16              | 3.3147    | 61.0                    | 38.27    | 20.29  |
| KDB0010    | 25Y_24H  | 2.10           | 9.2000                 | 8.60                | 3.31              | 3.3147    | 55.9                    | 38.27    | 20.29  |
| KDB0010    | MA_24H   | 0.59           | 9.1000                 | 4.50                | 1.10              | 3.3147    | 61.3                    | 38.27    | 20.29  |

Manual Basin: KDB0020

Scenario: ALT1  
Node: KD0020  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 13.3000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 1.0956 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 1.0956    | 1200            | A         |               |                       |                      |

Comment:



Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0020    | 100Y_24H | 1.14           | 9.0500                 | 10.60               | 4.57              | 1.0956    | 54.2                    | 37.30    | 18.90  |
| KDB0020    | 10Y_24H  | 0.58           | 9.0667                 | 7.50                | 2.55              | 1.0956    | 56.0                    | 37.30    | 18.90  |
| KDB0020    | 10Y_6H   | 0.70           | 2.5500                 | 4.65                | 1.10              | 1.0956    | 60.0                    | 37.30    | 18.90  |
| KDB0020    | 25Y_24H  | 0.77           | 9.0667                 | 8.60                | 3.22              | 1.0956    | 55.2                    | 37.30    | 18.90  |
| KDB0020    | MA_24H   | 0.19           | 9.0167                 | 4.50                | 1.04              | 1.0956    | 60.4                    | 37.30    | 18.90  |

Manual Basin: KDB0030

Scenario: ALT1  
Node: KD0030  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 23.3000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 6.2464 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.2357    | 1400            | A/D       |               |                       |                      |
| 0.0114    | 1200            | A/D       |               |                       |                      |
| 5.6956    | 1200            | A         |               |                       |                      |
| 0.3037    | 1400            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0030    | 100Y_24H | 6.19           | 9.1667                 | 10.60               | 4.79              | 6.2464    | 55.8                    | 38.15    | 20.11  |
| KDB0030    | 10Y_24H  | 3.23           | 9.1667                 | 7.50                | 2.72              | 6.2464    | 57.7                    | 38.15    | 20.11  |
| KDB0030    | 10Y_6H   | 3.85           | 2.6333                 | 4.65                | 1.22              | 6.2464    | 61.9                    | 38.15    | 20.11  |
| KDB0030    | 25Y_24H  | 4.21           | 9.1667                 | 8.60                | 3.42              | 6.2464    | 56.9                    | 38.15    | 20.11  |
| KDB0030    | MA_24H   | 1.22           | 9.0833                 | 4.50                | 1.15              | 6.2464    | 62.2                    | 38.15    | 20.11  |

Manual Basin: KDB0040

Scenario: ALT1  
Node: KD0040  
Hydrograph Method: NRCS Unit Hydrograph

Infiltration Method: Curve Number  
 Time of Concentration: 17.6000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 1.5426 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 1.5426    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0040    | 100Y_24H | 1.54           | 9.1000                 | 10.60               | 4.57              | 1.5426    | 54.2                    | 37.30    | 18.90  |
| KDB0040    | 10Y_24H  | 0.78           | 9.1167                 | 7.50                | 2.54              | 1.5426    | 56.0                    | 37.30    | 18.90  |
| KDB0040    | 10Y_6H   | 0.92           | 2.5833                 | 4.65                | 1.10              | 1.5426    | 60.0                    | 37.30    | 18.90  |
| KDB0040    | 25Y_24H  | 1.03           | 9.1167                 | 8.60                | 3.22              | 1.5426    | 55.2                    | 37.30    | 18.90  |
| KDB0040    | MA_24H   | 0.27           | 9.0333                 | 4.50                | 1.04              | 1.5426    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0050

Scenario: ALT1  
 Node: KD0050  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 18.7000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 2.8650 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 2.8650    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0050    | 100Y_24H | 2.83           | 9.1167                 | 10.60               | 4.57              | 2.8650    | 54.2                    | 37.30    | 18.90  |
| KDB0050    | 10Y_24H  | 1.43           | 9.1333                 | 7.50                | 2.55              | 2.8650    | 56.0                    | 37.30    | 18.90  |
| KDB0050    | 10Y_6H   | 1.67           | 2.6000                 | 4.65                | 1.10              | 2.8650    | 60.0                    | 37.30    | 18.90  |
| KDB0050    | 25Y_24H  | 1.90           | 9.1167                 | 8.60                | 3.22              | 2.8650    | 55.2                    | 37.30    | 18.90  |
| KDB0050    | MA_24H   | 0.49           | 9.0333                 | 4.50                | 1.04              | 2.8650    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0060

Scenario: ALT1  
 Node: KD0060  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 17.2000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.9439 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.9439    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0060    | 100Y_24H | 0.94           | 9.1000                 | 10.60               | 4.57              | 0.9439    | 54.2                    | 37.30    | 18.90  |
| KDB0060    | 10Y_24H  | 0.48           | 9.1167                 | 7.50                | 2.55              | 0.9439    | 56.0                    | 37.30    | 18.90  |
| KDB0060    | 10Y_6H   | 0.56           | 2.5833                 | 4.65                | 1.10              | 0.9439    | 60.0                    | 37.30    | 18.90  |
| KDB0060    | 25Y_24H  | 0.63           | 9.1000                 | 8.60                | 3.22              | 0.9439    | 55.2                    | 37.30    | 18.90  |
| KDB0060    | MA_24H   | 0.16           | 9.0333                 | 4.50                | 1.04              | 0.9439    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0070

Scenario: ALT1  
 Node: KD0070  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr



Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.0201 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0201    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0070    | 100Y_24H | 0.02           | 9.0333                 | 10.60               | 4.57              | 0.0201    | 54.2                    | 37.30    | 18.90  |
| KDB0070    | 10Y_24H  | 0.01           | 9.0333                 | 7.50                | 2.54              | 0.0201    | 56.0                    | 37.30    | 18.90  |
| KDB0070    | 10Y_6H   | 0.01           | 2.5333                 | 4.65                | 1.10              | 0.0201    | 60.0                    | 37.30    | 18.90  |
| KDB0070    | 25Y_24H  | 0.01           | 9.0333                 | 8.60                | 3.22              | 0.0201    | 55.2                    | 37.30    | 18.90  |
| KDB0070    | MA_24H   | 0.00           | 9.0000                 | 4.50                | 1.04              | 0.0201    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0080

Scenario: ALT1  
 Node: KD0080  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 19.1000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 2.9007 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 2.9007    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0080    | 100Y_24H | 2.85           | 9.1167                 | 10.60               | 4.57              | 2.9007    | 54.2                    | 37.30    | 18.90  |
| KDB0080    | 10Y_24H  | 1.44           | 9.1333                 | 7.50                | 2.55              | 2.9007    | 56.0                    | 37.30    | 18.90  |
| KDB0080    | 10Y_6H   | 1.68           | 2.6000                 | 4.65                | 1.10              | 2.9007    | 60.0                    | 37.30    | 18.90  |
| KDB0080    | 25Y_24H  | 1.91           | 9.1333                 | 8.60                | 3.22              | 2.9007    | 55.2                    | 37.30    | 18.90  |

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0080    | MA_24H   | 0.50           | 9.0333                 | 4.50                | 1.04              | 2.9007    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0090

Scenario: ALT1  
 Node: Bioswale  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.6758 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.6758    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0090    | 100Y_24H | 0.72           | 9.0333                 | 10.60               | 4.57              | 0.6758    | 54.2                    | 37.30    | 18.90  |
| KDB0090    | 10Y_24H  | 0.37           | 9.0333                 | 7.50                | 2.54              | 0.6758    | 56.0                    | 37.30    | 18.90  |
| KDB0090    | 10Y_6H   | 0.45           | 2.5333                 | 4.65                | 1.10              | 0.6758    | 60.0                    | 37.30    | 18.90  |
| KDB0090    | 25Y_24H  | 0.49           | 9.0333                 | 8.60                | 3.22              | 0.6758    | 55.2                    | 37.30    | 18.90  |
| KDB0090    | MA_24H   | 0.12           | 9.0000                 | 4.50                | 1.04              | 0.6758    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0100

Scenario: ALT1  
 Node: KD0100  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.0978 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient | Reference ET Station |
|-----------|-----------------|-----------|---------------|------------------|----------------------|
|-----------|-----------------|-----------|---------------|------------------|----------------------|

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0978    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0100    | 100Y_24H | 0.10           | 9.0333                 | 10.60               | 4.57              | 0.0978    | 54.2                    | 37.30    | 18.90  |
| KDB0100    | 10Y_24H  | 0.05           | 9.0333                 | 7.50                | 2.54              | 0.0978    | 56.0                    | 37.30    | 18.90  |
| KDB0100    | 10Y_6H   | 0.07           | 2.5333                 | 4.65                | 1.10              | 0.0978    | 60.0                    | 37.30    | 18.90  |
| KDB0100    | 25Y_24H  | 0.07           | 9.0333                 | 8.60                | 3.22              | 0.0978    | 55.2                    | 37.30    | 18.90  |
| KDB0100    | MA_24H   | 0.02           | 9.0000                 | 4.50                | 1.04              | 0.0978    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0110

Scenario: ALT1  
 Node: KD0110  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 11.6000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 3.6964 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 3.6964    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0110    | 100Y_24H | 3.89           | 9.0500                 | 10.60               | 4.57              | 3.6964    | 54.2                    | 37.30    | 18.90  |
| KDB0110    | 10Y_24H  | 1.99           | 9.0500                 | 7.50                | 2.54              | 3.6964    | 56.0                    | 37.30    | 18.90  |
| KDB0110    | 10Y_6H   | 2.41           | 2.5500                 | 4.65                | 1.10              | 3.6964    | 60.0                    | 37.30    | 18.90  |
| KDB0110    | 25Y_24H  | 2.63           | 9.0500                 | 8.60                | 3.22              | 3.6964    | 55.2                    | 37.30    | 18.90  |
| KDB0110    | MA_24H   | 0.65           | 9.0000                 | 4.50                | 1.04              | 3.6964    | 60.4                    | 37.30    | 18.90  |



Manual Basin: KDB0120

Scenario: ALT1  
Node: KD0120  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 21.2000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 6.7420 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 6.1688    | 1200            | A         |               |                       |                      |
| 0.0164    | 7400            | A         |               |                       |                      |
| 0.3071    | 1200            | A/D       |               |                       |                      |
| 0.2496    | 1400            | A/D       |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0120    | 100Y_24H | 7.04           | 9.1333                 | 10.60               | 4.93              | 6.7420    | 56.7                    | 37.66    | 19.42  |
| KDB0120    | 10Y_24H  | 3.74           | 9.1500                 | 7.50                | 2.82              | 6.7420    | 58.7                    | 37.66    | 19.42  |
| KDB0120    | 10Y_6H   | 4.58           | 2.6167                 | 4.65                | 1.28              | 6.7420    | 62.8                    | 37.66    | 19.42  |
| KDB0120    | 25Y_24H  | 4.84           | 9.1333                 | 8.60                | 3.53              | 6.7420    | 57.8                    | 37.66    | 19.42  |
| KDB0120    | MA_24H   | 1.44           | 9.0667                 | 4.50                | 1.21              | 6.7420    | 63.1                    | 37.66    | 19.42  |

Manual Basin: KDB0130

Scenario: ALT1  
Node: KDB0130  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 10.0000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 0.5337 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0793    | 1400            | A/D       |               |                       |                      |
| 0.0252    | 1200            | A/D       |               |                       |                      |
| 0.4292    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0130    | 100Y_24H | 0.67           | 9.0167                 | 10.60               | 5.43              | 0.5337    | 60.4                    | 38.76    | 20.98  |
| KDB0130    | 10Y_24H  | 0.38           | 9.0333                 | 7.50                | 3.22              | 0.5337    | 62.4                    | 38.76    | 20.98  |
| KDB0130    | 10Y_6H   | 0.55           | 2.3167                 | 4.65                | 1.53              | 0.5337    | 66.5                    | 38.76    | 20.98  |
| KDB0130    | 25Y_24H  | 0.48           | 9.0167                 | 8.60                | 3.97              | 0.5337    | 61.6                    | 38.76    | 20.98  |
| KDB0130    | MA_24H   | 0.15           | 9.0000                 | 4.50                | 1.45              | 0.5337    | 66.9                    | 38.76    | 20.98  |

Node: Bioswale

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 86.38 ft  
Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 86.38      | 0.0000    | 1          |
| 86.50      | 0.0007    | 32         |
| 86.75      | 0.0020    | 85         |
| 87.00      | 0.0038    | 164        |
| 87.25      | 0.0059    | 257        |
| 87.50      | 0.0087    | 378        |
| 87.75      | 0.0117    | 510        |
| 88.00      | 0.0151    | 656        |
| 88.25      | 0.0190    | 826        |
| 88.50      | 0.0234    | 1018       |
| 88.75      | 0.0286    | 1244       |
| 89.00      | 0.0405    | 1763       |
| 89.25      | 0.0670    | 2918       |
| 89.50      | 0.0798    | 3475       |
| 89.75      | 0.0912    | 3971       |
| 90.00      | 0.1011    | 4402       |
| 90.25      | 0.1094    | 4767       |
| 90.50      | 0.1188    | 5173       |
| 90.75      | 0.1289    | 5616       |
| 91.00      | 0.1383    | 6026       |
| 91.25      | 0.1476    | 6430       |
| 91.50      | 0.1567    | 6828       |
| 91.75      | 0.1672    | 7285       |
| 92.00      | 0.1777    | 7742       |
| 92.25      | 0.1902    | 8283       |
| 92.50      | 0.2050    | 8930       |
| 92.75      | 0.2192    | 9548       |
| 93.00      | 0.2346    | 10221      |
| 93.25      | 0.2537    | 11049      |
| 93.50      | 0.2742    | 11946      |
| 93.75      | 0.2952    | 12858      |
| 94.00      | 0.3171    | 13811      |
| 94.25      | 0.3430    | 14940      |
| 94.50      | 0.3677    | 16016      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 94.75      | 0.3882    | 16912      |
| 95.00      | 0.4126    | 17972      |
| 95.25      | 0.4448    | 19376      |
| 95.50      | 0.4844    | 21100      |
| 95.75      | 0.5133    | 22361      |
| 96.00      | 0.5621    | 24485      |
| 96.25      | 0.6105    | 26594      |
| 96.50      | 0.6543    | 28502      |
| 96.75      | 0.6978    | 30397      |
| 97.00      | 0.7388    | 32181      |
| 97.25      | 0.7800    | 33977      |
| 97.50      | 0.8179    | 35627      |
| 97.75      | 0.8522    | 37120      |
| 98.00      | 0.8879    | 38679      |
| 98.25      | 0.9297    | 40498      |
| 98.50      | 0.9681    | 42170      |
| 98.75      | 1.0003    | 43571      |
| 99.00      | 1.0461    | 45566      |
| 99.25      | 1.0780    | 46956      |
| 99.50      | 1.1443    | 49847      |
| 99.75      | 1.1969    | 52135      |
| 100.00     | 1.2088    | 52656      |
| 100.25     | 1.2093    | 52677      |
| 100.50     | 1.2093    | 52677      |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| Bioswale  | 100Y_24H | 0.00               | 89.47          | 0.0010                   | 5.76                   | 5.75                    | 3417                   |
| Bioswale  | 10Y_24H  | 0.00               | 89.38          | 0.0010                   | 2.35                   | 2.35                    | 3211                   |
| Bioswale  | 10Y_6H   | 0.00               | 89.35          | -0.0010                  | 1.58                   | 1.57                    | 3133                   |
| Bioswale  | 25Y_24H  | 0.00               | 89.42          | 0.0010                   | 3.57                   | 3.57                    | 3301                   |
| Bioswale  | MA_24H   | 0.00               | 87.95          | 0.0010                   | 0.12                   | 0.09                    | 629                    |



Node: KD0010

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 91.26 ft  
Warning Stage: 93.83 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.74      | 0.0001    | 6          |
| 94.00      | 0.0123    | 537        |
| 94.50      | 0.0377    | 1644       |



| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.00      | 0.0940    | 4094       |
| 95.50      | 0.2666    | 11612      |
| 96.00      | 0.3725    | 16225      |
| 96.50      | 0.4731    | 20606      |
| 97.00      | 0.6497    | 28300      |
| 97.50      | 0.8768    | 38194      |
| 98.00      | 1.1886    | 51775      |
| 98.50      | 1.5262    | 66481      |
| 99.00      | 1.8675    | 81350      |
| 99.50      | 2.3948    | 104319     |
| 100.00     | 3.1627    | 137769     |
| 100.50     | 3.2942    | 143494     |
| 101.00     | 3.2980    | 143659     |
| 101.50     | 3.3017    | 143823     |
| 102.00     | 3.3017    | 143823     |
| 91.26      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0010    | 100Y_24H | 93.83              | 92.20          | 0.0008                   | 3.11                   | 3.11                    | 100                    |
| KD0010    | 10Y_24H  | 93.83              | 91.90          | 0.0008                   | 1.60                   | 1.60                    | 100                    |
| KD0010    | 10Y_6H   | 93.83              | 91.95          | -0.0009                  | 1.85                   | 1.85                    | 100                    |
| KD0010    | 25Y_24H  | 93.83              | 92.00          | 0.0010                   | 2.10                   | 2.10                    | 100                    |
| KD0010    | MA_24H   | 93.83              | 91.63          | 0.0009                   | 0.59                   | 0.59                    | 100                    |

Node: KD0020

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 91.04 ft  
Warning Stage: 93.81 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.69      | 0.0001    | 6          |
| 94.00      | 0.0165    | 719        |
| 94.50      | 0.0902    | 3931       |
| 95.00      | 0.2587    | 11269      |
| 95.50      | 0.4545    | 19800      |
| 96.00      | 0.6323    | 27544      |
| 96.50      | 0.8147    | 35488      |
| 97.00      | 0.9005    | 39225      |
| 97.50      | 0.9930    | 43256      |
| 98.00      | 1.0240    | 44606      |
| 98.50      | 1.0596    | 46156      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 99.00      | 1.0892    | 47444      |
| 99.50      | 1.0899    | 47477      |
| 100.00     | 1.0899    | 47477      |
| 91.04      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0020    | 100Y_24H | 93.81              | 91.56          | 0.0004                   | 1.14                   | 1.14                    | 100                    |
| KD0020    | 10Y_24H  | 93.81              | 91.40          | 0.0006                   | 0.58                   | 0.58                    | 100                    |
| KD0020    | 10Y_6H   | 93.81              | 91.44          | -0.0009                  | 0.70                   | 0.70                    | 100                    |
| KD0020    | 25Y_24H  | 93.81              | 91.46          | -0.0005                  | 0.77                   | 0.77                    | 100                    |
| KD0020    | MA_24H   | 93.81              | 91.24          | 0.0004                   | 0.19                   | 0.19                    | 100                    |

#### Node: KD0030

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 89.46 ft  
Warning Stage: 93.95 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.90      | 0.0004    | 19         |
| 94.00      | 0.0026    | 113        |
| 94.50      | 0.0337    | 1469       |
| 95.00      | 0.0743    | 3238       |
| 95.50      | 0.1195    | 5206       |
| 96.00      | 0.1717    | 7481       |
| 96.50      | 0.2352    | 10244      |
| 97.00      | 0.3287    | 14319      |
| 97.50      | 0.4821    | 21000      |
| 98.00      | 0.7853    | 34206      |
| 98.50      | 1.2544    | 54644      |
| 99.00      | 1.8396    | 80131      |
| 99.50      | 2.5953    | 113050     |
| 100.00     | 3.6783    | 160225     |
| 100.50     | 5.1390    | 223856     |
| 101.00     | 5.9345    | 258506     |
| 101.50     | 6.2012    | 270125     |
| 102.00     | 6.2334    | 271525     |
| 102.50     | 6.2389    | 271768     |
| 103.00     | 6.2389    | 271768     |
| 89.46      | 0.0001    | 4          |

Comment:

## Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0030    | 100Y_24H | 93.95              | 91.20          | -0.0009                  | 6.19                   | 6.19                    | 100                    |
| KD0030    | 10Y_24H  | 93.95              | 90.44          | -0.0010                  | 3.23                   | 3.23                    | 100                    |
| KD0030    | 10Y_6H   | 93.95              | 90.56          | -0.0008                  | 3.85                   | 3.85                    | 100                    |
| KD0030    | 25Y_24H  | 93.95              | 90.66          | -0.0010                  | 4.21                   | 4.21                    | 100                    |
| KD0030    | MA_24H   | 93.95              | 90.02          | -0.0009                  | 1.22                   | 1.22                    | 100                    |

## Node: KD0040

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 90.89 ft  
Warning Stage: 93.86 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.78      | 0.0003    | 13         |
| 94.00      | 0.0069    | 300        |
| 94.50      | 0.2124    | 9250       |
| 95.00      | 0.5624    | 24500      |
| 95.50      | 0.8441    | 36769      |
| 96.00      | 1.0701    | 46613      |
| 96.50      | 1.2400    | 54012      |
| 97.00      | 1.4136    | 61575      |
| 97.50      | 1.4708    | 64069      |
| 98.00      | 1.5177    | 66112      |
| 98.50      | 1.5431    | 67218      |
| 99.00      | 1.5431    | 67218      |
| 90.89      | 0.0001    | 4          |

Comment:

## Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0040    | 100Y_24H | 93.86              | 91.50          | 0.0004                   | 1.54                   | 1.54                    | 100                    |
| KD0040    | 10Y_24H  | 93.86              | 91.30          | -0.0004                  | 0.78                   | 0.78                    | 100                    |
| KD0040    | 10Y_6H   | 93.86              | 91.34          | -0.0004                  | 0.92                   | 0.92                    | 100                    |
| KD0040    | 25Y_24H  | 93.86              | 91.38          | 0.0004                   | 1.03                   | 1.03                    | 100                    |
| KD0040    | MA_24H   | 93.86              | 91.11          | -0.0004                  | 0.27                   | 0.27                    | 100                    |

## Node: KD0050

Scenario: ALT1



Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 82.55 ft  
Warning Stage: 85.80 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 85.80      | 0.0003    | 13         |
| 86.00      | 0.0057    | 250        |
| 86.50      | 0.0412    | 1794       |
| 87.00      | 0.0857    | 3731       |
| 87.50      | 0.1570    | 6837       |
| 88.00      | 0.2323    | 10119      |
| 88.50      | 0.3046    | 13269      |
| 89.00      | 0.3840    | 16725      |
| 89.50      | 0.4518    | 19681      |
| 90.00      | 0.5187    | 22594      |
| 90.50      | 0.6155    | 26812      |
| 91.00      | 0.7145    | 31125      |
| 91.50      | 0.9039    | 39375      |
| 92.00      | 1.0744    | 46800      |
| 92.50      | 1.2377    | 53913      |
| 93.00      | 1.3982    | 60906      |
| 93.50      | 1.5565    | 67800      |
| 94.00      | 1.6832    | 73319      |
| 94.50      | 1.8242    | 79463      |
| 95.00      | 2.0265    | 88275      |
| 95.50      | 2.4935    | 108619     |
| 96.00      | 2.7769    | 120963     |
| 96.50      | 2.8370    | 123581     |
| 97.00      | 2.8568    | 124444     |
| 97.50      | 2.8658    | 124833     |
| 98.00      | 2.8658    | 124833     |
| 82.55      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0050    | 100Y_24H | 85.80              | 86.02          | 0.0010                   | 2.83                   | 2.82                    | 323                    |
| KD0050    | 10Y_24H  | 85.80              | 83.82          | 0.0010                   | 1.43                   | 1.42                    | 100                    |
| KD0050    | 10Y_6H   | 85.80              | 84.05          | -0.0010                  | 1.67                   | 1.66                    | 100                    |
| KD0050    | 25Y_24H  | 85.80              | 84.35          | 0.0010                   | 1.90                   | 1.89                    | 100                    |
| KD0050    | MA_24H   | 85.80              | 83.15          | -0.0010                  | 0.49                   | 0.50                    | 100                    |

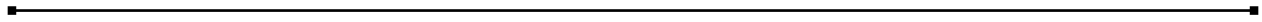
Node: KD0060

Scenario: ALT1  
Type: Stage/Area

Base Flow: 0.00 cfs  
Initial Stage: 82.33 ft  
Warning Stage: 85.39 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 85.38      | 0.0001    | 6          |
| 85.50      | 0.0012    | 51         |
| 86.00      | 0.0209    | 912        |
| 86.50      | 0.0729    | 3175       |
| 87.00      | 0.1126    | 4906       |
| 87.50      | 0.1486    | 6475       |
| 88.00      | 0.1921    | 8369       |
| 88.50      | 0.2324    | 10125      |
| 89.00      | 0.2663    | 11600      |
| 89.50      | 0.2822    | 12294      |
| 90.00      | 0.3096    | 13487      |
| 90.50      | 0.3568    | 15544      |
| 91.00      | 0.3887    | 16931      |
| 91.50      | 0.4161    | 18125      |
| 92.00      | 0.4396    | 19150      |
| 92.50      | 0.4946    | 21544      |
| 93.00      | 0.5627    | 24513      |
| 93.50      | 0.6353    | 27675      |
| 94.00      | 0.6510    | 28356      |
| 94.50      | 0.6855    | 29863      |
| 95.00      | 0.7640    | 33281      |
| 95.50      | 0.8533    | 37169      |
| 96.00      | 0.9044    | 39394      |
| 96.50      | 0.9281    | 40426      |
| 97.00      | 0.9281    | 40426      |
| 82.33      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0060    | 100Y_24H | 85.39              | 85.94          | -0.0010                  | 15.68                  | 15.68                   | 1130                   |
| KD0060    | 10Y_24H  | 85.39              | 83.80          | 0.0010                   | 8.03                   | 8.02                    | 1157                   |
| KD0060    | 10Y_6H   | 85.39              | 84.02          | -0.0010                  | 9.48                   | 9.45                    | 1156                   |
| KD0060    | 25Y_24H  | 85.39              | 84.31          | 0.0010                   | 10.57                  | 10.57                   | 1142                   |
| KD0060    | MA_24H   | 85.39              | 83.15          | -0.0010                  | 2.92                   | 2.92                    | 1133                   |



Node: KD0070

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 84.86 ft

Warning Stage: 88.26 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.07      | 0.0001    | 6          |
| 88.50      | 0.0115    | 500        |
| 89.00      | 0.0194    | 844        |
| 89.50      | 0.0194    | 847        |
| 90.00      | 0.0194    | 847        |
| 84.86      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0070    | 100Y_24H | 88.26              | 87.52          | -0.0010                  | 7.83                   | 7.83                    | 100                    |
| KD0070    | 10Y_24H  | 88.26              | 85.99          | -0.0010                  | 3.25                   | 3.25                    | 100                    |
| KD0070    | 10Y_6H   | 88.26              | 85.68          | -0.0009                  | 2.08                   | 2.08                    | 100                    |
| KD0070    | 25Y_24H  | 88.26              | 86.50          | 0.0010                   | 4.87                   | 4.87                    | 100                    |
| KD0070    | MA_24H   | 88.26              | 85.23          | 0.0009                   | 0.50                   | 0.50                    | 100                    |

#### Node: KD0080

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 85.43 ft  
Warning Stage: 88.27 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.14      | 0.0001    | 6          |
| 88.50      | 0.0086    | 375        |
| 89.00      | 0.0232    | 1013       |
| 89.50      | 0.0390    | 1700       |
| 90.00      | 0.0600    | 2613       |
| 90.50      | 0.0796    | 3469       |
| 91.00      | 0.1013    | 4412       |
| 91.50      | 0.1286    | 5600       |
| 92.00      | 0.1805    | 7862       |
| 92.50      | 0.2299    | 10012      |
| 93.00      | 0.2682    | 11681      |
| 93.50      | 0.3151    | 13725      |
| 94.00      | 0.3753    | 16350      |
| 94.50      | 0.4322    | 18825      |
| 95.00      | 0.5119    | 22300      |
| 95.50      | 0.6672    | 29062      |
| 96.00      | 1.0996    | 47900      |
| 96.50      | 1.7020    | 74138      |
| 97.00      | 2.1503    | 93669      |



| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 97.50      | 2.6237    | 114288     |
| 98.00      | 2.8439    | 123881     |
| 98.50      | 2.8970    | 126191     |
| 99.00      | 2.9006    | 126351     |
| 99.50      | 2.9006    | 126351     |
| 85.43      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0080    | 100Y_24H | 88.27              | 88.14          | -0.0010                  | 7.81                   | 7.81                    | 100                    |
| KD0080    | 10Y_24H  | 88.27              | 86.51          | -0.0010                  | 3.24                   | 3.24                    | 100                    |
| KD0080    | 10Y_6H   | 88.27              | 86.24          | -0.0010                  | 2.07                   | 2.07                    | 100                    |
| KD0080    | 25Y_24H  | 88.27              | 86.88          | -0.0010                  | 4.86                   | 4.86                    | 100                    |
| KD0080    | MA_24H   | 88.27              | 85.79          | -0.0010                  | 0.50                   | 0.50                    | 100                    |

#### Node: KD0090

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 86.23 ft  
Warning Stage: 88.59 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 86.23      | 0.0010    | 44         |
| 88.59      | 0.0010    | 44         |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0090    | 100Y_24H | 88.59              | 88.56          | -0.0010                  | 5.24                   | 5.24                    | 100                    |
| KD0090    | 10Y_24H  | 88.59              | 86.99          | 0.0010                   | 1.87                   | 1.87                    | 100                    |
| KD0090    | 10Y_6H   | 88.59              | 86.79          | -0.0010                  | 1.10                   | 1.10                    | 100                    |
| KD0090    | 25Y_24H  | 88.59              | 87.28          | 0.0010                   | 3.07                   | 3.07                    | 100                    |
| KD0090    | MA_24H   | 88.59              | 86.23          | 0.0000                   | 0.00                   | 0.00                    | 100                    |

Node: KD0100

Scenario: ALT1  
 Type: Stage/Area  
 Base Flow: 0.00 cfs  
 Initial Stage: 85.27 ft  
 Warning Stage: 88.55 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.33      | 0.0001    | 6          |
| 88.50      | 0.0029    | 125        |
| 89.00      | 0.0892    | 3888       |
| 89.50      | 0.0939    | 4090       |
| 90.00      | 0.0939    | 4090       |
| 85.27      | 0.0001    | 4          |

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0100    | 100Y_24H | 88.55              | 86.38          | 0.0010                   | 3.99                   | 3.99                    | 139                    |
| KD0100    | 10Y_24H  | 88.55              | 86.02          | 0.0010                   | 2.05                   | 2.05                    | 138                    |
| KD0100    | 10Y_6H   | 88.55              | 86.10          | -0.0010                  | 2.47                   | 2.47                    | 139                    |
| KD0100    | 25Y_24H  | 88.55              | 86.15          | 0.0010                   | 2.70                   | 2.70                    | 139                    |
| KD0100    | MA_24H   | 88.55              | 85.68          | 0.0010                   | 0.67                   | 0.67                    | 119                    |

Node: KD0110

Scenario: ALT1  
 Type: Stage/Area  
 Base Flow: 0.00 cfs  
 Initial Stage: 85.41 ft  
 Warning Stage: 88.48 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.43      | 0.0001    | 6          |
| 88.50      | 0.0016    | 69         |
| 89.00      | 0.0819    | 3569       |
| 89.50      | 0.1573    | 6850       |
| 90.00      | 0.2369    | 10319      |
| 90.50      | 0.3037    | 13231      |
| 91.00      | 0.3726    | 16231      |
| 91.50      | 0.4599    | 20031      |
| 92.00      | 0.5632    | 24531      |
| 92.50      | 0.6903    | 30069      |
| 93.00      | 0.7876    | 34306      |
| 93.50      | 0.9026    | 39319      |
| 94.00      | 0.9929    | 43250      |
| 94.50      | 1.1335    | 49375      |

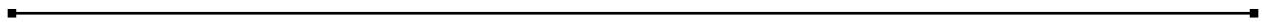
| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.00      | 1.2346    | 53781      |
| 95.50      | 1.3394    | 58344      |
| 96.00      | 1.4477    | 63063      |
| 96.50      | 1.6566    | 72162      |
| 97.00      | 1.9140    | 83375      |
| 97.50      | 2.4139    | 105150     |
| 98.00      | 3.0096    | 131100     |
| 98.50      | 3.3444    | 145681     |
| 99.00      | 3.4563    | 150556     |
| 99.50      | 3.5128    | 153019     |
| 100.00     | 3.5516    | 154706     |
| 100.50     | 3.6292    | 158088     |
| 101.00     | 3.6754    | 160100     |
| 101.50     | 3.6830    | 160433     |
| 102.00     | 3.6830    | 160433     |
| 85.41      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0110    | 100Y_24H | 88.48              | 86.65          | 0.0010                   | 3.89                   | 3.89                    | 100                    |
| KD0110    | 10Y_24H  | 88.48              | 86.21          | 0.0010                   | 1.99                   | 1.99                    | 100                    |
| KD0110    | 10Y_6H   | 88.48              | 86.31          | 0.0010                   | 2.41                   | 2.41                    | 100                    |
| KD0110    | 25Y_24H  | 88.48              | 86.36          | 0.0010                   | 2.63                   | 2.63                    | 100                    |
| KD0110    | MA_24H   | 88.48              | 85.84          | 0.0010                   | 0.65                   | 0.65                    | 100                    |



Node: KD0120

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 95.50 ft  
Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 97.28      | 0.0001    | 6          |
| 97.50      | 0.0171    | 744        |
| 98.00      | 0.1194    | 5200       |
| 98.50      | 0.2834    | 12344      |
| 99.00      | 0.6104    | 26587      |
| 99.50      | 0.9440    | 41119      |
| 100.00     | 1.2516    | 54519      |
| 100.50     | 1.5809    | 68862      |
| 101.00     | 2.6641    | 116050     |
| 101.50     | 5.0608    | 220450     |
| 102.00     | 6.3572    | 276919     |



| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 102.50     | 6.6189    | 288319     |
| 103.00     | 6.7130    | 292419     |
| 103.50     | 6.7259    | 292979     |
| 104.00     | 6.7259    | 292979     |
| 95.50      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0120    | 100Y_24H | 0.00               | 98.60          | -0.0010                  | 7.04                   | 6.37                    | 15108                  |
| KD0120    | 10Y_24H  | 0.00               | 98.25          | 0.0010                   | 3.74                   | 3.43                    | 8724                   |
| KD0120    | 10Y_6H   | 0.00               | 98.17          | 0.0010                   | 4.58                   | 3.84                    | 7571                   |
| KD0120    | 25Y_24H  | 0.00               | 98.37          | -0.0010                  | 4.84                   | 4.45                    | 10436                  |
| KD0120    | MA_24H   | 0.00               | 97.46          | -0.0010                  | 1.44                   | 1.43                    | 622                    |



Node: KD0130

Scenario: ALT1  
Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 82.04 ft  
Warning Stage: 0.00 ft  
Boundary Stage: KD0130

| Year | Month | Day | Hour     | Stage [ft] |
|------|-------|-----|----------|------------|
| 0    | 0     | 0   | 0.0000   | 82.04      |
| 0    | 0     | 0   | 999.0000 | 82.04      |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0130    | 100Y_24H | 0.00               | 85.22          | 0.0029                   | 26.86                  | 0.10                    | 0                      |
| KD0130    | 10Y_24H  | 0.00               | 83.22          | 0.0011                   | 12.86                  | 0.02                    | 0                      |
| KD0130    | 10Y_6H   | 0.00               | 83.22          | 0.0011                   | 13.46                  | 0.04                    | 0                      |
| KD0130    | 25Y_24H  | 0.00               | 83.92          | 0.0017                   | 17.26                  | 0.04                    | 0                      |
| KD0130    | MA_24H   | 0.00               | 82.72          | 0.0006                   | 4.07                   | 0.00                    | 0                      |

Node: KD0140

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 89.09 ft  
Warning Stage: 93.74 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 89.09      | 0.0001    | 4          |
| 93.74      | 0.0001    | 4          |

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0140    | 100Y_24H | 93.74              | 91.00          | -0.0010                  | 11.92                  | 11.92                   | 1023                   |
| KD0140    | 10Y_24H  | 93.74              | 90.34          | -0.0009                  | 6.16                   | 6.15                    | 1097                   |
| KD0140    | 10Y_6H   | 93.74              | 90.47          | -0.0008                  | 7.28                   | 7.26                    | 1097                   |
| KD0140    | 25Y_24H  | 93.74              | 90.56          | -0.0008                  | 8.07                   | 8.06                    | 1087                   |
| KD0140    | MA_24H   | 93.74              | 89.80          | -0.0009                  | 2.27                   | 2.27                    | 1055                   |

Node: KDB0130

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 95.13 ft  
Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.13      | 0.0001    | 3          |
| 95.25      | 0.0018    | 77         |
| 95.50      | 0.0080    | 350        |
| 95.75      | 0.0174    | 758        |
| 96.00      | 0.0322    | 1401       |
| 96.25      | 0.0539    | 2350       |
| 96.50      | 0.0793    | 3454       |
| 96.75      | 0.1013    | 4412       |
| 97.00      | 0.1235    | 5379       |
| 97.25      | 0.1462    | 6370       |
| 97.50      | 0.1694    | 7379       |
| 97.75      | 0.1911    | 8324       |
| 98.00      | 0.2156    | 9392       |
| 98.25      | 0.2550    | 11109      |
| 98.50      | 0.2930    | 12765      |
| 98.75      | 0.3249    | 14152      |
| 99.00      | 0.3703    | 16131      |
| 99.25      | 0.4015    | 17489      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 99.50      | 0.4675    | 20365      |
| 99.75      | 0.5200    | 22653      |
| 100.00     | 0.5320    | 23174      |
| 100.25     | 0.5335    | 23238      |
| 100.50     | 0.5335    | 23238      |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KDB0130   | 100Y_24H | 0.00               | 98.30          | -0.0010                  | 6.89                   | 6.89                    | 11454                  |
| KDB0130   | 10Y_24H  | 0.00               | 98.16          | -0.0010                  | 3.72                   | 3.65                    | 10502                  |
| KDB0130   | 10Y_6H   | 0.00               | 98.11          | -0.0010                  | 4.38                   | 2.94                    | 10140                  |
| KDB0130   | 25Y_24H  | 0.00               | 98.22          | 0.0010                   | 4.83                   | 4.81                    | 10918                  |
| KDB0130   | MA_24H   | 0.00               | 97.46          | 0.0010                   | 1.58                   | 1.08                    | 7203                   |



Node: NTZ-0040

Scenario: ALT1  
Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 0.00 ft  
Warning Stage: 0.00 ft  
Boundary Stage:

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| NTZ-0040  | 100Y_24H | 0.00               | 0.00           | 0.0000                   | 0.51                   | 0.00                    | 0                      |
| NTZ-0040  | 10Y_24H  | 0.00               | 0.00           | 0.0000                   | 0.48                   | 0.00                    | 0                      |
| NTZ-0040  | 10Y_6H   | 0.00               | 0.00           | 0.0000                   | 0.47                   | 0.00                    | 0                      |
| NTZ-0040  | 25Y_24H  | 0.00               | 0.00           | 0.0000                   | 0.50                   | 0.00                    | 0                      |
| NTZ-0040  | MA_24H   | 0.00               | 0.00           | 0.0000                   | 0.09                   | 0.00                    | 0                      |



Node: NTZ-0080

Scenario: ALT1

Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 0.00 ft  
Warning Stage: 0.00 ft  
Boundary Stage:

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| NTZ-0080  | 100Y_24H | 0.00               | 0.00           | 0.0000                   | 1.72                   | 0.00                    | 0                      |
| NTZ-0080  | 10Y_24H  | 0.00               | 0.00           | 0.0000                   | 1.58                   | 0.00                    | 0                      |
| NTZ-0080  | 10Y_6H   | 0.00               | 0.00           | 0.0000                   | 1.53                   | 0.00                    | 0                      |
| NTZ-0080  | 25Y_24H  | 0.00               | 0.00           | 0.0000                   | 1.64                   | 0.00                    | 0                      |
| NTZ-0080  | MA_24H   | 0.00               | 0.00           | 0.0000                   | 1.08                   | 0.00                    | 0                      |

#### Link: L-0030W

Scenario: ALT1  
Type: Weir  
From Node: Bioswale  
To Node: KD0090  
Link Count: 1  
Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0030W   | 100Y_24H | 5.24           | 0.00           | 0.00                     | 1.16                  | 1.16                  | 1.16                   |
| L-0030W   | 10Y_24H  | 1.87           | 0.00           | 0.00                     | 0.96                  | 0.96                  | 0.96                   |
| L-0030W   | 10Y_6H   | 1.10           | 0.00           | 0.00                     | 0.86                  | 0.86                  | 0.86                   |
| L-0030W   | 25Y_24H  | 3.07           | 0.00           | 0.00                     | 1.06                  | 1.06                  | 1.06                   |
| L-0030W   | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: L-0060PERC

Scenario: ALT1  
Type:  
From Node: Bioswale  
To Node: NTZ-0040



Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name  | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|------------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0060PERC | 100Y_24H | 0.51           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 10Y_24H  | 0.48           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 10Y_6H   | 0.47           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 25Y_24H  | 0.50           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | MA_24H   | 0.09           | 0.00           | 0.01                     | 0.00                  | 0.00                  | 0.00                   |

Link: L-0070P

Scenario: ALT1  
Type: Pipe  
From Node: KD0120  
To Node: KDB0130  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0070P   | 100Y_24H | 6.37           | 0.00           | -0.54                    | 3.60                  | 3.60                  | 3.60                   |
| L-0070P   | 10Y_24H  | 3.43           | 0.00           | -0.43                    | 1.94                  | 1.94                  | 1.94                   |
| L-0070P   | 10Y_6H   | 3.84           | 0.00           | -0.10                    | 2.17                  | 2.17                  | 2.17                   |
| L-0070P   | 25Y_24H  | 4.45           | 0.00           | -0.56                    | 2.52                  | 2.52                  | 2.52                   |
| L-0070P   | MA_24H   | 1.43           | 0.00           | 0.54                     | 1.47                  | 1.27                  | 1.08                   |

Link: L-0090W

Scenario: ALT1  
Type: Weir  
From Node: KDB0130  
To Node: Bioswale  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0090W   | 100Y_24H | 5.17           | 0.00           | 0.00                     | 1.51                  | 1.51                  | 1.51                   |
| L-0090W   | 10Y_24H  | 2.07           | 0.00           | 0.00                     | 1.34                  | 1.34                  | 1.34                   |
| L-0090W   | 10Y_6H   | 1.42           | 0.00           | 0.00                     | 1.23                  | 1.23                  | 1.23                   |
| L-0090W   | 25Y_24H  | 3.17           | 0.00           | 0.00                     | 1.40                  | 1.40                  | 1.40                   |
| L-0090W   | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: L-0100PERC

Scenario: ALT1  
 Type:  
 From Node: KDB0130  
 To Node: NTZ-0080  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name  | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|------------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0100PERC | 100Y_24H | 1.72           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | 10Y_24H  | 1.58           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | 10Y_6H   | 1.53           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | 25Y_24H  | 1.64           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | MA_24H   | 1.08           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |

Link: P0020

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0060  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0020     | 100Y_24H | 14.18          | -0.10          | 0.69                     | 4.51                  | 4.51                  | 4.51                   |
| P0020     | 10Y_24H  | 8.02           | -0.02          | -0.09                    | 3.25                  | 3.88                  | 3.57                   |
| P0020     | 10Y_6H   | 9.45           | -0.04          | 0.03                     | 3.33                  | 5.34                  | 4.34                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0020     | 25Y_24H  | 10.57          | -0.04          | -0.20                    | 3.37                  | 3.39                  | 3.38                   |
| P0020     | MA_24H   | 2.92           | 0.00           | 0.06                     | 2.42                  | 2.71                  | 2.57                   |



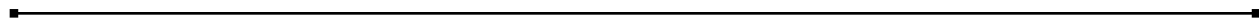
Link: P0030

Scenario: ALT1  
Type: Pipe  
From Node: KD0010  
To Node: KD0140  
Link Count: 1  
Flow Direction: Both



Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0030     | 100Y_24H | 3.11           | 0.00           | 0.01                     | 2.68                  | 5.81                  | 3.82                   |
| P0030     | 10Y_24H  | 1.60           | 0.00           | 0.01                     | 2.25                  | 5.80                  | 3.82                   |
| P0030     | 10Y_6H   | 1.85           | 0.00           | 0.01                     | 2.33                  | 5.96                  | 3.92                   |
| P0030     | 25Y_24H  | 2.10           | 0.00           | 0.01                     | 2.41                  | 5.72                  | 3.77                   |
| P0030     | MA_24H   | 0.59           | 0.00           | 0.01                     | 1.78                  | 5.57                  | 3.67                   |



Link: P0040

Scenario: ALT1  
Type: Pipe  
From Node: KD0020  
To Node: KD0140  
Link Count: 1  
Flow Direction: Both



Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0040     | 100Y_24H | 1.14           | 0.00           | 0.01                     | 2.07                  | 0.64                  | 1.35                   |
| P0040     | 10Y_24H  | 0.58           | 0.00           | 0.01                     | 1.77                  | 0.52                  | 1.09                   |
| P0040     | 10Y_6H   | 0.70           | 0.00           | -0.01                    | 1.84                  | 0.91                  | 1.14                   |
| P0040     | 25Y_24H  | 0.77           | 0.00           | -0.01                    | 1.88                  | 0.48                  | 1.17                   |
| P0040     | MA_24H   | 0.19           | 0.00           | 0.01                     | 1.48                  | 0.45                  | 0.89                   |

Link: P0050

Scenario: ALT1  
Type: Pipe  
From Node: KD0030  
To Node: KD0140  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0050     | 100Y_24H | 6.19           | 0.00           | 0.09                     | 3.50                  | 3.50                  | 3.50                   |
| P0050     | 10Y_24H  | 3.23           | 0.00           | -0.01                    | 2.65                  | 2.43                  | 2.54                   |
| P0050     | 10Y_6H   | 3.85           | 0.00           | 0.01                     | 2.78                  | 2.57                  | 2.67                   |
| P0050     | 25Y_24H  | 4.21           | 0.00           | 0.01                     | 2.79                  | 2.62                  | 2.70                   |
| P0050     | MA_24H   | 1.22           | 0.00           | -0.01                    | 2.01                  | 2.28                  | 2.13                   |

Link: P0060

Scenario: ALT1  
Type: Pipe  
From Node: KD0040  
To Node: KD0140  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0060     | 100Y_24H | 1.54           | 0.00           | 0.00                     | 2.28                  | 0.87                  | 1.57                   |
| P0060     | 10Y_24H  | 0.78           | 0.00           | 0.00                     | 1.96                  | 0.74                  | 1.26                   |
| P0060     | 10Y_6H   | 0.92           | 0.00           | 0.00                     | 2.03                  | 0.87                  | 1.31                   |
| P0060     | 25Y_24H  | 1.03           | 0.00           | 0.00                     | 2.08                  | 0.75                  | 1.35                   |
| P0060     | MA_24H   | 0.27           | 0.00           | 0.00                     | 1.61                  | 0.72                  | 1.02                   |

Link: P0070

Scenario: ALT1  
Type: Pipe  
From Node: KD0140  
To Node: KD0060  
Link Count: 1



Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0070     | 100Y_24H | 11.92          | 0.00           | -0.03                    | 3.86                  | 3.79                  | 3.83                   |
| P0070     | 10Y_24H  | 6.15           | 0.00           | 0.02                     | 2.99                  | 2.51                  | 2.75                   |
| P0070     | 10Y_6H   | 7.26           | 0.00           | 0.02                     | 3.15                  | 2.58                  | 2.86                   |
| P0070     | 25Y_24H  | 8.06           | 0.00           | 0.02                     | 3.26                  | 2.57                  | 2.92                   |
| P0070     | MA_24H   | 2.27           | 0.00           | 0.02                     | 2.26                  | 1.91                  | 2.09                   |

Link: P0080

Scenario: ALT1  
Type: Pipe  
From Node: KD0090  
To Node: KD0080  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0080     | 100Y_24H | 5.24           | 0.00           | 0.01                     | 4.27                  | 4.27                  | 4.27                   |
| P0080     | 10Y_24H  | 1.87           | 0.00           | 0.01                     | 2.37                  | 1.70                  | 2.03                   |
| P0080     | 10Y_6H   | 1.10           | 0.00           | 0.01                     | 2.05                  | 1.37                  | 1.70                   |
| P0080     | 25Y_24H  | 3.07           | 0.00           | 0.01                     | 2.80                  | 2.50                  | 2.65                   |
| P0080     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: P0090

Scenario: ALT1  
Type: Pipe  
From Node: KD0080  
To Node: KD0070  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0090     | 100Y_24H | 7.81           | 0.00           | 0.01                     | 6.37                  | 6.37                  | 6.37                   |
| P0090     | 10Y_24H  | 3.24           | 0.00           | -0.01                    | 2.87                  | 6.80                  | 4.66                   |
| P0090     | 10Y_6H   | 2.07           | 0.00           | 0.01                     | 2.46                  | 6.50                  | 4.45                   |
| P0090     | 25Y_24H  | 4.86           | 0.00           | 0.02                     | 3.96                  | 6.70                  | 4.59                   |
| P0090     | MA_24H   | 0.50           | 0.00           | 0.01                     | 1.69                  | 4.39                  | 3.04                   |

#### Link: P0100

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0070  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0100     | 100Y_24H | 7.83           | 0.00           | 0.02                     | 6.38                  | 6.83                  | 6.60                   |
| P0100     | 10Y_24H  | 3.25           | 0.00           | -0.01                    | 2.78                  | 4.40                  | 3.59                   |
| P0100     | 10Y_6H   | 2.08           | 0.00           | 0.01                     | 2.43                  | 3.74                  | 3.09                   |
| P0100     | 25Y_24H  | 4.87           | 0.00           | -0.02                    | 3.97                  | 5.19                  | 4.58                   |
| P0100     | MA_24H   | 0.50           | 0.00           | -0.01                    | 1.64                  | 2.58                  | 2.11                   |

#### Link: P0110

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0110  
 To Node: KD0100  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0110     | 100Y_24H | 3.89           | 0.00           | 0.01                     | 3.17                  | 3.41                  | 3.29                   |
| P0110     | 10Y_24H  | 1.99           | 0.00           | 0.01                     | 2.40                  | 2.68                  | 2.54                   |
| P0110     | 10Y_6H   | 2.41           | 0.00           | 0.01                     | 2.55                  | 2.84                  | 2.69                   |
| P0110     | 25Y_24H  | 2.63           | 0.00           | 0.01                     | 2.62                  | 2.93                  | 2.78                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0110     | MA_24H   | 0.65           | 0.00           | 0.01                     | 1.76                  | 2.00                  | 1.88                   |

#### Link: P0120

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0100  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0120     | 100Y_24H | 3.99           | 0.00           | 0.02                     | 2.84                  | 5.64                  | 4.24                   |
| P0120     | 10Y_24H  | 2.05           | 0.00           | 0.02                     | 2.32                  | 4.68                  | 3.50                   |
| P0120     | 10Y_6H   | 2.47           | 0.00           | 0.01                     | 2.45                  | 4.94                  | 3.69                   |
| P0120     | 25Y_24H  | 2.70           | 0.00           | -0.02                    | 2.51                  | 5.06                  | 3.79                   |
| P0120     | MA_24H   | 0.67           | 0.00           | -0.02                    | 1.71                  | 3.38                  | 2.55                   |

#### Link: P0130

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0050  
 To Node: KD0060  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0130     | 100Y_24H | 2.82           | -0.03          | -0.66                    | 1.60                  | 1.60                  | 1.60                   |
| P0130     | 10Y_24H  | 1.42           | 0.00           | -0.28                    | 1.31                  | 0.81                  | 0.86                   |
| P0130     | 10Y_6H   | 1.66           | 0.00           | -0.01                    | 1.32                  | 1.32                  | 1.18                   |
| P0130     | 25Y_24H  | 1.89           | -0.01          | -0.42                    | 1.07                  | 1.07                  | 1.07                   |
| P0130     | MA_24H   | 0.50           | 0.00           | -0.10                    | 1.20                  | 0.72                  | 0.76                   |

Link: W0010

Scenario: ALT1  
Type: Weir  
From Node: KD0050  
To Node: KD0060  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0010     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0020

Scenario: ALT1  
Type: Weir  
From Node: KD0070  
To Node: KD0130  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0020     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0030

Scenario: ALT1  
Type: Weir  
From Node: KD0100  
To Node: KD0070  
Link Count: 1



Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0030     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0040

Scenario: ALT1  
Type: Weir  
From Node: KD0110  
To Node: KD0100  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0040     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0050

Scenario: ALT1  
Type: Weir  
From Node: KD0080  
To Node: KD0070  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0050     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0060

Scenario: ALT1  
 Type: Weir  
 From Node: KD0090  
 To Node: KD0110  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0060     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0070

Scenario: ALT1  
 Type: Weir  
 From Node: KD0090  
 To Node: KD0080  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0070     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0070     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

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Link: W0080

Scenario: ALT1  
Type: Weir  
From Node: KD0010  
To Node: KD0020  
Link Count: 1  
Flow Direction: Both

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Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0080     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

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Link: W0090

Scenario: ALT1  
Type: Weir  
From Node: KD0030  
To Node: KD0040  
Link Count: 1  
Flow Direction: Both

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Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0090     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0100

Scenario: ALT1  
Type: Weir  
From Node: KD0040  
To Node: KD0050  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0100     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0110

Scenario: ALT1  
Type: Weir  
From Node: KD0020  
To Node: KD0060  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0110     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0130

Scenario: ALT1  
Type: Weir  
From Node: KD0060  
To Node: KD0130  
Link Count: 1



Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0130     | 100Y_24H | 1.50           | 0.00           | 0.00                     | 0.86                  | 0.86                  | 0.86                   |
| W0130     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0140

Scenario: ALT1  
Type: Weir  
From Node: KD0060  
To Node: KD0070  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0140     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0150

Scenario: ALT1  
Type: Weir  
From Node: KD0010  
To Node: KD0030  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0150     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0160

Scenario: ALT1  
 Type: Weir  
 From Node: KD0020  
 To Node: KD0040  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0160     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0170

Scenario: ALT1  
 Type: Weir  
 From Node: KD0080  
 To Node: KD0070  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0170     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0170     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

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#### Link: W0190

Scenario: ALT1  
 Type: Weir  
 From Node: KD0100  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

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#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0190     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

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#### Simulation: 100Y\_24H

Scenario: ALT1  
 Run Date/Time: 12/5/2022 11:01:06 AM  
 Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

## Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

## Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

## Restart File

Save Restart: False

## Resources & Lookup Tables

| Resources               | Lookup Tables              |
|-------------------------|----------------------------|
| Rainfall Folder:        | Boundary Stage Set: 100_24 |
| Reference ET Folder:    | Extern Hydrograph Set:     |
| Unit Hydrograph Folder: | Curve Number Set: CN       |
|                         | Green-Ampt Set:            |
|                         | Vertical Layers Set:       |
|                         | Impervious Set: Impervious |
|                         | Roughness Set:             |
|                         | Crop Coef Set:             |
|                         | Fillable Porosity Set:     |
|                         | Conductivity Set:          |
|                         | Leakage Set:               |

## Tolerances & Options

|                                 |                                 |
|---------------------------------|---------------------------------|
| Time Marching: SAOR             | IA Recovery Time: 24.0000 hr    |
| Max Iterations: 6               | ET for Manual Basins: False     |
| Over-Relax Weight Fact: 0.5 dec |                                 |
| dZ Tolerance: 0.0010 ft         | Smp/Man Basin Rain: Global      |
|                                 | Opt:                            |
| Max dZ: 1.0000 ft               | OF Region Rain Opt: Global      |
| Link Optimizer Tol: 0.0001 ft   | Rainfall Name: ~ORANGE          |
|                                 | Rainfall Amount: 10.60 in       |
| Edge Length Option: Automatic   | Storm Duration: 24.0000 hr      |
| Dflt Damping (2D): 0.0050 ft    | Dflt Damping (1D): 0.0050 ft    |
| Min Node Srf Area (2D): 100 ft2 | Min Node Srf Area (1D): 100 ft2 |
| Energy Switch (2D): Energy      | Energy Switch (1D): Energy      |

Comment:

## Simulation: 10Y\_24H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:01:29 AM  
Program Version: ICPR4 4.07.08

## General



Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph Folder:

##### Lookup Tables

Boundary Stage Set: 10\_24  
Extern Hydrograph Set:  
Curve Number Set: CN  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

#### Tolerances & Options

Time Marching: SAOR  
Max Iterations: 6  
Over-Relax Weight Fact: 0.5 dec  
dZ Tolerance: 0.0010 ft  
  
Max dZ: 1.0000 ft  
Link Optimizer Tol: 0.0001 ft  
  
Edge Length Option: Automatic

IA Recovery Time: 24.0000 hr  
ET for Manual Basins: False  
  
Smp/Man Basin Rain Global  
Opt:  
OF Region Rain Opt: Global  
Rainfall Name: ~ORANGE  
Rainfall Amount: 7.50 in  
Storm Duration: 24.0000 hr

Dflt Damping (2D): 0.0050 ft  
Min Node Srf Area (2D): 100 ft2  
Energy Switch (2D): Energy

Dflt Damping (1D): 0.0050 ft  
Min Node Srf Area (1D): 100 ft2  
Energy Switch (1D): Energy

Comment:

Simulation: 10Y\_6H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:02:05 AM  
Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph Folder:

##### Lookup Tables

Boundary Stage Set: 10\_6  
Extern Hydrograph Set:  
Curve Number Set: CN  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious

Roughness Set:  
 Crop Coef Set:  
 Fillable Porosity Set:  
 Conductivity Set:  
 Leakage Set:

#### Tolerances & Options

Time Marching: SAOR  
 Max Iterations: 6  
 Over-Relax Weight Fact: 0.5 dec  
 dZ Tolerance: 0.0010 ft

Max dZ: 1.0000 ft  
 Link Optimizer Tol: 0.0001 ft

Edge Length Option: Automatic

Dflt Damping (2D): 0.0050 ft  
 Min Node Srf Area (2D): 100 ft2  
 Energy Switch (2D): Energy

IA Recovery Time: 24.0000 hr  
 ET for Manual Basins: False

Smp/Man Basin Rain Opt: Global  
 OF Region Rain Opt: Global  
 Rainfall Name: ~ORANGE  
 Rainfall Amount: 4.65 in  
 Storm Duration: 6.0000 hr

Dflt Damping (1D): 0.0050 ft  
 Min Node Srf Area (1D): 100 ft2  
 Energy Switch (1D): Energy

Comment:

#### Simulation: 25Y\_24H

Scenario: ALT1  
 Run Date/Time: 12/5/2022 11:02:21 AM  
 Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

## Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

## Restart File

Save Restart: False

## Resources & Lookup Tables

| Resources               | Lookup Tables              |
|-------------------------|----------------------------|
| Rainfall Folder:        | Boundary Stage Set: 25_24  |
| Reference ET Folder:    | Extern Hydrograph Set:     |
| Unit Hydrograph Folder: | Curve Number Set: CN       |
|                         | Green-Ampt Set:            |
|                         | Vertical Layers Set:       |
|                         | Impervious Set: Impervious |
|                         | Roughness Set:             |
|                         | Crop Coef Set:             |
|                         | Fillable Porosity Set:     |
|                         | Conductivity Set:          |
|                         | Leakage Set:               |

## Tolerances & Options

|                                 |                                 |
|---------------------------------|---------------------------------|
| Time Marching: SAOR             | IA Recovery Time: 24.0000 hr    |
| Max Iterations: 6               | ET for Manual Basins: False     |
| Over-Relax Weight Fact: 0.5 dec |                                 |
| dZ Tolerance: 0.0010 ft         | Smp/Man Basin Rain Global       |
|                                 | Opt:                            |
| Max dZ: 1.0000 ft               | OF Region Rain Opt: Global      |
| Link Optimizer Tol: 0.0001 ft   | Rainfall Name: ~ORANGE          |
|                                 | Rainfall Amount: 8.60 in        |
| Edge Length Option: Automatic   | Storm Duration: 24.0000 hr      |
| Dflt Damping (2D): 0.0050 ft    | Dflt Damping (1D): 0.0050 ft    |
| Min Node Srf Area (2D): 100 ft2 | Min Node Srf Area (1D): 100 ft2 |
| Energy Switch (2D): Energy      | Energy Switch (1D): Energy      |

Comment:

## Simulation: MA\_24H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:02:42 AM  
Program Version: ICPR4 4.07.08

## General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |



|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph Folder:

##### Lookup Tables

Boundary Stage Set: MA\_24  
Extern Hydrograph Set:  
Curve Number Set: CN  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

#### Tolerances & Options

|                         |           |                         |            |
|-------------------------|-----------|-------------------------|------------|
| Time Marching:          | SAOR      | IA Recovery Time:       | 24.0000 hr |
| Max Iterations:         | 6         | ET for Manual Basins:   | False      |
| Over-Relax Weight Fact: | 0.5 dec   | Smp/Man Basin Rain      | Global     |
| dZ Tolerance:           | 0.0010 ft | Opt:                    |            |
| Max dZ:                 | 1.0000 ft | OF Region Rain Opt:     | Global     |
| Link Optimizer Tol:     | 0.0001 ft | Rainfall Name:          | ~ORANGE    |
| Edge Length Option:     | Automatic | Rainfall Amount:        | 4.50 in    |
|                         |           | Storm Duration:         | 24.0000 hr |
| Dflt Damping (2D):      | 0.0050 ft | Dflt Damping (1D):      | 0.0050 ft  |
| Min Node Srf Area (2D): | 100 ft2   | Min Node Srf Area (1D): | 100 ft2    |
| Energy Switch (2D):     | Energy    | Energy Switch (1D):     | Energy     |

|          |
|----------|
| Comment: |
|----------|

## **APPENDIX D**

### **Alternative 2 ICPR Input and Results**

Manual Basin: KDB0010

Scenario: ALT1  
Node: KD0010  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 25.6000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 3.3147 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.3293    | 1400            | A         |               |                       |                      |
| 2.9854    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0010    | 100Y_24H | 3.11           | 9.1833                 | 10.60               | 4.67              | 3.3147    | 54.9                    | 38.27    | 20.29  |
| KDB0010    | 10Y_24H  | 1.60           | 10.0333                | 7.50                | 2.63              | 3.3147    | 56.8                    | 38.27    | 20.29  |
| KDB0010    | 10Y_6H   | 1.85           | 2.6667                 | 4.65                | 1.16              | 3.3147    | 61.0                    | 38.27    | 20.29  |
| KDB0010    | 25Y_24H  | 2.10           | 9.2000                 | 8.60                | 3.31              | 3.3147    | 55.9                    | 38.27    | 20.29  |
| KDB0010    | MA_24H   | 0.59           | 9.1000                 | 4.50                | 1.10              | 3.3147    | 61.3                    | 38.27    | 20.29  |

Manual Basin: KDB0020

Scenario: ALT1  
Node: KD0020  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 13.3000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 1.0956 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 1.0956    | 1200            | A         |               |                       |                      |

Comment:



Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0020    | 100Y_24H | 1.14           | 9.0500                 | 10.60               | 4.57              | 1.0956    | 54.2                    | 37.30    | 18.90  |
| KDB0020    | 10Y_24H  | 0.58           | 9.0667                 | 7.50                | 2.55              | 1.0956    | 56.0                    | 37.30    | 18.90  |
| KDB0020    | 10Y_6H   | 0.70           | 2.5500                 | 4.65                | 1.10              | 1.0956    | 60.0                    | 37.30    | 18.90  |
| KDB0020    | 25Y_24H  | 0.77           | 9.0667                 | 8.60                | 3.22              | 1.0956    | 55.2                    | 37.30    | 18.90  |
| KDB0020    | MA_24H   | 0.19           | 9.0167                 | 4.50                | 1.04              | 1.0956    | 60.4                    | 37.30    | 18.90  |

Manual Basin: KDB0030

Scenario: ALT1  
Node: KD0030  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 23.3000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 6.2464 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.2357    | 1400            | A/D       |               |                       |                      |
| 0.0114    | 1200            | A/D       |               |                       |                      |
| 5.6956    | 1200            | A         |               |                       |                      |
| 0.3037    | 1400            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0030    | 100Y_24H | 6.19           | 9.1667                 | 10.60               | 4.79              | 6.2464    | 55.8                    | 38.15    | 20.11  |
| KDB0030    | 10Y_24H  | 3.23           | 9.1667                 | 7.50                | 2.72              | 6.2464    | 57.7                    | 38.15    | 20.11  |
| KDB0030    | 10Y_6H   | 3.85           | 2.6333                 | 4.65                | 1.22              | 6.2464    | 61.9                    | 38.15    | 20.11  |
| KDB0030    | 25Y_24H  | 4.21           | 9.1667                 | 8.60                | 3.42              | 6.2464    | 56.9                    | 38.15    | 20.11  |
| KDB0030    | MA_24H   | 1.22           | 9.0833                 | 4.50                | 1.15              | 6.2464    | 62.2                    | 38.15    | 20.11  |

Manual Basin: KDB0040

Scenario: ALT1  
Node: KD0040  
Hydrograph Method: NRCS Unit Hydrograph

Infiltration Method: Curve Number  
 Time of Concentration: 17.6000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 1.5426 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 1.5426    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0040    | 100Y_24H | 1.54           | 9.1000                 | 10.60               | 4.57              | 1.5426    | 54.2                    | 37.30    | 18.90  |
| KDB0040    | 10Y_24H  | 0.78           | 9.1167                 | 7.50                | 2.54              | 1.5426    | 56.0                    | 37.30    | 18.90  |
| KDB0040    | 10Y_6H   | 0.92           | 2.5833                 | 4.65                | 1.10              | 1.5426    | 60.0                    | 37.30    | 18.90  |
| KDB0040    | 25Y_24H  | 1.03           | 9.1167                 | 8.60                | 3.22              | 1.5426    | 55.2                    | 37.30    | 18.90  |
| KDB0040    | MA_24H   | 0.27           | 9.0333                 | 4.50                | 1.04              | 1.5426    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0050

Scenario: ALT1  
 Node: KD0050  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 18.7000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 2.8650 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 2.8650    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0050    | 100Y_24H | 2.83           | 9.1167                 | 10.60               | 4.57              | 2.8650    | 54.2                    | 37.30    | 18.90  |
| KDB0050    | 10Y_24H  | 1.43           | 9.1333                 | 7.50                | 2.55              | 2.8650    | 56.0                    | 37.30    | 18.90  |
| KDB0050    | 10Y_6H   | 1.67           | 2.6000                 | 4.65                | 1.10              | 2.8650    | 60.0                    | 37.30    | 18.90  |
| KDB0050    | 25Y_24H  | 1.90           | 9.1167                 | 8.60                | 3.22              | 2.8650    | 55.2                    | 37.30    | 18.90  |
| KDB0050    | MA_24H   | 0.49           | 9.0333                 | 4.50                | 1.04              | 2.8650    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0060

Scenario: ALT1  
 Node: KD0060  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 17.2000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.9439 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.9439    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0060    | 100Y_24H | 0.94           | 9.1000                 | 10.60               | 4.57              | 0.9439    | 54.2                    | 37.30    | 18.90  |
| KDB0060    | 10Y_24H  | 0.48           | 9.1167                 | 7.50                | 2.55              | 0.9439    | 56.0                    | 37.30    | 18.90  |
| KDB0060    | 10Y_6H   | 0.56           | 2.5833                 | 4.65                | 1.10              | 0.9439    | 60.0                    | 37.30    | 18.90  |
| KDB0060    | 25Y_24H  | 0.63           | 9.1000                 | 8.60                | 3.22              | 0.9439    | 55.2                    | 37.30    | 18.90  |
| KDB0060    | MA_24H   | 0.16           | 9.0333                 | 4.50                | 1.04              | 0.9439    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0070

Scenario: ALT1  
 Node: KD0070  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr

Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.0201 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0201    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0070    | 100Y_24H | 0.02           | 9.0333                 | 10.60               | 4.57              | 0.0201    | 54.2                    | 37.30    | 18.90  |
| KDB0070    | 10Y_24H  | 0.01           | 9.0333                 | 7.50                | 2.54              | 0.0201    | 56.0                    | 37.30    | 18.90  |
| KDB0070    | 10Y_6H   | 0.01           | 2.5333                 | 4.65                | 1.10              | 0.0201    | 60.0                    | 37.30    | 18.90  |
| KDB0070    | 25Y_24H  | 0.01           | 9.0333                 | 8.60                | 3.22              | 0.0201    | 55.2                    | 37.30    | 18.90  |
| KDB0070    | MA_24H   | 0.00           | 9.0000                 | 4.50                | 1.04              | 0.0201    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0080

Scenario: ALT1  
 Node: KD0080  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 19.1000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 2.9007 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 2.9007    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0080    | 100Y_24H | 2.85           | 9.1167                 | 10.60               | 4.57              | 2.9007    | 54.2                    | 37.30    | 18.90  |
| KDB0080    | 10Y_24H  | 1.44           | 9.1333                 | 7.50                | 2.55              | 2.9007    | 56.0                    | 37.30    | 18.90  |
| KDB0080    | 10Y_6H   | 1.68           | 2.6000                 | 4.65                | 1.10              | 2.9007    | 60.0                    | 37.30    | 18.90  |
| KDB0080    | 25Y_24H  | 1.91           | 9.1333                 | 8.60                | 3.22              | 2.9007    | 55.2                    | 37.30    | 18.90  |



| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0080    | MA_24H   | 0.50           | 9.0333                 | 4.50                | 1.04              | 2.9007    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0090

Scenario: ALT1  
 Node: Bioswale  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.6758 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.6758    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0090    | 100Y_24H | 0.72           | 9.0333                 | 10.60               | 4.57              | 0.6758    | 54.2                    | 37.30    | 18.90  |
| KDB0090    | 10Y_24H  | 0.37           | 9.0333                 | 7.50                | 2.54              | 0.6758    | 56.0                    | 37.30    | 18.90  |
| KDB0090    | 10Y_6H   | 0.45           | 2.5333                 | 4.65                | 1.10              | 0.6758    | 60.0                    | 37.30    | 18.90  |
| KDB0090    | 25Y_24H  | 0.49           | 9.0333                 | 8.60                | 3.22              | 0.6758    | 55.2                    | 37.30    | 18.90  |
| KDB0090    | MA_24H   | 0.12           | 9.0000                 | 4.50                | 1.04              | 0.6758    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0100

Scenario: ALT1  
 Node: KD0100  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.0978 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient | Reference ET Station |
|-----------|-----------------|-----------|---------------|------------------|----------------------|
|-----------|-----------------|-----------|---------------|------------------|----------------------|

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0978    | 1200            | A         |               |                       |                      |

Comment:



#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0100    | 100Y_24H | 0.10           | 9.0333                 | 10.60               | 4.57              | 0.0978    | 54.2                    | 37.30    | 18.90  |
| KDB0100    | 10Y_24H  | 0.05           | 9.0333                 | 7.50                | 2.54              | 0.0978    | 56.0                    | 37.30    | 18.90  |
| KDB0100    | 10Y_6H   | 0.07           | 2.5333                 | 4.65                | 1.10              | 0.0978    | 60.0                    | 37.30    | 18.90  |
| KDB0100    | 25Y_24H  | 0.07           | 9.0333                 | 8.60                | 3.22              | 0.0978    | 55.2                    | 37.30    | 18.90  |
| KDB0100    | MA_24H   | 0.02           | 9.0000                 | 4.50                | 1.04              | 0.0978    | 60.4                    | 37.30    | 18.90  |



#### Manual Basin: KDB0110

Scenario: ALT1  
 Node: KD0110  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 11.6000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 3.6964 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 3.6964    | 1200            | A         |               |                       |                      |

Comment:



#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0110    | 100Y_24H | 3.89           | 9.0500                 | 10.60               | 4.57              | 3.6964    | 54.2                    | 37.30    | 18.90  |
| KDB0110    | 10Y_24H  | 1.99           | 9.0500                 | 7.50                | 2.54              | 3.6964    | 56.0                    | 37.30    | 18.90  |
| KDB0110    | 10Y_6H   | 2.41           | 2.5500                 | 4.65                | 1.10              | 3.6964    | 60.0                    | 37.30    | 18.90  |
| KDB0110    | 25Y_24H  | 2.63           | 9.0500                 | 8.60                | 3.22              | 3.6964    | 55.2                    | 37.30    | 18.90  |
| KDB0110    | MA_24H   | 0.65           | 9.0000                 | 4.50                | 1.04              | 3.6964    | 60.4                    | 37.30    | 18.90  |

Manual Basin: KDB0120

Scenario: ALT1  
Node: KD0120  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 21.2000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 6.7420 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 6.1688    | 1200            | A         |               |                       |                      |
| 0.0164    | 7400            | A         |               |                       |                      |
| 0.3071    | 1200            | A/D       |               |                       |                      |
| 0.2496    | 1400            | A/D       |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0120    | 100Y_24H | 7.04           | 9.1333                 | 10.60               | 4.93              | 6.7420    | 56.7                    | 37.66    | 19.42  |
| KDB0120    | 10Y_24H  | 3.74           | 9.1500                 | 7.50                | 2.82              | 6.7420    | 58.7                    | 37.66    | 19.42  |
| KDB0120    | 10Y_6H   | 4.58           | 2.6167                 | 4.65                | 1.28              | 6.7420    | 62.8                    | 37.66    | 19.42  |
| KDB0120    | 25Y_24H  | 4.84           | 9.1333                 | 8.60                | 3.53              | 6.7420    | 57.8                    | 37.66    | 19.42  |
| KDB0120    | MA_24H   | 1.44           | 9.0667                 | 4.50                | 1.21              | 6.7420    | 63.1                    | 37.66    | 19.42  |

Manual Basin: KDB0130

Scenario: ALT1  
Node: KDB0130  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 10.0000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 0.5337 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0793    | 1400            | A/D       |               |                       |                      |
| 0.0252    | 1200            | A/D       |               |                       |                      |
| 0.4292    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0130    | 100Y_24H | 0.67           | 9.0167                 | 10.60               | 5.43              | 0.5337    | 60.4                    | 38.76    | 20.98  |
| KDB0130    | 10Y_24H  | 0.38           | 9.0333                 | 7.50                | 3.22              | 0.5337    | 62.4                    | 38.76    | 20.98  |
| KDB0130    | 10Y_6H   | 0.55           | 2.3167                 | 4.65                | 1.53              | 0.5337    | 66.5                    | 38.76    | 20.98  |
| KDB0130    | 25Y_24H  | 0.48           | 9.0167                 | 8.60                | 3.97              | 0.5337    | 61.6                    | 38.76    | 20.98  |
| KDB0130    | MA_24H   | 0.15           | 9.0000                 | 4.50                | 1.45              | 0.5337    | 66.9                    | 38.76    | 20.98  |

Node: Bioswale

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 86.38 ft  
Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 86.38      | 0.0000    | 1          |
| 86.50      | 0.0007    | 32         |
| 86.75      | 0.0020    | 85         |
| 87.00      | 0.0038    | 164        |
| 87.25      | 0.0059    | 257        |
| 87.50      | 0.0087    | 378        |
| 87.75      | 0.0117    | 510        |
| 88.00      | 0.0151    | 656        |
| 88.25      | 0.0190    | 826        |
| 88.50      | 0.0234    | 1018       |
| 88.75      | 0.0286    | 1244       |
| 89.00      | 0.0405    | 1763       |
| 89.25      | 0.0670    | 2918       |
| 89.50      | 0.0798    | 3475       |
| 89.75      | 0.0912    | 3971       |
| 90.00      | 0.1011    | 4402       |
| 90.25      | 0.1094    | 4767       |
| 90.50      | 0.1188    | 5173       |
| 90.75      | 0.1289    | 5616       |
| 91.00      | 0.1383    | 6026       |
| 91.25      | 0.1476    | 6430       |
| 91.50      | 0.1567    | 6828       |
| 91.75      | 0.1672    | 7285       |
| 92.00      | 0.1777    | 7742       |
| 92.25      | 0.1902    | 8283       |
| 92.50      | 0.2050    | 8930       |
| 92.75      | 0.2192    | 9548       |
| 93.00      | 0.2346    | 10221      |
| 93.25      | 0.2537    | 11049      |
| 93.50      | 0.2742    | 11946      |
| 93.75      | 0.2952    | 12858      |
| 94.00      | 0.3171    | 13811      |
| 94.25      | 0.3430    | 14940      |
| 94.50      | 0.3677    | 16016      |



| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 94.75      | 0.3882    | 16912      |
| 95.00      | 0.4126    | 17972      |
| 95.25      | 0.4448    | 19376      |
| 95.50      | 0.4844    | 21100      |
| 95.75      | 0.5133    | 22361      |
| 96.00      | 0.5621    | 24485      |
| 96.25      | 0.6105    | 26594      |
| 96.50      | 0.6543    | 28502      |
| 96.75      | 0.6978    | 30397      |
| 97.00      | 0.7388    | 32181      |
| 97.25      | 0.7800    | 33977      |
| 97.50      | 0.8179    | 35627      |
| 97.75      | 0.8522    | 37120      |
| 98.00      | 0.8879    | 38679      |
| 98.25      | 0.9297    | 40498      |
| 98.50      | 0.9681    | 42170      |
| 98.75      | 1.0003    | 43571      |
| 99.00      | 1.0461    | 45566      |
| 99.25      | 1.0780    | 46956      |
| 99.50      | 1.1443    | 49847      |
| 99.75      | 1.1969    | 52135      |
| 100.00     | 1.2088    | 52656      |
| 100.25     | 1.2093    | 52677      |
| 100.50     | 1.2093    | 52677      |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| Bioswale  | 100Y_24H | 0.00               | 89.47          | 0.0010                   | 5.76                   | 5.75                    | 3417                   |
| Bioswale  | 10Y_24H  | 0.00               | 89.38          | 0.0010                   | 2.35                   | 2.35                    | 3211                   |
| Bioswale  | 10Y_6H   | 0.00               | 89.35          | 0.0010                   | 1.58                   | 1.57                    | 3133                   |
| Bioswale  | 25Y_24H  | 0.00               | 89.42          | 0.0010                   | 3.57                   | 3.57                    | 3301                   |
| Bioswale  | MA_24H   | 0.00               | 87.95          | 0.0002                   | 0.12                   | 0.09                    | 629                    |



Node: KD0010

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 91.26 ft  
Warning Stage: 93.83 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.74      | 0.0001    | 6          |
| 94.00      | 0.0123    | 537        |
| 94.50      | 0.0377    | 1644       |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.00      | 0.0940    | 4094       |
| 95.50      | 0.2666    | 11612      |
| 96.00      | 0.3725    | 16225      |
| 96.50      | 0.4731    | 20606      |
| 97.00      | 0.6497    | 28300      |
| 97.50      | 0.8768    | 38194      |
| 98.00      | 1.1886    | 51775      |
| 98.50      | 1.5262    | 66481      |
| 99.00      | 1.8675    | 81350      |
| 99.50      | 2.3948    | 104319     |
| 100.00     | 3.1627    | 137769     |
| 100.50     | 3.2942    | 143494     |
| 101.00     | 3.2980    | 143659     |
| 101.50     | 3.3017    | 143823     |
| 102.00     | 3.3017    | 143823     |
| 91.26      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0010    | 100Y_24H | 93.83              | 92.20          | 0.0005                   | 3.11                   | 3.11                    | 100                    |
| KD0010    | 10Y_24H  | 93.83              | 91.90          | 0.0004                   | 1.60                   | 1.60                    | 100                    |
| KD0010    | 10Y_6H   | 93.83              | 91.95          | -0.0005                  | 1.85                   | 1.85                    | 100                    |
| KD0010    | 25Y_24H  | 93.83              | 92.00          | 0.0005                   | 2.10                   | 2.10                    | 100                    |
| KD0010    | MA_24H   | 93.83              | 91.63          | 0.0004                   | 0.59                   | 0.59                    | 100                    |

Node: KD0020

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 91.04 ft  
Warning Stage: 93.81 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.69      | 0.0001    | 6          |
| 94.00      | 0.0165    | 719        |
| 94.50      | 0.0902    | 3931       |
| 95.00      | 0.2587    | 11269      |
| 95.50      | 0.4545    | 19800      |
| 96.00      | 0.6323    | 27544      |
| 96.50      | 0.8147    | 35488      |
| 97.00      | 0.9005    | 39225      |
| 97.50      | 0.9930    | 43256      |
| 98.00      | 1.0240    | 44606      |
| 98.50      | 1.0596    | 46156      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 99.00      | 1.0892    | 47444      |
| 99.50      | 1.0899    | 47477      |
| 100.00     | 1.0899    | 47477      |
| 91.04      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0020    | 100Y_24H | 93.81              | 91.56          | 0.0004                   | 1.14                   | 1.14                    | 100                    |
| KD0020    | 10Y_24H  | 93.81              | 91.40          | 0.0004                   | 0.58                   | 0.58                    | 100                    |
| KD0020    | 10Y_6H   | 93.81              | 91.44          | 0.0004                   | 0.70                   | 0.70                    | 100                    |
| KD0020    | 25Y_24H  | 93.81              | 91.46          | 0.0003                   | 0.77                   | 0.77                    | 100                    |
| KD0020    | MA_24H   | 93.81              | 91.24          | 0.0004                   | 0.19                   | 0.19                    | 100                    |

#### Node: KD0030

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 89.46 ft  
Warning Stage: 93.95 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.90      | 0.0004    | 19         |
| 94.00      | 0.0026    | 113        |
| 94.50      | 0.0337    | 1469       |
| 95.00      | 0.0743    | 3238       |
| 95.50      | 0.1195    | 5206       |
| 96.00      | 0.1717    | 7481       |
| 96.50      | 0.2352    | 10244      |
| 97.00      | 0.3287    | 14319      |
| 97.50      | 0.4821    | 21000      |
| 98.00      | 0.7853    | 34206      |
| 98.50      | 1.2544    | 54644      |
| 99.00      | 1.8396    | 80131      |
| 99.50      | 2.5953    | 113050     |
| 100.00     | 3.6783    | 160225     |
| 100.50     | 5.1390    | 223856     |
| 101.00     | 5.9345    | 258506     |
| 101.50     | 6.2012    | 270125     |
| 102.00     | 6.2334    | 271525     |
| 102.50     | 6.2389    | 271768     |
| 103.00     | 6.2389    | 271768     |
| 89.46      | 0.0001    | 4          |

Comment:

## Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0030    | 100Y_24H | 93.95              | 91.20          | -0.0008                  | 6.19                   | 6.19                    | 100                    |
| KD0030    | 10Y_24H  | 93.95              | 90.44          | 0.0007                   | 3.23                   | 3.23                    | 100                    |
| KD0030    | 10Y_6H   | 93.95              | 90.56          | -0.0008                  | 3.85                   | 3.86                    | 100                    |
| KD0030    | 25Y_24H  | 93.95              | 90.66          | 0.0008                   | 4.21                   | 4.21                    | 100                    |
| KD0030    | MA_24H   | 93.95              | 90.02          | 0.0007                   | 1.22                   | 1.22                    | 100                    |

## Node: KD0040

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 90.89 ft  
Warning Stage: 93.86 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.78      | 0.0003    | 13         |
| 94.00      | 0.0069    | 300        |
| 94.50      | 0.2124    | 9250       |
| 95.00      | 0.5624    | 24500      |
| 95.50      | 0.8441    | 36769      |
| 96.00      | 1.0701    | 46613      |
| 96.50      | 1.2400    | 54012      |
| 97.00      | 1.4136    | 61575      |
| 97.50      | 1.4708    | 64069      |
| 98.00      | 1.5177    | 66112      |
| 98.50      | 1.5431    | 67218      |
| 99.00      | 1.5431    | 67218      |
| 90.89      | 0.0001    | 4          |

Comment:

## Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0040    | 100Y_24H | 93.86              | 91.50          | 0.0004                   | 1.54                   | 1.54                    | 100                    |
| KD0040    | 10Y_24H  | 93.86              | 91.30          | 0.0004                   | 0.78                   | 0.78                    | 100                    |
| KD0040    | 10Y_6H   | 93.86              | 91.34          | -0.0004                  | 0.92                   | 0.92                    | 100                    |
| KD0040    | 25Y_24H  | 93.86              | 91.38          | 0.0004                   | 1.03                   | 1.03                    | 100                    |
| KD0040    | MA_24H   | 93.86              | 91.11          | 0.0004                   | 0.27                   | 0.27                    | 100                    |

## Node: KD0050

Scenario: ALT1

Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 83.53 ft  
Warning Stage: 85.80 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 85.80      | 0.0003    | 13         |
| 86.00      | 0.0057    | 250        |
| 86.50      | 0.0412    | 1794       |
| 87.00      | 0.0857    | 3731       |
| 87.50      | 0.1570    | 6837       |
| 88.00      | 0.2323    | 10119      |
| 88.50      | 0.3046    | 13269      |
| 89.00      | 0.3840    | 16725      |
| 89.50      | 0.4518    | 19681      |
| 90.00      | 0.5187    | 22594      |
| 90.50      | 0.6155    | 26812      |
| 91.00      | 0.7145    | 31125      |
| 91.50      | 0.9039    | 39375      |
| 92.00      | 1.0744    | 46800      |
| 92.50      | 1.2377    | 53913      |
| 93.00      | 1.3982    | 60906      |
| 93.50      | 1.5565    | 67800      |
| 94.00      | 1.6832    | 73319      |
| 94.50      | 1.8242    | 79463      |
| 95.00      | 2.0265    | 88275      |
| 95.50      | 2.4935    | 108619     |
| 96.00      | 2.7769    | 120963     |
| 96.50      | 2.8370    | 123581     |
| 97.00      | 2.8568    | 124444     |
| 97.50      | 2.8658    | 124833     |
| 98.00      | 2.8658    | 124833     |
| 83.53      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0050    | 100Y_24H | 85.80              | 86.22          | 0.0010                   | 2.83                   | 2.90                    | 920                    |
| KD0050    | 10Y_24H  | 85.80              | 86.06          | 0.0010                   | 1.43                   | 1.45                    | 437                    |
| KD0050    | 10Y_6H   | 85.80              | 86.07          | 0.0010                   | 1.67                   | 1.74                    | 473                    |
| KD0050    | 25Y_24H  | 85.80              | 86.13          | 0.0010                   | 1.90                   | 1.89                    | 663                    |
| KD0050    | MA_24H   | 85.80              | 85.80          | 0.0010                   | 0.49                   | 0.79                    | 100                    |

Node: KD0060

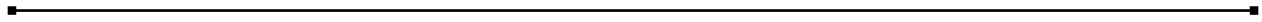
Scenario: ALT1  
Type: Stage/Area



Base Flow: 0.00 cfs  
Initial Stage: 82.34 ft  
Warning Stage: 85.39 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 85.38      | 0.0001    | 6          |
| 85.50      | 0.0012    | 51         |
| 86.00      | 0.0209    | 912        |
| 86.50      | 0.0729    | 3175       |
| 87.00      | 0.1126    | 4906       |
| 87.50      | 0.1486    | 6475       |
| 88.00      | 0.1921    | 8369       |
| 88.50      | 0.2324    | 10125      |
| 89.00      | 0.2663    | 11600      |
| 89.50      | 0.2822    | 12294      |
| 90.00      | 0.3096    | 13487      |
| 90.50      | 0.3568    | 15544      |
| 91.00      | 0.3887    | 16931      |
| 91.50      | 0.4161    | 18125      |
| 92.00      | 0.4396    | 19150      |
| 92.50      | 0.4946    | 21544      |
| 93.00      | 0.5627    | 24513      |
| 93.50      | 0.6353    | 27675      |
| 94.00      | 0.6510    | 28356      |
| 94.50      | 0.6855    | 29863      |
| 95.00      | 0.7640    | 33281      |
| 95.50      | 0.8533    | 37169      |
| 96.00      | 0.9044    | 39394      |
| 96.50      | 0.9281    | 40426      |
| 97.00      | 0.9281    | 40426      |
| 82.34      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0060    | 100Y_24H | 85.39              | 86.19          | 0.0014                   | 16.64                  | 16.53                   | 1775                   |
| KD0060    | 10Y_24H  | 85.39              | 86.04          | 0.0014                   | 6.63                   | 6.93                    | 1132                   |
| KD0060    | 10Y_6H   | 85.39              | 86.05          | 0.0014                   | 7.84                   | 8.18                    | 1170                   |
| KD0060    | 25Y_24H  | 85.39              | 86.10          | 0.0014                   | 9.36                   | 9.02                    | 1376                   |
| KD0060    | MA_24H   | 85.39              | 85.81          | 0.0014                   | 2.43                   | 2.55                    | 987                    |



Node: KD0070

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 84.86 ft

Warning Stage: 88.26 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.07      | 0.0001    | 6          |
| 88.50      | 0.0115    | 500        |
| 89.00      | 0.0194    | 844        |
| 89.50      | 0.0194    | 847        |
| 90.00      | 0.0194    | 847        |
| 84.86      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0070    | 100Y_24H | 88.26              | 86.21          | -0.0120                  | 7.83                   | 12.00                   | 150                    |
| KD0070    | 10Y_24H  | 88.26              | 86.01          | -0.0120                  | 5.44                   | 12.00                   | 148                    |
| KD0070    | 10Y_6H   | 88.26              | 85.97          | -0.0120                  | 5.13                   | 12.00                   | 148                    |
| KD0070    | 25Y_24H  | 88.26              | 86.09          | -0.0120                  | 6.23                   | 12.00                   | 150                    |
| KD0070    | MA_24H   | 88.26              | 85.75          | -0.0120                  | 3.42                   | 12.00                   | 146                    |

#### Node: KD0080

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 85.43 ft  
Warning Stage: 88.27 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.14      | 0.0001    | 6          |
| 88.50      | 0.0086    | 375        |
| 89.00      | 0.0232    | 1013       |
| 89.50      | 0.0390    | 1700       |
| 90.00      | 0.0600    | 2613       |
| 90.50      | 0.0796    | 3469       |
| 91.00      | 0.1013    | 4412       |
| 91.50      | 0.1286    | 5600       |
| 92.00      | 0.1805    | 7862       |
| 92.50      | 0.2299    | 10012      |
| 93.00      | 0.2682    | 11681      |
| 93.50      | 0.3151    | 13725      |
| 94.00      | 0.3753    | 16350      |
| 94.50      | 0.4322    | 18825      |
| 95.00      | 0.5119    | 22300      |
| 95.50      | 0.6672    | 29062      |
| 96.00      | 1.0996    | 47900      |
| 96.50      | 1.7020    | 74138      |
| 97.00      | 2.1503    | 93669      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 97.50      | 2.6237    | 114288     |
| 98.00      | 2.8439    | 123881     |
| 98.50      | 2.8970    | 126191     |
| 99.00      | 2.9006    | 126351     |
| 99.50      | 2.9006    | 126351     |
| 85.43      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0080    | 100Y_24H | 88.27              | 87.87          | 0.0010                   | 7.81                   | 7.81                    | 100                    |
| KD0080    | 10Y_24H  | 88.27              | 86.51          | -0.0009                  | 3.24                   | 3.24                    | 100                    |
| KD0080    | 10Y_6H   | 88.27              | 86.24          | -0.0009                  | 2.07                   | 2.07                    | 100                    |
| KD0080    | 25Y_24H  | 88.27              | 86.88          | 0.0010                   | 4.86                   | 4.86                    | 100                    |
| KD0080    | MA_24H   | 88.27              | 85.79          | 0.0006                   | 0.50                   | 0.50                    | 100                    |



Node: KD0090

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 86.23 ft  
Warning Stage: 88.59 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 86.23      | 0.0010    | 44         |
| 88.59      | 0.0010    | 44         |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0090    | 100Y_24H | 88.59              | 88.28          | 0.0010                   | 5.24                   | 5.24                    | 100                    |
| KD0090    | 10Y_24H  | 88.59              | 86.99          | 0.0010                   | 1.87                   | 1.87                    | 100                    |
| KD0090    | 10Y_6H   | 88.59              | 86.79          | 0.0010                   | 1.10                   | 1.10                    | 100                    |
| KD0090    | 25Y_24H  | 88.59              | 87.28          | 0.0010                   | 3.07                   | 3.07                    | 100                    |
| KD0090    | MA_24H   | 88.59              | 86.23          | 0.0000                   | 0.00                   | 0.00                    | 100                    |

Node: KD0100

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 85.27 ft  
Warning Stage: 88.55 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.33      | 0.0001    | 6          |
| 88.50      | 0.0029    | 125        |
| 89.00      | 0.0892    | 3888       |
| 89.50      | 0.0939    | 4090       |
| 90.00      | 0.0939    | 4090       |
| 85.27      | 0.0001    | 4          |

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0100    | 100Y_24H | 88.55              | 86.38          | 0.0010                   | 3.99                   | 3.99                    | 139                    |
| KD0100    | 10Y_24H  | 88.55              | 86.02          | 0.0010                   | 2.05                   | 2.05                    | 138                    |
| KD0100    | 10Y_6H   | 88.55              | 86.10          | 0.0010                   | 2.47                   | 2.47                    | 139                    |
| KD0100    | 25Y_24H  | 88.55              | 86.15          | 0.0010                   | 2.70                   | 2.70                    | 139                    |
| KD0100    | MA_24H   | 88.55              | 85.68          | 0.0010                   | 0.67                   | 0.67                    | 119                    |

Node: KD0110

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 85.41 ft  
Warning Stage: 88.48 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.43      | 0.0001    | 6          |
| 88.50      | 0.0016    | 69         |
| 89.00      | 0.0819    | 3569       |
| 89.50      | 0.1573    | 6850       |
| 90.00      | 0.2369    | 10319      |
| 90.50      | 0.3037    | 13231      |
| 91.00      | 0.3726    | 16231      |
| 91.50      | 0.4599    | 20031      |
| 92.00      | 0.5632    | 24531      |
| 92.50      | 0.6903    | 30069      |
| 93.00      | 0.7876    | 34306      |
| 93.50      | 0.9026    | 39319      |
| 94.00      | 0.9929    | 43250      |
| 94.50      | 1.1335    | 49375      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.00      | 1.2346    | 53781      |
| 95.50      | 1.3394    | 58344      |
| 96.00      | 1.4477    | 63063      |
| 96.50      | 1.6566    | 72162      |
| 97.00      | 1.9140    | 83375      |
| 97.50      | 2.4139    | 105150     |
| 98.00      | 3.0096    | 131100     |
| 98.50      | 3.3444    | 145681     |
| 99.00      | 3.4563    | 150556     |
| 99.50      | 3.5128    | 153019     |
| 100.00     | 3.5516    | 154706     |
| 100.50     | 3.6292    | 158088     |
| 101.00     | 3.6754    | 160100     |
| 101.50     | 3.6830    | 160433     |
| 102.00     | 3.6830    | 160433     |
| 85.41      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0110    | 100Y_24H | 88.48              | 86.65          | 0.0010                   | 3.89                   | 3.89                    | 100                    |
| KD0110    | 10Y_24H  | 88.48              | 86.21          | 0.0010                   | 1.99                   | 1.99                    | 100                    |
| KD0110    | 10Y_6H   | 88.48              | 86.31          | 0.0010                   | 2.41                   | 2.41                    | 100                    |
| KD0110    | 25Y_24H  | 88.48              | 86.36          | 0.0010                   | 2.63                   | 2.63                    | 100                    |
| KD0110    | MA_24H   | 88.48              | 85.84          | 0.0010                   | 0.65                   | 0.65                    | 100                    |

#### Node: KD0120

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 95.50 ft  
Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 97.28      | 0.0001    | 6          |
| 97.50      | 0.0171    | 744        |
| 98.00      | 0.1194    | 5200       |
| 98.50      | 0.2834    | 12344      |
| 99.00      | 0.6104    | 26587      |
| 99.50      | 0.9440    | 41119      |
| 100.00     | 1.2516    | 54519      |
| 100.50     | 1.5809    | 68862      |
| 101.00     | 2.6641    | 116050     |
| 101.50     | 5.0608    | 220450     |
| 102.00     | 6.3572    | 276919     |



| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 102.50     | 6.6189    | 288319     |
| 103.00     | 6.7130    | 292419     |
| 103.50     | 6.7259    | 292979     |
| 104.00     | 6.7259    | 292979     |
| 95.50      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0120    | 100Y_24H | 0.00               | 98.60          | 0.0010                   | 7.04                   | 6.37                    | 15108                  |
| KD0120    | 10Y_24H  | 0.00               | 98.25          | 0.0010                   | 3.74                   | 3.43                    | 8724                   |
| KD0120    | 10Y_6H   | 0.00               | 98.17          | 0.0010                   | 4.58                   | 3.84                    | 7570                   |
| KD0120    | 25Y_24H  | 0.00               | 98.37          | 0.0010                   | 4.84                   | 4.45                    | 10435                  |
| KD0120    | MA_24H   | 0.00               | 97.46          | 0.0009                   | 1.44                   | 1.43                    | 621                    |



Node: KD0130

Scenario: ALT1  
Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 82.04 ft  
Warning Stage: 0.00 ft  
Boundary Stage: KD0130

| Year | Month | Day | Hour     | Stage [ft] |
|------|-------|-----|----------|------------|
| 0    | 0     | 0   | 0.0000   | 82.04      |
| 0    | 0     | 0   | 999.0000 | 82.04      |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0130    | 100Y_24H | 0.00               | 85.22          | 0.0029                   | 26.90                  | 0.00                    | 0                      |
| KD0130    | 10Y_24H  | 0.00               | 83.22          | 0.0011                   | 12.88                  | 0.00                    | 0                      |
| KD0130    | 10Y_6H   | 0.00               | 83.22          | 0.0011                   | 13.61                  | 0.00                    | 0                      |
| KD0130    | 25Y_24H  | 0.00               | 83.92          | 0.0017                   | 17.26                  | 0.00                    | 0                      |
| KD0130    | MA_24H   | 0.00               | 82.72          | 0.0006                   | 4.08                   | 0.00                    | 0                      |

Node: KD0140

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 89.09 ft  
Warning Stage: 93.74 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 89.09      | 0.0001    | 4          |
| 93.74      | 0.0001    | 4          |

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0140    | 100Y_24H | 93.74              | 91.00          | 0.0008                   | 11.92                  | 11.92                   | 918                    |
| KD0140    | 10Y_24H  | 93.74              | 90.34          | 0.0007                   | 6.16                   | 6.16                    | 908                    |
| KD0140    | 10Y_6H   | 93.74              | 90.47          | -0.0010                  | 7.28                   | 7.28                    | 991                    |
| KD0140    | 25Y_24H  | 93.74              | 90.56          | 0.0008                   | 8.07                   | 8.07                    | 912                    |
| KD0140    | MA_24H   | 93.74              | 89.80          | 0.0007                   | 2.27                   | 2.27                    | 894                    |

Node: KD0150

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 82.17 ft  
Warning Stage: 0.00 ft

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0150    | 100Y_24H | 0.00               | 86.20          | 0.0119                   | 12.09                  | 3.40                    | 321                    |
| KD0150    | 10Y_24H  | 0.00               | 86.04          | 0.0119                   | 12.09                  | 3.42                    | 321                    |
| KD0150    | 10Y_6H   | 0.00               | 86.04          | 0.0119                   | 12.09                  | 3.46                    | 321                    |
| KD0150    | 25Y_24H  | 0.00               | 86.10          | 0.0119                   | 12.09                  | 3.42                    | 321                    |
| KD0150    | MA_24H   | 0.00               | 85.80          | 0.0119                   | 12.09                  | 2.92                    | 321                    |

Node: KDB0130

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 95.13 ft  
Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.13      | 0.0001    | 3          |
| 95.25      | 0.0018    | 77         |
| 95.50      | 0.0080    | 350        |
| 95.75      | 0.0174    | 758        |
| 96.00      | 0.0322    | 1401       |
| 96.25      | 0.0539    | 2350       |
| 96.50      | 0.0793    | 3454       |
| 96.75      | 0.1013    | 4412       |
| 97.00      | 0.1235    | 5379       |
| 97.25      | 0.1462    | 6370       |
| 97.50      | 0.1694    | 7379       |
| 97.75      | 0.1911    | 8324       |
| 98.00      | 0.2156    | 9392       |
| 98.25      | 0.2550    | 11109      |
| 98.50      | 0.2930    | 12765      |
| 98.75      | 0.3249    | 14152      |
| 99.00      | 0.3703    | 16131      |
| 99.25      | 0.4015    | 17489      |
| 99.50      | 0.4675    | 20365      |
| 99.75      | 0.5200    | 22653      |
| 100.00     | 0.5320    | 23174      |
| 100.25     | 0.5335    | 23238      |
| 100.50     | 0.5335    | 23238      |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KDB0130   | 100Y_24H | 0.00               | 98.30          | 0.0010                   | 6.89                   | 6.89                    | 11454                  |
| KDB0130   | 10Y_24H  | 0.00               | 98.16          | 0.0010                   | 3.72                   | 3.65                    | 10502                  |
| KDB0130   | 10Y_6H   | 0.00               | 98.11          | 0.0010                   | 4.38                   | 2.94                    | 10140                  |
| KDB0130   | 25Y_24H  | 0.00               | 98.22          | 0.0010                   | 4.83                   | 4.81                    | 10918                  |
| KDB0130   | MA_24H   | 0.00               | 97.46          | 0.0010                   | 1.58                   | 1.08                    | 7202                   |

Node: NTZ-0040

Scenario: ALT1  
Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 0.00 ft

Warning Stage: 0.00 ft  
Boundary Stage:

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| NTZ-0040  | 100Y_24H | 0.00               | 0.00           | 0.0000                   | 0.51                   | 0.00                    | 0                      |
| NTZ-0040  | 10Y_24H  | 0.00               | 0.00           | 0.0000                   | 0.48                   | 0.00                    | 0                      |
| NTZ-0040  | 10Y_6H   | 0.00               | 0.00           | 0.0000                   | 0.47                   | 0.00                    | 0                      |
| NTZ-0040  | 25Y_24H  | 0.00               | 0.00           | 0.0000                   | 0.50                   | 0.00                    | 0                      |
| NTZ-0040  | MA_24H   | 0.00               | 0.00           | 0.0000                   | 0.09                   | 0.00                    | 0                      |

Node: NTZ-0080

Scenario: ALT1  
Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 0.00 ft  
Warning Stage: 0.00 ft  
Boundary Stage:

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| NTZ-0080  | 100Y_24H | 0.00               | 0.00           | 0.0000                   | 1.72                   | 0.00                    | 0                      |
| NTZ-0080  | 10Y_24H  | 0.00               | 0.00           | 0.0000                   | 1.58                   | 0.00                    | 0                      |
| NTZ-0080  | 10Y_6H   | 0.00               | 0.00           | 0.0000                   | 1.53                   | 0.00                    | 0                      |
| NTZ-0080  | 25Y_24H  | 0.00               | 0.00           | 0.0000                   | 1.64                   | 0.00                    | 0                      |
| NTZ-0080  | MA_24H   | 0.00               | 0.00           | 0.0000                   | 1.08                   | 0.00                    | 0                      |

Link: L-0030W

Scenario: ALT1  
Type: Weir  
From Node: Bioswale  
To Node: KD0090

Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0030W   | 100Y_24H | 5.24           | 0.00           | 0.00                     | 1.16                  | 1.16                  | 1.16                   |
| L-0030W   | 10Y_24H  | 1.87           | 0.00           | 0.00                     | 0.96                  | 0.96                  | 0.96                   |
| L-0030W   | 10Y_6H   | 1.10           | 0.00           | 0.00                     | 0.86                  | 0.86                  | 0.86                   |
| L-0030W   | 25Y_24H  | 3.07           | 0.00           | 0.00                     | 1.06                  | 1.06                  | 1.06                   |
| L-0030W   | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: L-0060PERC

Scenario: ALT1  
Type:  
From Node: Bioswale  
To Node: NTZ-0040  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name  | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|------------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0060PERC | 100Y_24H | 0.51           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 10Y_24H  | 0.48           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 10Y_6H   | 0.47           | 0.00           | -0.02                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 25Y_24H  | 0.50           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | MA_24H   | 0.09           | 0.00           | 0.01                     | 0.00                  | 0.00                  | 0.00                   |

Link: L-0070P

Scenario: ALT1  
Type: Pipe  
From Node: KD0120  
To Node: KDB0130  
Link Count: 1  
Flow Direction: Both



Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0070P   | 100Y_24H | 6.37           | 0.00           | -0.17                    | 3.60                  | 3.60                  | 3.60                   |
| L-0070P   | 10Y_24H  | 3.43           | 0.00           | -0.18                    | 1.94                  | 1.94                  | 1.94                   |
| L-0070P   | 10Y_6H   | 3.84           | 0.00           | -0.01                    | 2.17                  | 2.17                  | 2.17                   |
| L-0070P   | 25Y_24H  | 4.45           | 0.00           | 0.17                     | 2.52                  | 2.52                  | 2.52                   |
| L-0070P   | MA_24H   | 1.43           | 0.00           | -0.16                    | 1.47                  | 1.27                  | 1.08                   |

Link: L-0090W

Scenario: ALT1  
 Type: Weir  
 From Node: KDB0130  
 To Node: Bioswale  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0090W   | 100Y_24H | 5.17           | 0.00           | 0.00                     | 1.51                  | 1.51                  | 1.51                   |
| L-0090W   | 10Y_24H  | 2.07           | 0.00           | 0.00                     | 1.34                  | 1.34                  | 1.34                   |
| L-0090W   | 10Y_6H   | 1.42           | 0.00           | 0.00                     | 1.23                  | 1.23                  | 1.23                   |
| L-0090W   | 25Y_24H  | 3.17           | 0.00           | 0.00                     | 1.40                  | 1.40                  | 1.40                   |
| L-0090W   | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: L-0100PERC

Scenario: ALT1  
 Type:  
 From Node: KDB0130  
 To Node: NTZ-0080  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name  | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|------------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0100PERC | 100Y_24H | 1.72           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | 10Y_24H  | 1.58           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | 10Y_6H   | 1.53           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |

| Link Name  | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|------------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0100PERC | 25Y_24H  | 1.64           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | MA_24H   | 1.08           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |



Link: L-0110P

Scenario: ALT1  
Type: Pipe  
From Node: KD0150  
To Node: KD0070  
Link Count: 1  
Flow Direction: Both



Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0110P   | 100Y_24H | 3.40           | -12.00         | -0.73                    | -3.82                 | -5.84                 | -4.83                  |
| L-0110P   | 10Y_24H  | 3.42           | -12.00         | -0.63                    | -3.82                 | -5.84                 | -4.83                  |
| L-0110P   | 10Y_6H   | 3.46           | -12.00         | 0.56                     | -3.82                 | -5.84                 | -4.83                  |
| L-0110P   | 25Y_24H  | 3.42           | -12.00         | 0.70                     | -3.82                 | -5.84                 | -4.83                  |
| L-0110P   | MA_24H   | 2.92           | -12.00         | 0.65                     | -3.82                 | -5.84                 | -4.83                  |



Link: P0030

Scenario: ALT1  
Type: Pipe  
From Node: KD0010  
To Node: KD0140  
Link Count: 1  
Flow Direction: Both



Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0030     | 100Y_24H | 3.11           | 0.00           | 0.01                     | 2.68                  | 5.83                  | 3.84                   |
| P0030     | 10Y_24H  | 1.60           | 0.00           | 0.01                     | 2.25                  | 5.84                  | 3.84                   |
| P0030     | 10Y_6H   | 1.85           | 0.00           | 0.01                     | 2.33                  | 6.05                  | 3.97                   |
| P0030     | 25Y_24H  | 2.10           | 0.00           | 0.01                     | 2.41                  | 5.75                  | 3.78                   |
| P0030     | MA_24H   | 0.59           | 0.00           | 0.01                     | 1.78                  | 5.57                  | 3.67                   |

Link: P0040

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0020  
 To Node: KD0140  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0040     | 100Y_24H | 1.14           | 0.00           | 0.01                     | 2.07                  | 0.64                  | 1.35                   |
| P0040     | 10Y_24H  | 0.58           | 0.00           | 0.01                     | 1.77                  | 0.56                  | 1.08                   |
| P0040     | 10Y_6H   | 0.70           | 0.00           | 0.01                     | 1.84                  | 0.93                  | 1.20                   |
| P0040     | 25Y_24H  | 0.77           | 0.00           | -0.01                    | 1.88                  | 0.50                  | 1.17                   |
| P0040     | MA_24H   | 0.19           | 0.00           | -0.01                    | 1.48                  | 0.47                  | 0.89                   |

Link: P0050

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0030  
 To Node: KD0140  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0050     | 100Y_24H | 6.19           | 0.00           | 0.01                     | 3.50                  | 3.50                  | 3.50                   |
| P0050     | 10Y_24H  | 3.23           | 0.00           | 0.01                     | 2.65                  | 2.43                  | 2.54                   |
| P0050     | 10Y_6H   | 3.86           | 0.00           | 0.01                     | 2.77                  | 2.56                  | 2.67                   |
| P0050     | 25Y_24H  | 4.21           | 0.00           | 0.01                     | 2.79                  | 2.62                  | 2.70                   |
| P0050     | MA_24H   | 1.22           | 0.00           | 0.01                     | 2.01                  | 2.28                  | 2.13                   |

Link: P0060

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0040  
 To Node: KD0140  
 Link Count: 1

Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0060     | 100Y_24H | 1.54           | 0.00           | 0.00                     | 2.28                  | 0.87                  | 1.57                   |
| P0060     | 10Y_24H  | 0.78           | 0.00           | 0.00                     | 1.96                  | 0.74                  | 1.26                   |
| P0060     | 10Y_6H   | 0.92           | 0.00           | 0.00                     | 2.03                  | 0.89                  | 1.31                   |
| P0060     | 25Y_24H  | 1.03           | 0.00           | 0.00                     | 2.08                  | 0.75                  | 1.35                   |
| P0060     | MA_24H   | 0.27           | 0.00           | 0.00                     | 1.61                  | 0.73                  | 1.01                   |

Link: P0070

Scenario: ALT1  
Type: Pipe  
From Node: KD0140  
To Node: KD0060  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0070     | 100Y_24H | 11.92          | 0.00           | 0.02                     | 3.86                  | 3.79                  | 3.83                   |
| P0070     | 10Y_24H  | 6.16           | 0.00           | 0.02                     | 2.99                  | 1.96                  | 2.47                   |
| P0070     | 10Y_6H   | 7.28           | 0.00           | 0.02                     | 3.15                  | 2.32                  | 2.73                   |
| P0070     | 25Y_24H  | 8.07           | 0.00           | 0.02                     | 3.26                  | 2.57                  | 2.91                   |
| P0070     | MA_24H   | 2.27           | 0.00           | 0.02                     | 2.26                  | 0.72                  | 1.49                   |

Link: P0080

Scenario: ALT1  
Type: Pipe  
From Node: KD0090  
To Node: KD0080  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0080     | 100Y_24H | 5.24           | 0.00           | 0.01                     | 4.27                  | 4.27                  | 4.27                   |
| P0080     | 10Y_24H  | 1.87           | 0.00           | 0.01                     | 2.37                  | 1.70                  | 2.03                   |
| P0080     | 10Y_6H   | 1.10           | 0.00           | 0.01                     | 2.05                  | 1.36                  | 1.70                   |
| P0080     | 25Y_24H  | 3.07           | 0.00           | 0.01                     | 2.80                  | 2.50                  | 2.65                   |
| P0080     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: P0090

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0080  
 To Node: KD0070  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0090     | 100Y_24H | 7.81           | 0.00           | -0.01                    | 6.37                  | 8.08                  | 6.37                   |
| P0090     | 10Y_24H  | 3.24           | 0.00           | 0.02                     | 2.87                  | 2.77                  | 2.82                   |
| P0090     | 10Y_6H   | 2.07           | 0.00           | 0.01                     | 2.46                  | 3.88                  | 2.71                   |
| P0090     | 25Y_24H  | 4.86           | 0.00           | 0.01                     | 3.96                  | 8.11                  | 5.79                   |
| P0090     | MA_24H   | 0.50           | 0.00           | -0.01                    | 1.69                  | 1.19                  | 1.18                   |

#### Link: P0100

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0070  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0100     | 100Y_24H | 6.60           | 0.00           | 0.06                     | 2.94                  | 4.77                  | 3.85                   |
| P0100     | 10Y_24H  | 5.38           | 0.00           | 0.02                     | 2.87                  | 4.85                  | 3.86                   |
| P0100     | 10Y_6H   | 5.07           | 0.00           | 0.01                     | 2.82                  | 4.77                  | 3.80                   |
| P0100     | 25Y_24H  | 6.03           | 0.00           | 0.01                     | 2.97                  | 5.00                  | 3.99                   |



| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0100     | MA_24H   | 3.39           | 0.00           | 0.01                     | 2.52                  | 4.26                  | 3.39                   |

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#### Link: P0110

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0110  
 To Node: KD0100  
 Link Count: 1  
 Flow Direction: Both

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#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0110     | 100Y_24H | 3.89           | 0.00           | -0.01                    | 3.17                  | 3.41                  | 3.29                   |
| P0110     | 10Y_24H  | 1.99           | 0.00           | 0.01                     | 2.40                  | 2.68                  | 2.54                   |
| P0110     | 10Y_6H   | 2.41           | 0.00           | 0.01                     | 2.55                  | 2.84                  | 2.69                   |
| P0110     | 25Y_24H  | 2.63           | 0.00           | 0.01                     | 2.62                  | 2.93                  | 2.78                   |
| P0110     | MA_24H   | 0.65           | 0.00           | 0.01                     | 1.76                  | 2.00                  | 1.88                   |

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#### Link: P0120

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0100  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

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#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0120     | 100Y_24H | 3.99           | 0.00           | 0.02                     | 2.84                  | 5.64                  | 4.24                   |
| P0120     | 10Y_24H  | 2.05           | 0.00           | 0.02                     | 2.32                  | 4.68                  | 3.50                   |
| P0120     | 10Y_6H   | 2.47           | 0.00           | 0.02                     | 2.45                  | 4.94                  | 3.69                   |
| P0120     | 25Y_24H  | 2.70           | 0.00           | -0.02                    | 2.51                  | 5.07                  | 3.79                   |
| P0120     | MA_24H   | 0.67           | 0.00           | -0.02                    | 1.71                  | 3.38                  | 2.55                   |

**Link: P0130**

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0060  
 To Node: KD0150  
 Link Count: 1  
 Flow Direction: Both

**Link Min/Max Conditions [ALT1]**

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0130     | 100Y_24H | 2.69           | -2.60          | 1.07                     | -1.09                 | -3.01                 | -2.04                  |
| P0130     | 10Y_24H  | 2.70           | -1.37          | 1.15                     | -1.09                 | -3.01                 | -2.04                  |
| P0130     | 10Y_6H   | 2.44           | -1.37          | -1.06                    | -1.09                 | -3.01                 | -2.04                  |
| P0130     | 25Y_24H  | 2.72           | -1.37          | -1.08                    | -1.09                 | -3.01                 | -2.04                  |
| P0130     | MA_24H   | 2.52           | -1.37          | 1.10                     | -1.09                 | -3.01                 | -2.04                  |

**Link: P0140**

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0050  
 To Node: KD0150  
 Link Count: 1  
 Flow Direction: Both

**Link Min/Max Conditions [ALT1]**

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0140     | 100Y_24H | 2.16           | -0.05          | -0.63                    | 1.22                  | 1.57                  | 1.22                   |
| P0140     | 10Y_24H  | 1.45           | -0.03          | 0.63                     | 0.82                  | 1.57                  | 0.82                   |
| P0140     | 10Y_6H   | 1.74           | -0.05          | 0.67                     | 0.98                  | 1.96                  | 1.06                   |
| P0140     | 25Y_24H  | 1.89           | -0.05          | 0.64                     | 1.07                  | 1.57                  | 1.07                   |
| P0140     | MA_24H   | 0.79           | -0.03          | 0.66                     | 0.45                  | 1.57                  | 0.82                   |

**Link: W0010**

Scenario: ALT1  
 Type: Weir  
 From Node: KD0050  
 To Node: KD0060  
 Link Count: 1

Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0010     | 100Y_24H | 1.53           | 0.00           | 0.00                     | 0.67                  | 0.67                  | 0.67                   |
| W0010     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0020

Scenario: ALT1  
Type: Weir  
From Node: KD0070  
To Node: KD0130  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0020     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0030

Scenario: ALT1  
Type: Weir  
From Node: KD0100  
To Node: KD0070  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0030     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0040

Scenario: ALT1  
 Type: Weir  
 From Node: KD0110  
 To Node: KD0100  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0040     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0050

Scenario: ALT1  
 Type: Weir  
 From Node: KD0080  
 To Node: KD0070  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0050     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0050     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0060

Scenario: ALT1  
Type: Weir  
From Node: KD0090  
To Node: KD0110  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0060     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0070

Scenario: ALT1  
Type: Weir  
From Node: KD0090  
To Node: KD0080  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0070     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |



Link: W0080

Scenario: ALT1  
Type: Weir  
From Node: KD0010  
To Node: KD0020  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0080     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0090

Scenario: ALT1  
Type: Weir  
From Node: KD0030  
To Node: KD0040  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0090     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0100

Scenario: ALT1  
Type: Weir  
From Node: KD0040  
To Node: KD0050  
Link Count: 1

Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0100     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0110

Scenario: ALT1  
Type: Weir  
From Node: KD0020  
To Node: KD0060  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0110     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0130

Scenario: ALT1  
Type: Weir  
From Node: KD0060  
To Node: KD0130  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0130     | 100Y_24H | 16.53          | 0.00           | 0.02                     | 1.41                  | 1.41                  | 1.41                   |
| W0130     | 10Y_24H  | 5.69           | 0.00           | 0.02                     | 1.15                  | 1.15                  | 1.15                   |
| W0130     | 10Y_6H   | 6.14           | 0.00           | -0.02                    | 1.17                  | 1.17                  | 1.17                   |
| W0130     | 25Y_24H  | 8.91           | 0.00           | 0.02                     | 1.28                  | 1.28                  | 1.28                   |
| W0130     | MA_24H   | 0.04           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0140

Scenario: ALT1  
 Type: Weir  
 From Node: KD0060  
 To Node: KD0070  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0140     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0150

Scenario: ALT1  
 Type: Weir  
 From Node: KD0010  
 To Node: KD0030  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0150     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0150     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

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#### Link: W0160

Scenario: ALT1  
 Type: Weir  
 From Node: KD0020  
 To Node: KD0040  
 Link Count: 1  
 Flow Direction: Both

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#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0160     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

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#### Link: W0170

Scenario: ALT1  
 Type: Weir  
 From Node: KD0080  
 To Node: KD0070  
 Link Count: 1  
 Flow Direction: Both

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#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0170     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0190

Scenario: ALT1  
 Type: Weir  
 From Node: KD0100  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0190     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Simulation: 100Y\_24H

Scenario: ALT1  
 Run Date/Time: 12/5/2022 11:12:17 AM  
 Program Version: ICPR4 4.07.08

General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

Output Time Increments

Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
|------|-------|-----|-----------|----------------------|



| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

|                     |
|---------------------|
| Restart File        |
| Save Restart: False |

#### Resources & Lookup Tables

| Resources               | Lookup Tables              |
|-------------------------|----------------------------|
| Rainfall Folder:        | Boundary Stage Set: 100_24 |
| Reference ET Folder:    | Extern Hydrograph Set:     |
| Unit Hydrograph Folder: | Curve Number Set: CN       |
|                         | Green-Ampt Set:            |
|                         | Vertical Layers Set:       |
|                         | Impervious Set: Impervious |
|                         | Roughness Set:             |
|                         | Crop Coef Set:             |
|                         | Fillable Porosity Set:     |
|                         | Conductivity Set:          |
|                         | Leakage Set:               |

#### Tolerances & Options

|                                 |                                 |
|---------------------------------|---------------------------------|
| Time Marching: SAOR             | IA Recovery Time: 24.0000 hr    |
| Max Iterations: 6               | ET for Manual Basins: False     |
| Over-Relax Weight Fact: 0.5 dec |                                 |
| dZ Tolerance: 0.0010 ft         | Smp/Man Basin Rain: Global      |
|                                 | Opt:                            |
| Max dZ: 1.0000 ft               | OF Region Rain Opt: Global      |
| Link Optimizer Tol: 0.0001 ft   | Rainfall Name: ~ORANGE          |
|                                 | Rainfall Amount: 10.60 in       |
| Edge Length Option: Automatic   | Storm Duration: 24.0000 hr      |
|                                 |                                 |
| Dflt Damping (2D): 0.0050 ft    | Dflt Damping (1D): 0.0050 ft    |
| Min Node Srf Area (2D): 100 ft2 | Min Node Srf Area (1D): 100 ft2 |
| Energy Switch (2D): Energy      | Energy Switch (1D): Energy      |

Comment:

#### Simulation: 10Y\_24H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:13:16 AM  
Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year            | Month                    | Day               | Hour [hr] |
|-------------|-----------------|--------------------------|-------------------|-----------|
| Start Time: | 0               | 0                        | 0                 | 0.0000    |
| End Time:   | 0               | 0                        | 0                 | 36.0000   |
|             | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |           |

Min Calculation Time: 60.0000 0.1000 900.0000  
 Max Calculation Time: 30.0000

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:  
 Reference ET Folder:  
 Unit Hydrograph Folder:

##### Lookup Tables

Boundary Stage Set: 10\_24  
 Extern Hydrograph Set:  
 Curve Number Set: CN  
 Green-Ampt Set:  
 Vertical Layers Set:  
 Impervious Set: Impervious  
 Roughness Set:  
 Crop Coef Set:  
 Fillable Porosity Set:  
 Conductivity Set:  
 Leakage Set:

#### Tolerances & Options

Time Marching: SAOR  
 Max Iterations: 6  
 Over-Relax Weight Fact: 0.5 dec  
 dZ Tolerance: 0.0010 ft  
 Max dZ: 1.0000 ft  
 Link Optimizer Tol: 0.0001 ft  
 Edge Length Option: Automatic  
 Dflt Damping (2D): 0.0050 ft  
 Min Node Srf Area (2D): 100 ft2  
 Energy Switch (2D): Energy

IA Recovery Time: 24.0000 hr  
 ET for Manual Basins: False  
 Smp/Man Basin Rain Opt: Global  
 OF Region Rain Opt: Global  
 Rainfall Name: ~ORANGE  
 Rainfall Amount: 7.50 in  
 Storm Duration: 24.0000 hr  
 Dflt Damping (1D): 0.0050 ft  
 Min Node Srf Area (1D): 100 ft2  
 Energy Switch (1D): Energy

Comment:

## Simulation: 10Y\_6H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:14:03 AM  
Program Version: ICPR4 4.07.08

## General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

## Output Time Increments

## Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

## Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

## Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

## Restart File

Save Restart: False

## Resources &amp; Lookup Tables

## Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph Folder:

## Lookup Tables

Boundary Stage Set: 10\_6  
Extern Hydrograph Set:  
Curve Number Set: CN  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

## Tolerances &amp; Options

Time Marching: SAOR  
Max Iterations: 6  
Over-Relax Weight Fact: 0.5 dec

IA Recovery Time: 24.0000 hr  
ET for Manual Basins: False

dZ Tolerance: 0.0010 ft  
 Max dZ: 1.0000 ft  
 Link Optimizer Tol: 0.0001 ft  
 Edge Length Option: Automatic  
 Dflt Damping (2D): 0.0050 ft  
 Min Node Srf Area (2D): 100 ft2  
 Energy Switch (2D): Energy

Smp/Man Basin Rain Opt: Global  
 OF Region Rain Opt: Global  
 Rainfall Name: ~ORANGE  
 Rainfall Amount: 4.65 in  
 Storm Duration: 6.0000 hr  
 Dflt Damping (1D): 0.0050 ft  
 Min Node Srf Area (1D): 100 ft2  
 Energy Switch (1D): Energy

Comment:

#### Simulation: 25Y\_24H

Scenario: ALT1  
 Run Date/Time: 12/5/2022 11:14:27 AM  
 Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

##### Lookup Tables

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph Folder:

Boundary Stage Set: 25\_24  
Extern Hydrograph Set:  
Curve Number Set: CN  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

#### Tolerances & Options

|                         |           |                         |            |
|-------------------------|-----------|-------------------------|------------|
| Time Marching:          | SAOR      | IA Recovery Time:       | 24.0000 hr |
| Max Iterations:         | 6         | ET for Manual Basins:   | False      |
| Over-Relax Weight Fact: | 0.5 dec   |                         |            |
| dZ Tolerance:           | 0.0010 ft | Smp/Man Basin Rain      | Global     |
|                         |           | Opt:                    |            |
| Max dZ:                 | 1.0000 ft | OF Region Rain Opt:     | Global     |
| Link Optimizer Tol:     | 0.0001 ft | Rainfall Name:          | ~ORANGE    |
|                         |           | Rainfall Amount:        | 8.60 in    |
| Edge Length Option:     | Automatic | Storm Duration:         | 24.0000 hr |
|                         |           |                         |            |
| Dflt Damping (2D):      | 0.0050 ft | Dflt Damping (1D):      | 0.0050 ft  |
| Min Node Srf Area (2D): | 100 ft2   | Min Node Srf Area (1D): | 100 ft2    |
| Energy Switch (2D):     | Energy    | Energy Switch (1D):     | Energy     |

Comment:

#### Simulation: MA\_24H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:15:26 AM  
Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |



### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

### Restart File

Save Restart: False

### Resources & Lookup Tables

| Resources               | Lookup Tables              |
|-------------------------|----------------------------|
| Rainfall Folder:        | Boundary Stage Set: MA_24  |
| Reference ET Folder:    | Extern Hydrograph Set:     |
| Unit Hydrograph Folder: | Curve Number Set: CN       |
|                         | Green-Ampt Set:            |
|                         | Vertical Layers Set:       |
|                         | Impervious Set: Impervious |
|                         | Roughness Set:             |
|                         | Crop Coef Set:             |
|                         | Fillable Porosity Set:     |
|                         | Conductivity Set:          |
|                         | Leakage Set:               |

### Tolerances & Options

|                                 |                                 |
|---------------------------------|---------------------------------|
| Time Marching: SAOR             | IA Recovery Time: 24.0000 hr    |
| Max Iterations: 6               | ET for Manual Basins: False     |
| Over-Relax Weight Fact: 0.5 dec |                                 |
| dZ Tolerance: 0.0010 ft         | Smp/Man Basin Rain Global       |
|                                 | Opt:                            |
| Max dZ: 1.0000 ft               | OF Region Rain Opt: Global      |
| Link Optimizer Tol: 0.0001 ft   | Rainfall Name: ~ORANGE          |
|                                 | Rainfall Amount: 4.50 in        |
| Edge Length Option: Automatic   | Storm Duration: 24.0000 hr      |
|                                 |                                 |
| Dflt Damping (2D): 0.0050 ft    | Dflt Damping (1D): 0.0050 ft    |
| Min Node Srf Area (2D): 100 ft2 | Min Node Srf Area (1D): 100 ft2 |
| Energy Switch (2D): Energy      | Energy Switch (1D): Energy      |

Comment:

# **APPENDIX E**

## **Alternative 3 ICPR Input and Results**

Manual Basin: KDB0010

Scenario: ALT1  
Node: KD0010  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 25.6000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 3.3147 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.3293    | 1400            | A         |               |                       |                      |
| 2.9854    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0010    | 100Y_24H | 3.11           | 9.1833                 | 10.60               | 4.67              | 3.3147    | 54.9                    | 38.27    | 20.29  |
| KDB0010    | 10Y_24H  | 1.60           | 10.0333                | 7.50                | 2.63              | 3.3147    | 56.8                    | 38.27    | 20.29  |
| KDB0010    | 10Y_6H   | 1.85           | 2.6667                 | 4.65                | 1.16              | 3.3147    | 61.0                    | 38.27    | 20.29  |
| KDB0010    | 25Y_24H  | 2.10           | 9.2000                 | 8.60                | 3.31              | 3.3147    | 55.9                    | 38.27    | 20.29  |
| KDB0010    | MA_24H   | 0.59           | 9.1000                 | 4.50                | 1.10              | 3.3147    | 61.3                    | 38.27    | 20.29  |

Manual Basin: KDB0020

Scenario: ALT1  
Node: KD0020  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 13.3000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 1.0956 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 1.0956    | 1200            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0020    | 100Y_24H | 1.14           | 9.0500                 | 10.60               | 4.57              | 1.0956    | 54.2                    | 37.30    | 18.90  |
| KDB0020    | 10Y_24H  | 0.58           | 9.0667                 | 7.50                | 2.55              | 1.0956    | 56.0                    | 37.30    | 18.90  |
| KDB0020    | 10Y_6H   | 0.70           | 2.5500                 | 4.65                | 1.10              | 1.0956    | 60.0                    | 37.30    | 18.90  |
| KDB0020    | 25Y_24H  | 0.77           | 9.0667                 | 8.60                | 3.22              | 1.0956    | 55.2                    | 37.30    | 18.90  |
| KDB0020    | MA_24H   | 0.19           | 9.0167                 | 4.50                | 1.04              | 1.0956    | 60.4                    | 37.30    | 18.90  |

Manual Basin: KDB0030

Scenario: ALT1  
Node: KD0030  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 23.3000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 6.2464 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.2357    | 1400            | A/D       |               |                       |                      |
| 0.0114    | 1200            | A/D       |               |                       |                      |
| 5.6956    | 1200            | A         |               |                       |                      |
| 0.3037    | 1400            | A         |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0030    | 100Y_24H | 6.19           | 9.1667                 | 10.60               | 4.79              | 6.2464    | 55.8                    | 38.15    | 20.11  |
| KDB0030    | 10Y_24H  | 3.23           | 9.1667                 | 7.50                | 2.72              | 6.2464    | 57.7                    | 38.15    | 20.11  |
| KDB0030    | 10Y_6H   | 3.85           | 2.6333                 | 4.65                | 1.22              | 6.2464    | 61.9                    | 38.15    | 20.11  |
| KDB0030    | 25Y_24H  | 4.21           | 9.1667                 | 8.60                | 3.42              | 6.2464    | 56.9                    | 38.15    | 20.11  |
| KDB0030    | MA_24H   | 1.22           | 9.0833                 | 4.50                | 1.15              | 6.2464    | 62.2                    | 38.15    | 20.11  |

Manual Basin: KDB0040

Scenario: ALT1  
Node: KD0040  
Hydrograph Method: NRCS Unit Hydrograph

Infiltration Method: Curve Number  
 Time of Concentration: 17.6000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 1.5426 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 1.5426    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0040    | 100Y_24H | 1.54           | 9.1000                 | 10.60               | 4.57              | 1.5426    | 54.2                    | 37.30    | 18.90  |
| KDB0040    | 10Y_24H  | 0.78           | 9.1167                 | 7.50                | 2.54              | 1.5426    | 56.0                    | 37.30    | 18.90  |
| KDB0040    | 10Y_6H   | 0.92           | 2.5833                 | 4.65                | 1.10              | 1.5426    | 60.0                    | 37.30    | 18.90  |
| KDB0040    | 25Y_24H  | 1.03           | 9.1167                 | 8.60                | 3.22              | 1.5426    | 55.2                    | 37.30    | 18.90  |
| KDB0040    | MA_24H   | 0.27           | 9.0333                 | 4.50                | 1.04              | 1.5426    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0050

Scenario: ALT1  
 Node: KD0050  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 18.7000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 2.8650 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 2.8650    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]



| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0050    | 100Y_24H | 2.83           | 9.1167                 | 10.60               | 4.57              | 2.8650    | 54.2                    | 37.30    | 18.90  |
| KDB0050    | 10Y_24H  | 1.43           | 9.1333                 | 7.50                | 2.55              | 2.8650    | 56.0                    | 37.30    | 18.90  |
| KDB0050    | 10Y_6H   | 1.67           | 2.6000                 | 4.65                | 1.10              | 2.8650    | 60.0                    | 37.30    | 18.90  |
| KDB0050    | 25Y_24H  | 1.90           | 9.1167                 | 8.60                | 3.22              | 2.8650    | 55.2                    | 37.30    | 18.90  |
| KDB0050    | MA_24H   | 0.49           | 9.0333                 | 4.50                | 1.04              | 2.8650    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0060

Scenario: ALT1  
 Node: KD0060  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 17.2000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.9439 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.9439    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0060    | 100Y_24H | 0.94           | 9.1000                 | 10.60               | 4.57              | 0.9439    | 54.2                    | 37.30    | 18.90  |
| KDB0060    | 10Y_24H  | 0.48           | 9.1167                 | 7.50                | 2.55              | 0.9439    | 56.0                    | 37.30    | 18.90  |
| KDB0060    | 10Y_6H   | 0.56           | 2.5833                 | 4.65                | 1.10              | 0.9439    | 60.0                    | 37.30    | 18.90  |
| KDB0060    | 25Y_24H  | 0.63           | 9.1000                 | 8.60                | 3.22              | 0.9439    | 55.2                    | 37.30    | 18.90  |
| KDB0060    | MA_24H   | 0.16           | 9.0333                 | 4.50                | 1.04              | 0.9439    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0070

Scenario: ALT1  
 Node: KD0070  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr

Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.0201 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0201    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0070    | 100Y_24H | 0.02           | 9.0333                 | 10.60               | 4.57              | 0.0201    | 54.2                    | 37.30    | 18.90  |
| KDB0070    | 10Y_24H  | 0.01           | 9.0333                 | 7.50                | 2.54              | 0.0201    | 56.0                    | 37.30    | 18.90  |
| KDB0070    | 10Y_6H   | 0.01           | 2.5333                 | 4.65                | 1.10              | 0.0201    | 60.0                    | 37.30    | 18.90  |
| KDB0070    | 25Y_24H  | 0.01           | 9.0333                 | 8.60                | 3.22              | 0.0201    | 55.2                    | 37.30    | 18.90  |
| KDB0070    | MA_24H   | 0.00           | 9.0000                 | 4.50                | 1.04              | 0.0201    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0080

Scenario: ALT1  
 Node: KD0080  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 19.1000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 2.9007 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 2.9007    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0080    | 100Y_24H | 2.85           | 9.1167                 | 10.60               | 4.57              | 2.9007    | 54.2                    | 37.30    | 18.90  |
| KDB0080    | 10Y_24H  | 1.44           | 9.1333                 | 7.50                | 2.55              | 2.9007    | 56.0                    | 37.30    | 18.90  |
| KDB0080    | 10Y_6H   | 1.68           | 2.6000                 | 4.65                | 1.10              | 2.9007    | 60.0                    | 37.30    | 18.90  |
| KDB0080    | 25Y_24H  | 1.91           | 9.1333                 | 8.60                | 3.22              | 2.9007    | 55.2                    | 37.30    | 18.90  |

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0080    | MA_24H   | 0.50           | 9.0333                 | 4.50                | 1.04              | 2.9007    | 60.4                    | 37.30    | 18.90  |

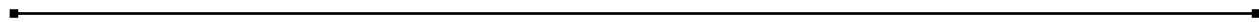


Manual Basin: KDB0090

Scenario: ALT1  
 Node: Bioswale  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.6758 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.6758    | 1200            | A         |               |                       |                      |

Comment:



Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0090    | 100Y_24H | 0.72           | 9.0333                 | 10.60               | 4.57              | 0.6758    | 54.2                    | 37.30    | 18.90  |
| KDB0090    | 10Y_24H  | 0.37           | 9.0333                 | 7.50                | 2.54              | 0.6758    | 56.0                    | 37.30    | 18.90  |
| KDB0090    | 10Y_6H   | 0.45           | 2.5333                 | 4.65                | 1.10              | 0.6758    | 60.0                    | 37.30    | 18.90  |
| KDB0090    | 25Y_24H  | 0.49           | 9.0333                 | 8.60                | 3.22              | 0.6758    | 55.2                    | 37.30    | 18.90  |
| KDB0090    | MA_24H   | 0.12           | 9.0000                 | 4.50                | 1.04              | 0.6758    | 60.4                    | 37.30    | 18.90  |



Manual Basin: KDB0100

Scenario: ALT1  
 Node: KD0100  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 10.0000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 0.0978 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient | Reference ET Station |
|-----------|-----------------|-----------|---------------|------------------|----------------------|
|-----------|-----------------|-----------|---------------|------------------|----------------------|

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0978    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0100    | 100Y_24H | 0.10           | 9.0333                 | 10.60               | 4.57              | 0.0978    | 54.2                    | 37.30    | 18.90  |
| KDB0100    | 10Y_24H  | 0.05           | 9.0333                 | 7.50                | 2.54              | 0.0978    | 56.0                    | 37.30    | 18.90  |
| KDB0100    | 10Y_6H   | 0.07           | 2.5333                 | 4.65                | 1.10              | 0.0978    | 60.0                    | 37.30    | 18.90  |
| KDB0100    | 25Y_24H  | 0.07           | 9.0333                 | 8.60                | 3.22              | 0.0978    | 55.2                    | 37.30    | 18.90  |
| KDB0100    | MA_24H   | 0.02           | 9.0000                 | 4.50                | 1.04              | 0.0978    | 60.4                    | 37.30    | 18.90  |

#### Manual Basin: KDB0110

Scenario: ALT1  
 Node: KD0110  
 Hydrograph Method: NRCS Unit Hydrograph  
 Infiltration Method: Curve Number  
 Time of Concentration: 11.6000 min  
 Max Allowable Q: 0.00 cfs  
 Time Shift: 0.0000 hr  
 Unit Hydrograph: UH256  
 Peaking Factor: 256.0  
 Area: 3.6964 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 3.6964    | 1200            | A         |               |                       |                      |

Comment:

#### Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0110    | 100Y_24H | 3.89           | 9.0500                 | 10.60               | 4.57              | 3.6964    | 54.2                    | 37.30    | 18.90  |
| KDB0110    | 10Y_24H  | 1.99           | 9.0500                 | 7.50                | 2.54              | 3.6964    | 56.0                    | 37.30    | 18.90  |
| KDB0110    | 10Y_6H   | 2.41           | 2.5500                 | 4.65                | 1.10              | 3.6964    | 60.0                    | 37.30    | 18.90  |
| KDB0110    | 25Y_24H  | 2.63           | 9.0500                 | 8.60                | 3.22              | 3.6964    | 55.2                    | 37.30    | 18.90  |
| KDB0110    | MA_24H   | 0.65           | 9.0000                 | 4.50                | 1.04              | 3.6964    | 60.4                    | 37.30    | 18.90  |

Manual Basin: KDB0120

Scenario: ALT1  
Node: KD0120  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 21.2000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 6.7420 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 6.1688    | 1200            | A         |               |                       |                      |
| 0.0164    | 7400            | A         |               |                       |                      |
| 0.3071    | 1200            | A/D       |               |                       |                      |
| 0.2496    | 1400            | A/D       |               |                       |                      |

Comment:

Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0120    | 100Y_24H | 7.04           | 9.1333                 | 10.60               | 4.93              | 6.7420    | 56.7                    | 37.66    | 19.42  |
| KDB0120    | 10Y_24H  | 3.74           | 9.1500                 | 7.50                | 2.82              | 6.7420    | 58.7                    | 37.66    | 19.42  |
| KDB0120    | 10Y_6H   | 4.58           | 2.6167                 | 4.65                | 1.28              | 6.7420    | 62.8                    | 37.66    | 19.42  |
| KDB0120    | 25Y_24H  | 4.84           | 9.1333                 | 8.60                | 3.53              | 6.7420    | 57.8                    | 37.66    | 19.42  |
| KDB0120    | MA_24H   | 1.44           | 9.0667                 | 4.50                | 1.21              | 6.7420    | 63.1                    | 37.66    | 19.42  |

Manual Basin: KDB0130

Scenario: ALT1  
Node: KDB0130  
Hydrograph Method: NRCS Unit Hydrograph  
Infiltration Method: Curve Number  
Time of Concentration: 10.0000 min  
Max Allowable Q: 0.00 cfs  
Time Shift: 0.0000 hr  
Unit Hydrograph: UH256  
Peaking Factor: 256.0  
Area: 0.5337 ac

| Area [ac] | Land Cover Zone | Soil Zone | Rainfall Name | Crop Coefficient Zone | Reference ET Station |
|-----------|-----------------|-----------|---------------|-----------------------|----------------------|
| 0.0793    | 1400            | A/D       |               |                       |                      |
| 0.0252    | 1200            | A/D       |               |                       |                      |
| 0.4292    | 1200            | A         |               |                       |                      |

Comment:



Manual Basin Runoff Summary [ALT1]

| Basin Name | Sim Name | Max Flow [cfs] | Time to Max Flow [hrs] | Total Rainfall [in] | Total Runoff [in] | Area [ac] | Equivalent Curve Number | % Imperv | % DCIA |
|------------|----------|----------------|------------------------|---------------------|-------------------|-----------|-------------------------|----------|--------|
| KDB0130    | 100Y_24H | 0.67           | 9.0167                 | 10.60               | 5.43              | 0.5337    | 60.4                    | 38.76    | 20.98  |
| KDB0130    | 10Y_24H  | 0.38           | 9.0333                 | 7.50                | 3.22              | 0.5337    | 62.4                    | 38.76    | 20.98  |
| KDB0130    | 10Y_6H   | 0.55           | 2.3167                 | 4.65                | 1.53              | 0.5337    | 66.5                    | 38.76    | 20.98  |
| KDB0130    | 25Y_24H  | 0.48           | 9.0167                 | 8.60                | 3.97              | 0.5337    | 61.6                    | 38.76    | 20.98  |
| KDB0130    | MA_24H   | 0.15           | 9.0000                 | 4.50                | 1.45              | 0.5337    | 66.9                    | 38.76    | 20.98  |

Node: Bioswale

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 86.38 ft  
Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 86.38      | 0.0000    | 1          |
| 86.50      | 0.0007    | 32         |
| 86.75      | 0.0020    | 85         |
| 87.00      | 0.0038    | 164        |
| 87.25      | 0.0059    | 257        |
| 87.50      | 0.0087    | 378        |
| 87.75      | 0.0117    | 510        |
| 88.00      | 0.0151    | 656        |
| 88.25      | 0.0190    | 826        |
| 88.50      | 0.0234    | 1018       |
| 88.75      | 0.0286    | 1244       |
| 89.00      | 0.0405    | 1763       |
| 89.25      | 0.0670    | 2918       |
| 89.50      | 0.0798    | 3475       |
| 89.75      | 0.0912    | 3971       |
| 90.00      | 0.1011    | 4402       |
| 90.25      | 0.1094    | 4767       |
| 90.50      | 0.1188    | 5173       |
| 90.75      | 0.1289    | 5616       |
| 91.00      | 0.1383    | 6026       |
| 91.25      | 0.1476    | 6430       |
| 91.50      | 0.1567    | 6828       |
| 91.75      | 0.1672    | 7285       |
| 92.00      | 0.1777    | 7742       |
| 92.25      | 0.1902    | 8283       |
| 92.50      | 0.2050    | 8930       |
| 92.75      | 0.2192    | 9548       |
| 93.00      | 0.2346    | 10221      |
| 93.25      | 0.2537    | 11049      |
| 93.50      | 0.2742    | 11946      |
| 93.75      | 0.2952    | 12858      |
| 94.00      | 0.3171    | 13811      |
| 94.25      | 0.3430    | 14940      |
| 94.50      | 0.3677    | 16016      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 94.75      | 0.3882    | 16912      |
| 95.00      | 0.4126    | 17972      |
| 95.25      | 0.4448    | 19376      |
| 95.50      | 0.4844    | 21100      |
| 95.75      | 0.5133    | 22361      |
| 96.00      | 0.5621    | 24485      |
| 96.25      | 0.6105    | 26594      |
| 96.50      | 0.6543    | 28502      |
| 96.75      | 0.6978    | 30397      |
| 97.00      | 0.7388    | 32181      |
| 97.25      | 0.7800    | 33977      |
| 97.50      | 0.8179    | 35627      |
| 97.75      | 0.8522    | 37120      |
| 98.00      | 0.8879    | 38679      |
| 98.25      | 0.9297    | 40498      |
| 98.50      | 0.9681    | 42170      |
| 98.75      | 1.0003    | 43571      |
| 99.00      | 1.0461    | 45566      |
| 99.25      | 1.0780    | 46956      |
| 99.50      | 1.1443    | 49847      |
| 99.75      | 1.1969    | 52135      |
| 100.00     | 1.2088    | 52656      |
| 100.25     | 1.2093    | 52677      |
| 100.50     | 1.2093    | 52677      |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| Bioswale  | 100Y_24H | 0.00               | 89.47          | 0.0010                   | 5.76                   | 5.75                    | 3417                   |
| Bioswale  | 10Y_24H  | 0.00               | 89.38          | -0.0010                  | 2.35                   | 2.35                    | 3211                   |
| Bioswale  | 10Y_6H   | 0.00               | 89.35          | -0.0010                  | 1.58                   | 1.57                    | 3133                   |
| Bioswale  | 25Y_24H  | 0.00               | 89.42          | -0.0010                  | 3.57                   | 3.57                    | 3301                   |
| Bioswale  | MA_24H   | 0.00               | 87.95          | 0.0010                   | 0.12                   | 0.09                    | 629                    |



Node: KD0010

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 91.26 ft  
Warning Stage: 93.83 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.74      | 0.0001    | 6          |
| 94.00      | 0.0123    | 537        |
| 94.50      | 0.0377    | 1644       |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.00      | 0.0940    | 4094       |
| 95.50      | 0.2666    | 11612      |
| 96.00      | 0.3725    | 16225      |
| 96.50      | 0.4731    | 20606      |
| 97.00      | 0.6497    | 28300      |
| 97.50      | 0.8768    | 38194      |
| 98.00      | 1.1886    | 51775      |
| 98.50      | 1.5262    | 66481      |
| 99.00      | 1.8675    | 81350      |
| 99.50      | 2.3948    | 104319     |
| 100.00     | 3.1627    | 137769     |
| 100.50     | 3.2942    | 143494     |
| 101.00     | 3.2980    | 143659     |
| 101.50     | 3.3017    | 143823     |
| 102.00     | 3.3017    | 143823     |
| 91.26      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0010    | 100Y_24H | 93.83              | 92.20          | -0.0006                  | 3.11                   | 3.11                    | 100                    |
| KD0010    | 10Y_24H  | 93.83              | 91.90          | -0.0005                  | 1.60                   | 1.60                    | 100                    |
| KD0010    | 10Y_6H   | 93.83              | 91.95          | -0.0009                  | 1.85                   | 1.85                    | 100                    |
| KD0010    | 25Y_24H  | 93.83              | 92.00          | -0.0005                  | 2.10                   | 2.10                    | 100                    |
| KD0010    | MA_24H   | 93.83              | 91.63          | 0.0007                   | 0.59                   | 0.59                    | 100                    |

Node: KD0020

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 91.04 ft  
Warning Stage: 93.81 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.69      | 0.0001    | 6          |
| 94.00      | 0.0165    | 719        |
| 94.50      | 0.0902    | 3931       |
| 95.00      | 0.2587    | 11269      |
| 95.50      | 0.4545    | 19800      |
| 96.00      | 0.6323    | 27544      |
| 96.50      | 0.8147    | 35488      |
| 97.00      | 0.9005    | 39225      |
| 97.50      | 0.9930    | 43256      |
| 98.00      | 1.0240    | 44606      |
| 98.50      | 1.0596    | 46156      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 99.00      | 1.0892    | 47444      |
| 99.50      | 1.0899    | 47477      |
| 100.00     | 1.0899    | 47477      |
| 91.04      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0020    | 100Y_24H | 93.81              | 91.56          | 0.0004                   | 1.14                   | 1.14                    | 100                    |
| KD0020    | 10Y_24H  | 93.81              | 91.40          | -0.0009                  | 0.58                   | 0.58                    | 100                    |
| KD0020    | 10Y_6H   | 93.81              | 91.44          | -0.0009                  | 0.70                   | 0.70                    | 100                    |
| KD0020    | 25Y_24H  | 93.81              | 91.46          | -0.0009                  | 0.77                   | 0.77                    | 100                    |
| KD0020    | MA_24H   | 93.81              | 91.24          | 0.0005                   | 0.19                   | 0.19                    | 100                    |



Node: KD0030

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 89.46 ft  
Warning Stage: 93.95 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.90      | 0.0004    | 19         |
| 94.00      | 0.0026    | 113        |
| 94.50      | 0.0337    | 1469       |
| 95.00      | 0.0743    | 3238       |
| 95.50      | 0.1195    | 5206       |
| 96.00      | 0.1717    | 7481       |
| 96.50      | 0.2352    | 10244      |
| 97.00      | 0.3287    | 14319      |
| 97.50      | 0.4821    | 21000      |
| 98.00      | 0.7853    | 34206      |
| 98.50      | 1.2544    | 54644      |
| 99.00      | 1.8396    | 80131      |
| 99.50      | 2.5953    | 113050     |
| 100.00     | 3.6783    | 160225     |
| 100.50     | 5.1390    | 223856     |
| 101.00     | 5.9345    | 258506     |
| 101.50     | 6.2012    | 270125     |
| 102.00     | 6.2334    | 271525     |
| 102.50     | 6.2389    | 271768     |
| 103.00     | 6.2389    | 271768     |
| 89.46      | 0.0001    | 4          |

Comment:

## Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0030    | 100Y_24H | 93.95              | 91.20          | -0.0009                  | 6.19                   | 6.19                    | 100                    |
| KD0030    | 10Y_24H  | 93.95              | 90.44          | -0.0010                  | 3.23                   | 3.23                    | 100                    |
| KD0030    | 10Y_6H   | 93.95              | 90.56          | -0.0009                  | 3.85                   | 3.85                    | 100                    |
| KD0030    | 25Y_24H  | 93.95              | 90.66          | -0.0009                  | 4.21                   | 4.21                    | 100                    |
| KD0030    | MA_24H   | 93.95              | 90.02          | -0.0009                  | 1.22                   | 1.22                    | 100                    |

## Node: KD0040

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 90.89 ft  
Warning Stage: 93.86 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 93.78      | 0.0003    | 13         |
| 94.00      | 0.0069    | 300        |
| 94.50      | 0.2124    | 9250       |
| 95.00      | 0.5624    | 24500      |
| 95.50      | 0.8441    | 36769      |
| 96.00      | 1.0701    | 46613      |
| 96.50      | 1.2400    | 54012      |
| 97.00      | 1.4136    | 61575      |
| 97.50      | 1.4708    | 64069      |
| 98.00      | 1.5177    | 66112      |
| 98.50      | 1.5431    | 67218      |
| 99.00      | 1.5431    | 67218      |
| 90.89      | 0.0001    | 4          |

Comment:

## Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0040    | 100Y_24H | 93.86              | 91.50          | -0.0004                  | 1.54                   | 1.54                    | 100                    |
| KD0040    | 10Y_24H  | 93.86              | 91.30          | -0.0004                  | 0.78                   | 0.78                    | 100                    |
| KD0040    | 10Y_6H   | 93.86              | 91.34          | -0.0005                  | 0.92                   | 0.92                    | 100                    |
| KD0040    | 25Y_24H  | 93.86              | 91.38          | -0.0005                  | 1.03                   | 1.03                    | 100                    |
| KD0040    | MA_24H   | 93.86              | 91.11          | -0.0005                  | 0.27                   | 0.27                    | 100                    |

## Node: KD0050

Scenario: ALT1

Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 82.55 ft  
Warning Stage: 85.80 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 85.80      | 0.0003    | 13         |
| 86.00      | 0.0057    | 250        |
| 86.50      | 0.0412    | 1794       |
| 87.00      | 0.0857    | 3731       |
| 87.50      | 0.1570    | 6837       |
| 88.00      | 0.2323    | 10119      |
| 88.50      | 0.3046    | 13269      |
| 89.00      | 0.3840    | 16725      |
| 89.50      | 0.4518    | 19681      |
| 90.00      | 0.5187    | 22594      |
| 90.50      | 0.6155    | 26812      |
| 91.00      | 0.7145    | 31125      |
| 91.50      | 0.9039    | 39375      |
| 92.00      | 1.0744    | 46800      |
| 92.50      | 1.2377    | 53913      |
| 93.00      | 1.3982    | 60906      |
| 93.50      | 1.5565    | 67800      |
| 94.00      | 1.6832    | 73319      |
| 94.50      | 1.8242    | 79463      |
| 95.00      | 2.0265    | 88275      |
| 95.50      | 2.4935    | 108619     |
| 96.00      | 2.7769    | 120963     |
| 96.50      | 2.8370    | 123581     |
| 97.00      | 2.8568    | 124444     |
| 97.50      | 2.8658    | 124833     |
| 98.00      | 2.8658    | 124833     |
| 82.55      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0050    | 100Y_24H | 85.80              | 85.31          | 0.0010                   | 2.83                   | 2.83                    | 100                    |
| KD0050    | 10Y_24H  | 85.80              | 84.14          | 0.0010                   | 1.43                   | 1.43                    | 100                    |
| KD0050    | 10Y_6H   | 85.80              | 84.20          | 0.0010                   | 1.67                   | 1.67                    | 100                    |
| KD0050    | 25Y_24H  | 85.80              | 84.25          | 0.0010                   | 1.90                   | 1.90                    | 100                    |
| KD0050    | MA_24H   | 85.80              | 83.88          | 0.0010                   | 0.49                   | 0.49                    | 100                    |

Node: KD0060

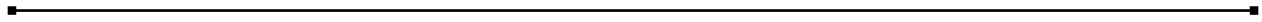
Scenario: ALT1  
Type: Stage/Area



Base Flow: 0.00 cfs  
Initial Stage: 82.33 ft  
Warning Stage: 85.39 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 85.38      | 0.0001    | 6          |
| 85.50      | 0.0012    | 51         |
| 86.00      | 0.0209    | 912        |
| 86.50      | 0.0729    | 3175       |
| 87.00      | 0.1126    | 4906       |
| 87.50      | 0.1486    | 6475       |
| 88.00      | 0.1921    | 8369       |
| 88.50      | 0.2324    | 10125      |
| 89.00      | 0.2663    | 11600      |
| 89.50      | 0.2822    | 12294      |
| 90.00      | 0.3096    | 13487      |
| 90.50      | 0.3568    | 15544      |
| 91.00      | 0.3887    | 16931      |
| 91.50      | 0.4161    | 18125      |
| 92.00      | 0.4396    | 19150      |
| 92.50      | 0.4946    | 21544      |
| 93.00      | 0.5627    | 24513      |
| 93.50      | 0.6353    | 27675      |
| 94.00      | 0.6510    | 28356      |
| 94.50      | 0.6855    | 29863      |
| 95.00      | 0.7640    | 33281      |
| 95.50      | 0.8533    | 37169      |
| 96.00      | 0.9044    | 39394      |
| 96.50      | 0.9281    | 40426      |
| 97.00      | 0.9281    | 40426      |
| 82.33      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0060    | 100Y_24H | 85.39              | 85.81          | 0.0010                   | 12.86                  | 12.85                   | 1099                   |
| KD0060    | 10Y_24H  | 85.39              | 83.63          | 0.0010                   | 6.62                   | 6.61                    | 1126                   |
| KD0060    | 10Y_6H   | 85.39              | 83.81          | -0.0010                  | 7.82                   | 7.80                    | 1126                   |
| KD0060    | 25Y_24H  | 85.39              | 84.18          | 0.0010                   | 8.69                   | 8.68                    | 1112                   |
| KD0060    | MA_24H   | 85.39              | 83.07          | -0.0010                  | 2.43                   | 2.43                    | 1084                   |



Node: KD0070

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 84.86 ft

Warning Stage: 88.26 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.07      | 0.0001    | 6          |
| 88.50      | 0.0115    | 500        |
| 89.00      | 0.0194    | 844        |
| 89.50      | 0.0194    | 847        |
| 90.00      | 0.0194    | 847        |
| 84.86      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0070    | 100Y_24H | 88.26              | 87.52          | -0.0010                  | 7.83                   | 7.83                    | 100                    |
| KD0070    | 10Y_24H  | 88.26              | 85.99          | 0.0010                   | 3.25                   | 3.25                    | 100                    |
| KD0070    | 10Y_6H   | 88.26              | 85.68          | -0.0010                  | 2.08                   | 2.08                    | 100                    |
| KD0070    | 25Y_24H  | 88.26              | 86.50          | 0.0010                   | 4.87                   | 4.87                    | 100                    |
| KD0070    | MA_24H   | 88.26              | 85.23          | -0.0008                  | 0.50                   | 0.50                    | 100                    |

#### Node: KD0080

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 85.43 ft  
Warning Stage: 88.27 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.14      | 0.0001    | 6          |
| 88.50      | 0.0086    | 375        |
| 89.00      | 0.0232    | 1013       |
| 89.50      | 0.0390    | 1700       |
| 90.00      | 0.0600    | 2613       |
| 90.50      | 0.0796    | 3469       |
| 91.00      | 0.1013    | 4412       |
| 91.50      | 0.1286    | 5600       |
| 92.00      | 0.1805    | 7862       |
| 92.50      | 0.2299    | 10012      |
| 93.00      | 0.2682    | 11681      |
| 93.50      | 0.3151    | 13725      |
| 94.00      | 0.3753    | 16350      |
| 94.50      | 0.4322    | 18825      |
| 95.00      | 0.5119    | 22300      |
| 95.50      | 0.6672    | 29062      |
| 96.00      | 1.0996    | 47900      |
| 96.50      | 1.7020    | 74138      |
| 97.00      | 2.1503    | 93669      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 97.50      | 2.6237    | 114288     |
| 98.00      | 2.8439    | 123881     |
| 98.50      | 2.8970    | 126191     |
| 99.00      | 2.9006    | 126351     |
| 99.50      | 2.9006    | 126351     |
| 85.43      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0080    | 100Y_24H | 88.27              | 88.14          | -0.0010                  | 7.81                   | 7.81                    | 100                    |
| KD0080    | 10Y_24H  | 88.27              | 86.51          | -0.0010                  | 3.24                   | 3.24                    | 100                    |
| KD0080    | 10Y_6H   | 88.27              | 86.24          | -0.0010                  | 2.07                   | 2.07                    | 100                    |
| KD0080    | 25Y_24H  | 88.27              | 86.88          | -0.0010                  | 4.86                   | 4.86                    | 100                    |
| KD0080    | MA_24H   | 88.27              | 85.79          | 0.0010                   | 0.50                   | 0.50                    | 100                    |



Node: KD0090

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 86.23 ft  
Warning Stage: 88.59 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 86.23      | 0.0010    | 44         |
| 88.59      | 0.0010    | 44         |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0090    | 100Y_24H | 88.59              | 88.56          | -0.0010                  | 5.24                   | 5.24                    | 100                    |
| KD0090    | 10Y_24H  | 88.59              | 86.99          | 0.0010                   | 1.87                   | 1.87                    | 100                    |
| KD0090    | 10Y_6H   | 88.59              | 86.79          | 0.0010                   | 1.10                   | 1.10                    | 100                    |
| KD0090    | 25Y_24H  | 88.59              | 87.28          | 0.0010                   | 3.07                   | 3.07                    | 100                    |
| KD0090    | MA_24H   | 88.59              | 86.23          | 0.0000                   | 0.00                   | 0.00                    | 100                    |

Node: KD0100

Scenario: ALT1  
 Type: Stage/Area  
 Base Flow: 0.00 cfs  
 Initial Stage: 85.27 ft  
 Warning Stage: 88.55 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.33      | 0.0001    | 6          |
| 88.50      | 0.0029    | 125        |
| 89.00      | 0.0892    | 3888       |
| 89.50      | 0.0939    | 4090       |
| 90.00      | 0.0939    | 4090       |
| 85.27      | 0.0001    | 4          |

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0100    | 100Y_24H | 88.55              | 86.38          | 0.0010                   | 3.99                   | 3.99                    | 139                    |
| KD0100    | 10Y_24H  | 88.55              | 86.02          | 0.0010                   | 2.05                   | 2.05                    | 138                    |
| KD0100    | 10Y_6H   | 88.55              | 86.10          | 0.0010                   | 2.47                   | 2.47                    | 139                    |
| KD0100    | 25Y_24H  | 88.55              | 86.15          | 0.0010                   | 2.70                   | 2.70                    | 139                    |
| KD0100    | MA_24H   | 88.55              | 85.68          | 0.0010                   | 0.67                   | 0.67                    | 119                    |

Node: KD0110

Scenario: ALT1  
 Type: Stage/Area  
 Base Flow: 0.00 cfs  
 Initial Stage: 85.41 ft  
 Warning Stage: 88.48 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 88.43      | 0.0001    | 6          |
| 88.50      | 0.0016    | 69         |
| 89.00      | 0.0819    | 3569       |
| 89.50      | 0.1573    | 6850       |
| 90.00      | 0.2369    | 10319      |
| 90.50      | 0.3037    | 13231      |
| 91.00      | 0.3726    | 16231      |
| 91.50      | 0.4599    | 20031      |
| 92.00      | 0.5632    | 24531      |
| 92.50      | 0.6903    | 30069      |
| 93.00      | 0.7876    | 34306      |
| 93.50      | 0.9026    | 39319      |
| 94.00      | 0.9929    | 43250      |
| 94.50      | 1.1335    | 49375      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.00      | 1.2346    | 53781      |
| 95.50      | 1.3394    | 58344      |
| 96.00      | 1.4477    | 63063      |
| 96.50      | 1.6566    | 72162      |
| 97.00      | 1.9140    | 83375      |
| 97.50      | 2.4139    | 105150     |
| 98.00      | 3.0096    | 131100     |
| 98.50      | 3.3444    | 145681     |
| 99.00      | 3.4563    | 150556     |
| 99.50      | 3.5128    | 153019     |
| 100.00     | 3.5516    | 154706     |
| 100.50     | 3.6292    | 158088     |
| 101.00     | 3.6754    | 160100     |
| 101.50     | 3.6830    | 160433     |
| 102.00     | 3.6830    | 160433     |
| 85.41      | 0.0001    | 4          |

Comment:

#### Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0110    | 100Y_24H | 88.48              | 86.65          | -0.0010                  | 3.89                   | 3.89                    | 100                    |
| KD0110    | 10Y_24H  | 88.48              | 86.21          | -0.0010                  | 1.99                   | 1.99                    | 100                    |
| KD0110    | 10Y_6H   | 88.48              | 86.31          | 0.0010                   | 2.41                   | 2.41                    | 100                    |
| KD0110    | 25Y_24H  | 88.48              | 86.36          | 0.0010                   | 2.63                   | 2.63                    | 100                    |
| KD0110    | MA_24H   | 88.48              | 85.84          | 0.0010                   | 0.65                   | 0.65                    | 100                    |

#### Node: KD0120

Scenario: ALT1  
Type: Stage/Area  
Base Flow: 0.00 cfs  
Initial Stage: 95.50 ft  
Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 97.28      | 0.0001    | 6          |
| 97.50      | 0.0171    | 744        |
| 98.00      | 0.1194    | 5200       |
| 98.50      | 0.2834    | 12344      |
| 99.00      | 0.6104    | 26587      |
| 99.50      | 0.9440    | 41119      |
| 100.00     | 1.2516    | 54519      |
| 100.50     | 1.5809    | 68862      |
| 101.00     | 2.6641    | 116050     |
| 101.50     | 5.0608    | 220450     |
| 102.00     | 6.3572    | 276919     |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 102.50     | 6.6189    | 288319     |
| 103.00     | 6.7130    | 292419     |
| 103.50     | 6.7259    | 292979     |
| 104.00     | 6.7259    | 292979     |
| 95.50      | 0.0001    | 4          |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0120    | 100Y_24H | 0.00               | 98.60          | -0.0010                  | 7.04                   | 6.37                    | 15108                  |
| KD0120    | 10Y_24H  | 0.00               | 98.25          | 0.0010                   | 3.74                   | 3.43                    | 8724                   |
| KD0120    | 10Y_6H   | 0.00               | 98.17          | 0.0010                   | 4.58                   | 3.84                    | 7571                   |
| KD0120    | 25Y_24H  | 0.00               | 98.37          | 0.0010                   | 4.84                   | 4.45                    | 10436                  |
| KD0120    | MA_24H   | 0.00               | 97.46          | 0.0010                   | 1.44                   | 1.43                    | 622                    |



Node: KD0130

Scenario: ALT1  
Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 82.04 ft  
Warning Stage: 0.00 ft  
Boundary Stage: KD0130

| Year | Month | Day | Hour     | Stage [ft] |
|------|-------|-----|----------|------------|
| 0    | 0     | 0   | 0.0000   | 82.04      |
| 0    | 0     | 0   | 999.0000 | 82.04      |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0130    | 100Y_24H | 0.00               | 85.22          | 0.0029                   | 26.85                  | 0.09                    | 0                      |
| KD0130    | 10Y_24H  | 0.00               | 83.22          | 0.0011                   | 12.86                  | 0.02                    | 0                      |
| KD0130    | 10Y_6H   | 0.00               | 83.22          | 0.0011                   | 13.47                  | 0.04                    | 0                      |
| KD0130    | 25Y_24H  | 0.00               | 83.92          | 0.0017                   | 17.26                  | 0.04                    | 0                      |
| KD0130    | MA_24H   | 0.00               | 82.72          | 0.0006                   | 4.08                   | 0.00                    | 0                      |



Node: KD0140

Scenario: ALT1  
 Type: Stage/Area  
 Base Flow: 0.00 cfs  
 Initial Stage: 89.09 ft  
 Warning Stage: 93.74 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 89.09      | 0.0001    | 4          |
| 93.74      | 0.0001    | 4          |

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KD0140    | 100Y_24H | 93.74              | 91.00          | -0.0010                  | 11.92                  | 11.92                   | 1024                   |
| KD0140    | 10Y_24H  | 93.74              | 90.34          | -0.0009                  | 6.16                   | 6.15                    | 1098                   |
| KD0140    | 10Y_6H   | 93.74              | 90.47          | -0.0010                  | 7.28                   | 7.26                    | 1098                   |
| KD0140    | 25Y_24H  | 93.74              | 90.56          | -0.0010                  | 8.07                   | 8.06                    | 1088                   |
| KD0140    | MA_24H   | 93.74              | 89.80          | -0.0010                  | 2.27                   | 2.27                    | 1050                   |

Node: KDB0130

Scenario: ALT1  
 Type: Stage/Area  
 Base Flow: 0.00 cfs  
 Initial Stage: 95.13 ft  
 Warning Stage: 0.00 ft

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 95.13      | 0.0001    | 3          |
| 95.25      | 0.0018    | 77         |
| 95.50      | 0.0080    | 350        |
| 95.75      | 0.0174    | 758        |
| 96.00      | 0.0322    | 1401       |
| 96.25      | 0.0539    | 2350       |
| 96.50      | 0.0793    | 3454       |
| 96.75      | 0.1013    | 4412       |
| 97.00      | 0.1235    | 5379       |
| 97.25      | 0.1462    | 6370       |
| 97.50      | 0.1694    | 7379       |
| 97.75      | 0.1911    | 8324       |
| 98.00      | 0.2156    | 9392       |
| 98.25      | 0.2550    | 11109      |
| 98.50      | 0.2930    | 12765      |
| 98.75      | 0.3249    | 14152      |
| 99.00      | 0.3703    | 16131      |
| 99.25      | 0.4015    | 17489      |

| Stage [ft] | Area [ac] | Area [ft2] |
|------------|-----------|------------|
| 99.50      | 0.4675    | 20365      |
| 99.75      | 0.5200    | 22653      |
| 100.00     | 0.5320    | 23174      |
| 100.25     | 0.5335    | 23238      |
| 100.50     | 0.5335    | 23238      |

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| KDB0130   | 100Y_24H | 0.00               | 98.30          | -0.0010                  | 6.89                   | 6.89                    | 11454                  |
| KDB0130   | 10Y_24H  | 0.00               | 98.16          | -0.0010                  | 3.72                   | 3.65                    | 10502                  |
| KDB0130   | 10Y_6H   | 0.00               | 98.11          | -0.0010                  | 4.38                   | 2.94                    | 10140                  |
| KDB0130   | 25Y_24H  | 0.00               | 98.22          | 0.0010                   | 4.83                   | 4.81                    | 10918                  |
| KDB0130   | MA_24H   | 0.00               | 97.46          | -0.0010                  | 1.58                   | 1.08                    | 7203                   |



Node: NTZ-0040

Scenario: ALT1  
Type: Time/Stage  
Base Flow: 0.00 cfs  
Initial Stage: 0.00 ft  
Warning Stage: 0.00 ft  
Boundary Stage:

Comment:



Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| NTZ-0040  | 100Y_24H | 0.00               | 0.00           | 0.0000                   | 0.51                   | 0.00                    | 0                      |
| NTZ-0040  | 10Y_24H  | 0.00               | 0.00           | 0.0000                   | 0.48                   | 0.00                    | 0                      |
| NTZ-0040  | 10Y_6H   | 0.00               | 0.00           | 0.0000                   | 0.47                   | 0.00                    | 0                      |
| NTZ-0040  | 25Y_24H  | 0.00               | 0.00           | 0.0000                   | 0.50                   | 0.00                    | 0                      |
| NTZ-0040  | MA_24H   | 0.00               | 0.00           | 0.0000                   | 0.09                   | 0.00                    | 0                      |



Node: NTZ-0080

Scenario: ALT1

Type: Time/Stage  
 Base Flow: 0.00 cfs  
 Initial Stage: 0.00 ft  
 Warning Stage: 0.00 ft  
 Boundary Stage:

Comment:

Node Max Conditions [ALT1]

| Node Name | Sim Name | Warning Stage [ft] | Max Stage [ft] | Min/Max Delta Stage [ft] | Max Total Inflow [cfs] | Max Total Outflow [cfs] | Max Surface Area [ft2] |
|-----------|----------|--------------------|----------------|--------------------------|------------------------|-------------------------|------------------------|
| NTZ-0080  | 100Y_24H | 0.00               | 0.00           | 0.0000                   | 1.72                   | 0.00                    | 0                      |
| NTZ-0080  | 10Y_24H  | 0.00               | 0.00           | 0.0000                   | 1.58                   | 0.00                    | 0                      |
| NTZ-0080  | 10Y_6H   | 0.00               | 0.00           | 0.0000                   | 1.53                   | 0.00                    | 0                      |
| NTZ-0080  | 25Y_24H  | 0.00               | 0.00           | 0.0000                   | 1.64                   | 0.00                    | 0                      |
| NTZ-0080  | MA_24H   | 0.00               | 0.00           | 0.0000                   | 1.08                   | 0.00                    | 0                      |

Link: L-0030W

Scenario: ALT1  
 Type: Weir  
 From Node: Bioswale  
 To Node: KD0090  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0030W   | 100Y_24H | 5.24           | 0.00           | 0.00                     | 1.16                  | 1.16                  | 1.16                   |
| L-0030W   | 10Y_24H  | 1.87           | 0.00           | 0.00                     | 0.96                  | 0.96                  | 0.96                   |
| L-0030W   | 10Y_6H   | 1.10           | 0.00           | 0.00                     | 0.86                  | 0.86                  | 0.86                   |
| L-0030W   | 25Y_24H  | 3.07           | 0.00           | 0.00                     | 1.06                  | 1.06                  | 1.06                   |
| L-0030W   | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: L-0060PERC

Scenario: ALT1  
 Type:  
 From Node: Bioswale  
 To Node: NTZ-0040

Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name  | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|------------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0060PERC | 100Y_24H | 0.51           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 10Y_24H  | 0.48           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 10Y_6H   | 0.47           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | 25Y_24H  | 0.50           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0060PERC | MA_24H   | 0.09           | 0.00           | 0.01                     | 0.00                  | 0.00                  | 0.00                   |

Link: L-0070P

Scenario: ALT1  
Type: Pipe  
From Node: KD0120  
To Node: KDB0130  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0070P   | 100Y_24H | 6.37           | 0.00           | -0.58                    | 3.60                  | 3.60                  | 3.60                   |
| L-0070P   | 10Y_24H  | 3.43           | 0.00           | -0.47                    | 1.94                  | 1.94                  | 1.94                   |
| L-0070P   | 10Y_6H   | 3.84           | 0.00           | -0.10                    | 2.17                  | 2.17                  | 2.17                   |
| L-0070P   | 25Y_24H  | 4.45           | 0.00           | -0.56                    | 2.52                  | 2.52                  | 2.52                   |
| L-0070P   | MA_24H   | 1.43           | 0.00           | 0.53                     | 1.47                  | 1.27                  | 1.08                   |

Link: L-0090W

Scenario: ALT1  
Type: Weir  
From Node: KDB0130  
To Node: Bioswale  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0090W   | 100Y_24H | 5.17           | 0.00           | 0.00                     | 1.51                  | 1.51                  | 1.51                   |
| L-0090W   | 10Y_24H  | 2.07           | 0.00           | 0.00                     | 1.34                  | 1.34                  | 1.34                   |
| L-0090W   | 10Y_6H   | 1.42           | 0.00           | 0.00                     | 1.23                  | 1.23                  | 1.23                   |
| L-0090W   | 25Y_24H  | 3.17           | 0.00           | 0.00                     | 1.40                  | 1.40                  | 1.40                   |
| L-0090W   | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: L-0100PERC

Scenario: ALT1  
 Type:  
 From Node: KDB0130  
 To Node: NTZ-0080  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name  | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|------------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| L-0100PERC | 100Y_24H | 1.72           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | 10Y_24H  | 1.58           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | 10Y_6H   | 1.53           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | 25Y_24H  | 1.64           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |
| L-0100PERC | MA_24H   | 1.08           | 0.00           | -0.01                    | 0.00                  | 0.00                  | 0.00                   |

Link: P0010

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0050  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0010     | 100Y_24H | 2.83           | 0.00           | 0.39                     | 1.60                  | 1.77                  | 1.60                   |
| P0010     | 10Y_24H  | 1.43           | 0.00           | 0.01                     | 2.10                  | 3.44                  | 2.77                   |
| P0010     | 10Y_6H   | 1.67           | 0.00           | 0.01                     | 2.19                  | 3.60                  | 2.90                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0010     | 25Y_24H  | 1.90           | 0.00           | -0.12                    | 2.27                  | 2.64                  | 2.45                   |
| P0010     | MA_24H   | 0.49           | 0.00           | 0.01                     | 1.58                  | 2.53                  | 2.06                   |



#### Link: P0020

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0060  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both



#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0020     | 100Y_24H | 12.83          | -0.09          | -0.77                    | 4.09                  | 4.09                  | 4.09                   |
| P0020     | 10Y_24H  | 6.61           | -0.02          | 0.09                     | 3.05                  | 3.20                  | 3.13                   |
| P0020     | 10Y_6H   | 7.80           | -0.04          | -0.03                    | 3.14                  | 5.01                  | 4.07                   |
| P0020     | 25Y_24H  | 8.68           | -0.04          | 0.11                     | 2.86                  | 2.78                  | 2.82                   |
| P0020     | MA_24H   | 2.43           | 0.00           | 0.02                     | 2.30                  | 2.26                  | 2.28                   |



#### Link: P0030

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0010  
 To Node: KD0140  
 Link Count: 1  
 Flow Direction: Both



#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0030     | 100Y_24H | 3.11           | 0.00           | 0.01                     | 2.68                  | 5.81                  | 3.82                   |
| P0030     | 10Y_24H  | 1.60           | 0.00           | 0.01                     | 2.25                  | 5.80                  | 3.82                   |
| P0030     | 10Y_6H   | 1.85           | 0.00           | -0.01                    | 2.33                  | 5.96                  | 3.92                   |
| P0030     | 25Y_24H  | 2.10           | 0.00           | 0.01                     | 2.41                  | 5.72                  | 3.77                   |
| P0030     | MA_24H   | 0.59           | 0.00           | -0.01                    | 1.78                  | 5.57                  | 3.67                   |



Link: P0040

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0020  
 To Node: KD0140  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0040     | 100Y_24H | 1.14           | 0.00           | 0.01                     | 2.07                  | 0.64                  | 1.35                   |
| P0040     | 10Y_24H  | 0.58           | 0.00           | -0.01                    | 1.77                  | 0.52                  | 1.09                   |
| P0040     | 10Y_6H   | 0.70           | 0.00           | -0.01                    | 1.84                  | 0.91                  | 1.14                   |
| P0040     | 25Y_24H  | 0.77           | 0.00           | -0.01                    | 1.88                  | 0.48                  | 1.17                   |
| P0040     | MA_24H   | 0.19           | 0.00           | 0.01                     | 1.48                  | 0.45                  | 0.89                   |

Link: P0050

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0030  
 To Node: KD0140  
 Link Count: 1  
 Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0050     | 100Y_24H | 6.19           | 0.00           | -0.09                    | 3.50                  | 3.50                  | 3.50                   |
| P0050     | 10Y_24H  | 3.23           | 0.00           | -0.01                    | 2.65                  | 2.44                  | 2.54                   |
| P0050     | 10Y_6H   | 3.85           | 0.00           | 0.01                     | 2.78                  | 2.57                  | 2.67                   |
| P0050     | 25Y_24H  | 4.21           | 0.00           | 0.01                     | 2.79                  | 2.62                  | 2.71                   |
| P0050     | MA_24H   | 1.22           | 0.00           | -0.01                    | 2.01                  | 2.28                  | 2.13                   |

Link: P0060

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0040  
 To Node: KD0140  
 Link Count: 1

Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0060     | 100Y_24H | 1.54           | 0.00           | 0.00                     | 2.28                  | 0.87                  | 1.57                   |
| P0060     | 10Y_24H  | 0.78           | 0.00           | 0.00                     | 1.96                  | 0.74                  | 1.26                   |
| P0060     | 10Y_6H   | 0.92           | 0.00           | 0.00                     | 2.03                  | 0.87                  | 1.31                   |
| P0060     | 25Y_24H  | 1.03           | 0.00           | 0.00                     | 2.08                  | 0.75                  | 1.35                   |
| P0060     | MA_24H   | 0.27           | 0.00           | 0.00                     | 1.61                  | 0.72                  | 1.01                   |

Link: P0070

Scenario: ALT1  
Type: Pipe  
From Node: KD0140  
To Node: KD0060  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0070     | 100Y_24H | 11.92          | 0.00           | -0.03                    | 3.86                  | 3.79                  | 3.83                   |
| P0070     | 10Y_24H  | 6.15           | 0.00           | 0.02                     | 2.99                  | 2.87                  | 2.93                   |
| P0070     | 10Y_6H   | 7.26           | 0.00           | 0.02                     | 3.15                  | 2.96                  | 3.05                   |
| P0070     | 25Y_24H  | 8.06           | 0.00           | 0.02                     | 3.26                  | 2.67                  | 2.96                   |
| P0070     | MA_24H   | 2.27           | 0.00           | 0.02                     | 2.26                  | 2.19                  | 2.23                   |

Link: P0080

Scenario: ALT1  
Type: Pipe  
From Node: KD0090  
To Node: KD0080  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0080     | 100Y_24H | 5.24           | 0.00           | 0.02                     | 4.27                  | 4.27                  | 4.27                   |
| P0080     | 10Y_24H  | 1.87           | 0.00           | -0.01                    | 2.37                  | 1.70                  | 2.03                   |
| P0080     | 10Y_6H   | 1.10           | 0.00           | -0.01                    | 2.05                  | 1.37                  | 1.71                   |
| P0080     | 25Y_24H  | 3.07           | 0.00           | -0.01                    | 2.80                  | 2.50                  | 2.65                   |
| P0080     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: P0090

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0080  
 To Node: KD0070  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0090     | 100Y_24H | 7.81           | 0.00           | 0.02                     | 6.37                  | 6.37                  | 6.37                   |
| P0090     | 10Y_24H  | 3.24           | 0.00           | 0.02                     | 2.87                  | 6.81                  | 4.66                   |
| P0090     | 10Y_6H   | 2.07           | 0.00           | 0.01                     | 2.46                  | 6.50                  | 4.45                   |
| P0090     | 25Y_24H  | 4.86           | 0.00           | -0.01                    | 3.96                  | 6.70                  | 4.59                   |
| P0090     | MA_24H   | 0.50           | 0.00           | 0.01                     | 1.69                  | 4.39                  | 3.04                   |

#### Link: P0100

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0070  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0100     | 100Y_24H | 7.83           | 0.00           | 0.03                     | 6.38                  | 6.83                  | 6.60                   |
| P0100     | 10Y_24H  | 3.25           | 0.00           | -0.01                    | 2.78                  | 4.40                  | 3.59                   |
| P0100     | 10Y_6H   | 2.08           | 0.00           | -0.01                    | 2.43                  | 3.74                  | 3.09                   |
| P0100     | 25Y_24H  | 4.87           | 0.00           | -0.02                    | 3.97                  | 5.19                  | 4.58                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0100     | MA_24H   | 0.50           | 0.00           | -0.01                    | 1.64                  | 2.58                  | 2.11                   |

#### Link: P0110

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0110  
 To Node: KD0100  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0110     | 100Y_24H | 3.89           | 0.00           | 0.01                     | 3.17                  | 3.41                  | 3.29                   |
| P0110     | 10Y_24H  | 1.99           | 0.00           | 0.01                     | 2.40                  | 2.68                  | 2.54                   |
| P0110     | 10Y_6H   | 2.41           | 0.00           | -0.01                    | 2.55                  | 2.84                  | 2.69                   |
| P0110     | 25Y_24H  | 2.63           | 0.00           | 0.01                     | 2.62                  | 2.93                  | 2.78                   |
| P0110     | MA_24H   | 0.65           | 0.00           | -0.01                    | 1.76                  | 2.00                  | 1.88                   |

#### Link: P0120

Scenario: ALT1  
 Type: Pipe  
 From Node: KD0100  
 To Node: KD0130  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| P0120     | 100Y_24H | 3.99           | 0.00           | 0.02                     | 2.84                  | 5.64                  | 4.24                   |
| P0120     | 10Y_24H  | 2.05           | 0.00           | 0.02                     | 2.32                  | 4.69                  | 3.50                   |
| P0120     | 10Y_6H   | 2.47           | 0.00           | 0.02                     | 2.45                  | 4.94                  | 3.69                   |
| P0120     | 25Y_24H  | 2.70           | 0.00           | -0.02                    | 2.51                  | 5.06                  | 3.79                   |
| P0120     | MA_24H   | 0.67           | 0.00           | -0.02                    | 1.71                  | 3.38                  | 2.55                   |

Link: W0010

Scenario: ALT1  
Type: Weir  
From Node: KD0050  
To Node: KD0060  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0010     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0010     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0020

Scenario: ALT1  
Type: Weir  
From Node: KD0070  
To Node: KD0130  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0020     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0020     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0030

Scenario: ALT1  
Type: Weir  
From Node: KD0100  
To Node: KD0070  
Link Count: 1

Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0030     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0030     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0040

Scenario: ALT1  
Type: Weir  
From Node: KD0110  
To Node: KD0100  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0040     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0040     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0050

Scenario: ALT1  
Type: Weir  
From Node: KD0080  
To Node: KD0070  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]



| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0050     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0050     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0060

Scenario: ALT1  
 Type: Weir  
 From Node: KD0090  
 To Node: KD0110  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0060     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0060     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0070

Scenario: ALT1  
 Type: Weir  
 From Node: KD0090  
 To Node: KD0080  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0070     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0070     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0070     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

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Link: W0080

Scenario: ALT1  
Type: Weir  
From Node: KD0010  
To Node: KD0020  
Link Count: 1  
Flow Direction: Both

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Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0080     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0080     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

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Link: W0090

Scenario: ALT1  
Type: Weir  
From Node: KD0030  
To Node: KD0040  
Link Count: 1  
Flow Direction: Both

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Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0090     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0090     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0100

Scenario: ALT1  
Type: Weir  
From Node: KD0040  
To Node: KD0050  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0100     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0100     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0110

Scenario: ALT1  
Type: Weir  
From Node: KD0020  
To Node: KD0060  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0110     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0110     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0130

Scenario: ALT1  
Type: Weir  
From Node: KD0060  
To Node: KD0130  
Link Count: 1

Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0130     | 100Y_24H | 0.02           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0130     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0140

Scenario: ALT1  
Type: Weir  
From Node: KD0060  
To Node: KD0070  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0140     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0140     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0150

Scenario: ALT1  
Type: Weir  
From Node: KD0010  
To Node: KD0030  
Link Count: 1  
Flow Direction: Both

Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0150     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0150     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0160

Scenario: ALT1  
 Type: Weir  
 From Node: KD0020  
 To Node: KD0040  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0160     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0160     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Link: W0170

Scenario: ALT1  
 Type: Weir  
 From Node: KD0080  
 To Node: KD0070  
 Link Count: 1  
 Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0170     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0170     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0170     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

Link: W0190

Scenario: ALT1  
Type: Weir  
From Node: KD0100  
To Node: KD0130  
Link Count: 1  
Flow Direction: Both

#### Link Min/Max Conditions [ALT1]

| Link Name | Sim Name | Max Flow [cfs] | Min Flow [cfs] | Min/Max Delta Flow [cfs] | Max Us Velocity [fps] | Max Ds Velocity [fps] | Max Avg Velocity [fps] |
|-----------|----------|----------------|----------------|--------------------------|-----------------------|-----------------------|------------------------|
| W0190     | 100Y_24H | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 10Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 10Y_6H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | 25Y_24H  | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |
| W0190     | MA_24H   | 0.00           | 0.00           | 0.00                     | 0.00                  | 0.00                  | 0.00                   |

#### Simulation: 100Y\_24H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:22:31 AM  
Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

#### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |



## Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

## Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

## Restart File

Save Restart: False

## Resources & Lookup Tables

| Resources               | Lookup Tables              |
|-------------------------|----------------------------|
| Rainfall Folder:        | Boundary Stage Set: 100_24 |
| Reference ET Folder:    | Extern Hydrograph Set:     |
| Unit Hydrograph Folder: | Curve Number Set: CN       |
|                         | Green-Ampt Set:            |
|                         | Vertical Layers Set:       |
|                         | Impervious Set: Impervious |
|                         | Roughness Set:             |
|                         | Crop Coef Set:             |
|                         | Fillable Porosity Set:     |
|                         | Conductivity Set:          |
|                         | Leakage Set:               |

## Tolerances & Options

|                                 |                                 |
|---------------------------------|---------------------------------|
| Time Marching: SAOR             | IA Recovery Time: 24.0000 hr    |
| Max Iterations: 6               | ET for Manual Basins: False     |
| Over-Relax Weight Fact: 0.5 dec |                                 |
| dZ Tolerance: 0.0010 ft         | Smp/Man Basin Rain: Global      |
|                                 | Opt:                            |
| Max dZ: 1.0000 ft               | OF Region Rain Opt: Global      |
| Link Optimizer Tol: 0.0001 ft   | Rainfall Name: ~ORANGE          |
|                                 | Rainfall Amount: 10.60 in       |
| Edge Length Option: Automatic   | Storm Duration: 24.0000 hr      |
| Dflt Damping (2D): 0.0050 ft    | Dflt Damping (1D): 0.0050 ft    |
| Min Node Srf Area (2D): 100 ft2 | Min Node Srf Area (1D): 100 ft2 |
| Energy Switch (2D): Energy      | Energy Switch (1D): Energy      |

Comment:

## Simulation: 10Y\_24H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:23:01 AM  
Program Version: ICPR4 4.07.08

## General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph Folder:

##### Lookup Tables

Boundary Stage Set: 10\_24  
Extern Hydrograph Set:  
Curve Number Set: CN  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

#### Tolerances & Options

Time Marching: SAOR  
Max Iterations: 6  
Over-Relax Weight Fact: 0.5 dec  
dZ Tolerance: 0.0010 ft  
  
Max dZ: 1.0000 ft  
Link Optimizer Tol: 0.0001 ft  
  
Edge Length Option: Automatic

IA Recovery Time: 24.0000 hr  
ET for Manual Basins: False  
  
Smp/Man Basin Rain Global  
Opt:  
OF Region Rain Opt: Global  
Rainfall Name: ~ORANGE  
Rainfall Amount: 7.50 in  
Storm Duration: 24.0000 hr

Dflt Damping (2D): 0.0050 ft  
Min Node Srf Area (2D): 100 ft2  
Energy Switch (2D): Energy

Dflt Damping (1D): 0.0050 ft  
Min Node Srf Area (1D): 100 ft2  
Energy Switch (1D): Energy

Comment:

Simulation: 10Y\_6H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:23:21 AM  
Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph Folder:

##### Lookup Tables

Boundary Stage Set: 10\_6  
Extern Hydrograph Set:  
Curve Number Set: CN  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious

Roughness Set:  
 Crop Coef Set:  
 Fillable Porosity Set:  
 Conductivity Set:  
 Leakage Set:

#### Tolerances & Options

|                         |           |                         |            |
|-------------------------|-----------|-------------------------|------------|
| Time Marching:          | SAOR      | IA Recovery Time:       | 24.0000 hr |
| Max Iterations:         | 6         | ET for Manual Basins:   | False      |
| Over-Relax Weight Fact: | 0.5 dec   |                         |            |
| dZ Tolerance:           | 0.0010 ft | Smp/Man Basin Rain Opt: | Global     |
|                         |           | OF Region Rain Opt:     | Global     |
| Max dZ:                 | 1.0000 ft | Rainfall Name:          | ~ORANGE    |
| Link Optimizer Tol:     | 0.0001 ft | Rainfall Amount:        | 4.65 in    |
|                         |           | Storm Duration:         | 6.0000 hr  |
| Edge Length Option:     | Automatic |                         |            |
| Dflt Damping (2D):      | 0.0050 ft | Dflt Damping (1D):      | 0.0050 ft  |
| Min Node Srf Area (2D): | 100 ft2   | Min Node Srf Area (1D): | 100 ft2    |
| Energy Switch (2D):     | Energy    | Energy Switch (1D):     | Energy     |

Comment:

#### Simulation: 25Y\_24H

Scenario: ALT1  
 Run Date/Time: 12/5/2022 11:23:37 AM  
 Program Version: ICPR4 4.07.08

#### General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

## Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

## Restart File

Save Restart: False

## Resources & Lookup Tables

| Resources               | Lookup Tables              |
|-------------------------|----------------------------|
| Rainfall Folder:        | Boundary Stage Set: 25_24  |
| Reference ET Folder:    | Extern Hydrograph Set:     |
| Unit Hydrograph Folder: | Curve Number Set: CN       |
|                         | Green-Ampt Set:            |
|                         | Vertical Layers Set:       |
|                         | Impervious Set: Impervious |
|                         | Roughness Set:             |
|                         | Crop Coef Set:             |
|                         | Fillable Porosity Set:     |
|                         | Conductivity Set:          |
|                         | Leakage Set:               |

## Tolerances & Options

|                                 |                                 |
|---------------------------------|---------------------------------|
| Time Marching: SAOR             | IA Recovery Time: 24.0000 hr    |
| Max Iterations: 6               | ET for Manual Basins: False     |
| Over-Relax Weight Fact: 0.5 dec |                                 |
| dZ Tolerance: 0.0010 ft         | Smp/Man Basin Rain Global       |
|                                 | Opt:                            |
| Max dZ: 1.0000 ft               | OF Region Rain Opt: Global      |
| Link Optimizer Tol: 0.0001 ft   | Rainfall Name: ~ORANGE          |
|                                 | Rainfall Amount: 8.60 in        |
| Edge Length Option: Automatic   | Storm Duration: 24.0000 hr      |
|                                 |                                 |
| Dflt Damping (2D): 0.0050 ft    | Dflt Damping (1D): 0.0050 ft    |
| Min Node Srf Area (2D): 100 ft2 | Min Node Srf Area (1D): 100 ft2 |
| Energy Switch (2D): Energy      | Energy Switch (1D): Energy      |

Comment:

## Simulation: MA\_24H

Scenario: ALT1  
Run Date/Time: 12/5/2022 11:24:04 AM  
Program Version: ICPR4 4.07.08

## General

Run Mode: Normal

|             | Year | Month | Day | Hour [hr] |
|-------------|------|-------|-----|-----------|
| Start Time: | 0    | 0     | 0   | 0.0000    |
| End Time:   | 0    | 0     | 0   | 36.0000   |

|                       | Hydrology [sec] | Surface Hydraulics [sec] | Groundwater [sec] |
|-----------------------|-----------------|--------------------------|-------------------|
| Min Calculation Time: | 60.0000         | 0.1000                   | 900.0000          |
| Max Calculation Time: |                 | 30.0000                  |                   |

#### Output Time Increments

##### Hydrology

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Surface Hydraulics

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 5.0000               |

##### Groundwater

| Year | Month | Day | Hour [hr] | Time Increment [min] |
|------|-------|-----|-----------|----------------------|
| 0    | 0     | 0   | 0.0000    | 60.0000              |

##### Restart File

Save Restart: False

#### Resources & Lookup Tables

##### Resources

Rainfall Folder:  
Reference ET Folder:  
Unit Hydrograph Folder:

##### Lookup Tables

Boundary Stage Set: MA\_24  
Extern Hydrograph Set:  
Curve Number Set: CN  
Green-Ampt Set:  
Vertical Layers Set:  
Impervious Set: Impervious  
Roughness Set:  
Crop Coef Set:  
Fillable Porosity Set:  
Conductivity Set:  
Leakage Set:

#### Tolerances & Options

Time Marching: SAOR  
Max Iterations: 6  
Over-Relax Weight Fact: 0.5 dec  
dZ Tolerance: 0.0010 ft  
  
Max dZ: 1.0000 ft  
Link Optimizer Tol: 0.0001 ft  
  
Edge Length Option: Automatic  
  
Dflt Damping (2D): 0.0050 ft  
Min Node Srf Area (2D): 100 ft2  
Energy Switch (2D): Energy

IA Recovery Time: 24.0000 hr  
ET for Manual Basins: False  
  
Smp/Man Basin Rain Global  
Opt:  
OF Region Rain Opt: Global  
Rainfall Name: ~ORANGE  
Rainfall Amount: 4.50 in  
Storm Duration: 24.0000 hr  
  
Dflt Damping (1D): 0.0050 ft  
Min Node Srf Area (1D): 100 ft2  
Energy Switch (1D): Energy



|          |
|----------|
| Comment: |
|----------|

## **APPENDIX F**

### **Engineer's Opinion of Probable Cost**

**IMPROVEMENT ALTERNATIVE 1  
PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS**

| Item                                        | Pay Item No. | Description                                                                                 | Units | Unit Cost   | Quantity | Total              |
|---------------------------------------------|--------------|---------------------------------------------------------------------------------------------|-------|-------------|----------|--------------------|
| 1                                           | 101-1        | Mobilization (15% of Construction Total)                                                    | LS    | varies      | 1        | \$76,303           |
| 2                                           | 102-1        | Maintenance of Traffic (10% of Construction Total)                                          | LS    | varies      | 1        | \$50,869           |
| 3                                           | 104-1        | Prevention, Control and Abatement of Erosion and Water Pollution (5% of Construction Total) | LS    | varies      | 1        | \$25,434           |
| 4                                           | 110-1-1      | Clearing and Grubbing (10% of Construction Total)                                           | LS    | varies      | 1        | \$50,869           |
| 5                                           | 120-1        | Excavation, Embankment, and Grading                                                         | CY    | \$10.00     | 1935     | \$19,350.00        |
| 6                                           | 160-4        | Type B Stabilization (12")                                                                  | SY    | \$15.00     | 2552     | \$38,280           |
| 7                                           | 285-704      | Optional Base, Base Group 04 (6")                                                           | SY    | \$26.00     | 2552     | \$66,352           |
| 8                                           | 334-1-13     | Superpave Asphaltic Concrete, Traffic C (2")                                                | SY    | \$16.00     | 2552     | \$40,832           |
| 9                                           | 425-11       | Modify Existing Drainage Structure                                                          | EA    | \$5,000.00  | 6        | \$30,000           |
| 10                                          | 425-2-71     | Manhole, J-7, <10'                                                                          | EA    | \$11,250.00 | 1        | \$11,250           |
| 11                                          | 430-175-118  | Pipe Culvert, RCP, Round, 18", S/CD                                                         | LF    | \$135.00    | 205      | \$27,675           |
| 12                                          | 430-175-124  | Pipe Culvert, RCP, Round, 24", S/CD                                                         | LF    | \$170.00    | 1050     | \$178,500          |
| 13                                          | 430-982-125  | Mitered End Section, Round, 18", CD                                                         | EA    | \$3,000.00  | 2        | \$6,000            |
| 14                                          | 430-982-129  | Mitered End Section, Round, 24", CD                                                         | EA    | \$2,950.00  | 1        | \$2,950            |
| 15                                          | 520-1-10     | Concrete Curb & Gutter, Type F                                                              | LF    | \$35.00     | 1600     | \$56,000           |
| 16                                          | 570-1-2      | Performance Turf, Sod                                                                       | SY    | \$5.00      | 3300     | \$16,500           |
| 17                                          | 900-1        | Bioswale Planting                                                                           | LS    | varies      | 1        | \$15,000           |
| SUBTOTAL COST:                              |              |                                                                                             |       |             |          | \$712,165          |
| CONTINGENCY (20%):                          |              |                                                                                             |       |             |          | \$142,433          |
| CONSTRUCTION SUBTOTAL:                      |              |                                                                                             |       |             |          | \$854,598          |
| DESIGN & PERMITTING (see note 3):           |              |                                                                                             |       |             |          | \$142,433          |
| EASEMENT ACQUISITION (see note 4):          |              |                                                                                             |       |             |          | \$4,500            |
| <b>ESTIMATED TOTAL IMPLEMENTATION COST:</b> |              |                                                                                             |       |             |          | <b>\$1,001,530</b> |

Notes:

- 1) Unit costs based on current FDOT Cost Averages along with Engineer's experience with recent projects. FDOT costs were referenced from Statewide averages as well as from Market Area 08, which Orange County is listed under. The higher of the two values was typically used.
- 2) Above estimate does not include cost for potential utility relocations.
- 3) Assumes no muck or other removal of unsuitable soils.
- 4) Design & Permitting Cost was assumed to be 20% of the Construction Subtotal Cost. Assumed to include survey and geotechnical / environmental investigations.
- 5) Parcel market values (land + buildings + features) were obtained from Orange County property appraiser. Values were multiplied by a factor of 1.5 to account for administrative costs.

**IMPROVEMENT ALTERNATIVE 2  
PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS**

| Item                                        | Pay Item No. | Description                                                                                 | Units | Unit Cost   | Quantity | Total              |
|---------------------------------------------|--------------|---------------------------------------------------------------------------------------------|-------|-------------|----------|--------------------|
| 1                                           | 101-1        | Mobilization (15% of Construction Total)                                                    | LS    | varies      | 1        | \$90,426           |
| 2                                           | 102-1        | Maintenance of Traffic (10% of Construction Total)                                          | LS    | varies      | 1        | \$60,284           |
| 3                                           | 104-1        | Prevention, Control and Abatement of Erosion and Water Pollution (5% of Construction Total) | LS    | varies      | 1        | \$30,142           |
| 4                                           | 110-1-1      | Clearing and Grubbing (10% of Construction Total)                                           | LS    | varies      | 1        | \$60,284           |
| 5                                           | 120-1        | Excavation, Embankment, and Grading                                                         | CY    | \$10.00     | 1935     | \$19,350.00        |
| 6                                           | 160-4        | Type B Stabilization (12")                                                                  | SY    | \$15.00     | 2552     | \$38,280           |
| 7                                           | 285-704      | Optional Base, Base Group 04 (6")                                                           | SY    | \$26.00     | 2552     | \$66,352           |
| 8                                           | 334-1-13     | Superpave Asphaltic Concrete, Traffic C (2")                                                | SY    | \$16.00     | 2552     | \$40,832           |
| 9                                           | 425-11       | Modify Existing Drainage Structure                                                          | EA    | \$5,000.00  | 7        | \$35,000           |
| 10                                          | 425-2-71     | Manhole, J-7, <10'                                                                          | EA    | \$11,250.00 | 4        | \$45,000           |
| 11                                          | 430-175-118  | Pipe Culvert, RCP, Round, 18", S/CD                                                         | LF    | \$135.00    | 195      | \$26,325           |
| 12                                          | 430-175-124  | Pipe Culvert, RCP, Round, 24", S/CD                                                         | LF    | \$170.00    | 1375     | \$233,750          |
| 13                                          | 430-982-125  | Mitered End Section, Round, 18", CD                                                         | EA    | \$3,000.00  | 2        | \$6,000            |
| 14                                          | 430-982-129  | Mitered End Section, Round, 24", CD                                                         | EA    | \$2,950.00  | 1        | \$2,950            |
| 15                                          | 520-1-10     | Concrete Curb & Gutter, Type F                                                              | LF    | \$35.00     | 1600     | \$56,000           |
| 16                                          | 570-1-2      | Performance Turf, Sod                                                                       | SY    | \$5.00      | 3600     | \$18,000           |
| 17                                          | 900-1        | Bioswale Planting                                                                           | LS    | varies      | 1        | \$15,000           |
| SUBTOTAL COST:                              |              |                                                                                             |       |             |          | \$843,975          |
| CONTINGENCY (20%):                          |              |                                                                                             |       |             |          | \$168,795          |
| CONSTRUCTION SUBTOTAL:                      |              |                                                                                             |       |             |          | \$1,012,770        |
| DESIGN & PERMITTING (see note 3):           |              |                                                                                             |       |             |          | \$168,795          |
| <b>ESTIMATED TOTAL IMPLEMENTATION COST:</b> |              |                                                                                             |       |             |          | <b>\$1,181,564</b> |

Notes:

- 1) Unit costs based on current FDOT Cost Averages along with Engineer's experience with recent projects. FDOT costs were referenced from Statewide averages as well as from Market Area 08, which Orange County is listed under. The higher of the two values was typically used.
- 2) Above estimate does not include cost for potential utility relocations.
- 3) Assumes no muck or other removal of unsuitable soils.
- 4) Design & Permitting Cost was assumed to be 20% of the Construction Subtotal Cost. Assumed to include survey and geotechnical / environmental investigations.

**IMPROVEMENT ALTERNATIVE 3  
PRELIMINARY ESTIMATE OF IMPROVEMENT COSTS**

| Item                                        | Pay Item No. | Description                                                                                 | Units | Unit Cost   | Quantity | Total              |
|---------------------------------------------|--------------|---------------------------------------------------------------------------------------------|-------|-------------|----------|--------------------|
| 1                                           | 101-1        | Mobilization (15% of Construction Total)                                                    | LS    | varies      | 1        | \$76,825           |
| 2                                           | 102-1        | Maintenance of Traffic (10% of Construction Total)                                          | LS    | varies      | 1        | \$51,216           |
| 3                                           | 104-1        | Prevention, Control and Abatement of Erosion and Water Pollution (5% of Construction Total) | LS    | varies      | 1        | \$25,608           |
| 4                                           | 110-1-1      | Clearing and Grubbing (10% of Construction Total)                                           | LS    | varies      | 1        | \$51,216           |
| 5                                           | 120-1        | Excavation, Embankment, and Grading                                                         | CY    | \$10.00     | 1935     | \$19,350.00        |
| 6                                           | 160-4        | Type B Stabilization (12")                                                                  | SY    | \$15.00     | 2552     | \$38,280           |
| 7                                           | 285-704      | Optional Base, Base Group 04 (6")                                                           | SY    | \$26.00     | 2552     | \$66,352           |
| 8                                           | 334-1-13     | Superpave Asphaltic Concrete, Traffic C (2")                                                | SY    | \$16.00     | 2552     | \$40,832           |
| 9                                           | 425-11       | Modify Existing Drainage Structure                                                          | EA    | \$5,000.00  | 6        | \$30,000           |
| 10                                          | 425-2-71     | Manhole, J-7, <10'                                                                          | EA    | \$11,250.00 | 1        | \$11,250           |
| 11                                          | 430-175-118  | Pipe Culvert, RCP, Round, 18", S/CD                                                         | LF    | \$135.00    | 230      | \$31,050           |
| 12                                          | 430-175-124  | Pipe Culvert, RCP, Round, 24", S/CD                                                         | LF    | \$170.00    | 1030     | \$175,100          |
| 13                                          | 430-982-125  | Mitered End Section, Round, 18", CD                                                         | EA    | \$3,000.00  | 3        | \$9,000            |
| 14                                          | 430-982-129  | Mitered End Section, Round, 24", CD                                                         | EA    | \$2,950.00  | 1        | \$2,950            |
| 15                                          | 520-1-10     | Concrete Curb & Gutter, Type F                                                              | LF    | \$35.00     | 1600     | \$56,000           |
| 16                                          | 570-1-2      | Performance Turf, Sod                                                                       | SY    | \$5.00      | 3400     | \$17,000           |
| 17                                          | 900-1        | Bioswale Planting                                                                           | LS    | varies      | 1        | \$15,000           |
| SUBTOTAL COST:                              |              |                                                                                             |       |             |          | \$717,030          |
| CONTINGENCY (20%):                          |              |                                                                                             |       |             |          | \$143,406          |
| CONSTRUCTION SUBTOTAL:                      |              |                                                                                             |       |             |          | \$860,436          |
| DESIGN & PERMITTING (see note 3):           |              |                                                                                             |       |             |          | \$143,406          |
| EASEMENT ACQUISITION (see note 4):          |              |                                                                                             |       |             |          | \$5,500            |
| <b>ESTIMATED TOTAL IMPLEMENTATION COST:</b> |              |                                                                                             |       |             |          | <b>\$1,009,341</b> |

Notes:

- 1) Unit costs based on current FDOT Cost Averages along with Engineer's experience with recent projects. FDOT costs were referenced from Statewide averages as well as from Market Area 08, which Orange County is listed under. The higher of the two values was typically used.
- 2) Above estimate does not include cost for potential utility relocations.
- 3) Assumes no muck or other removal of unsuitable soils.
- 4) Design & Permitting Cost was assumed to be 20% of the Construction Subtotal Cost. Assumed to include survey and geotechnical / environmental investigations.
- 5) Parcel market values (land + buildings + features) were obtained from Orange County property appraiser. Values were multiplied by a factor of 1.5 to account for administrative costs.

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|                            |                               |
|----------------------------|-------------------------------|
| item type Non-Action Items | meeting date February 1, 2023 |
| prepared by Victoria Tabor | approved by                   |
| board approval             |                               |
| strategic objective        |                               |

## subject

Lake Killarney Board: Annexation Update

## motion / recommendation

## background

- Annexation Work Session PowerPoint:  
<https://ocfl.box.com/s/5hibctjo43bim8esbayua7u8ak48ivli>
- Information on the Orange County Lake Killarney Advisory Board can be found here:  
[https://apps.ocfl.net/aware/advisory/board\\_details.asp?id=52](https://apps.ocfl.net/aware/advisory/board_details.asp?id=52).
- Tab for Agendas & Minutes. The minutes go back to August 11, 2022. To obtain historical minutes you'd have to know the date and do a search on the County Calendar: <https://www.orangecountyfl.net/Home/CountyCalendar.aspx>.

## alternatives / other considerations

## fiscal impact

## ATTACHMENTS:

[City Commission Work Session Annexation Options](#)



# City Commission Work Session

## Agenda

**November 30, 2022 @ 1:00 pm**

City Hall - Commission Chambers  
401 S. Park Avenue

### welcome

Agendas and all backup material supporting each agenda item are accessible via the city's website at [cityofwinterpark.org/bpm](http://cityofwinterpark.org/bpm) and include virtual meeting instructions.

### assistance & appeals

Persons with disabilities needing assistance to participate in any of these proceedings should contact the City Clerk's Office ([407-599-3277](tel:407-599-3277)) at least 48 hours in advance of the meeting.

"If a person decides to appeal any decision made by the Board with respect to any matter considered at this hearing, a record of the proceedings is needed to ensure that a verbatim record of the proceedings is made, which record includes the testimony and evidence upon which the appeal is to be based." (F.S. 286.0105).

### please note

Times are projected and subject to change.

- 
1. Call to Order
  2. Discussion Item(s)
    - a. [Annexation Options](#) 90 minutes
  3. Adjournment



# City Commission **agenda item**

|                                     |                                                     |
|-------------------------------------|-----------------------------------------------------|
| <b>item type</b> Discussion Item(s) | <b>meeting date</b> November 30, 2022               |
| <b>prepared by</b> Jeffrey Briggs   | <b>approved by</b> Michelle del Valle, Randy Knight |
| <b>board approval</b> Completed     |                                                     |
| <b>strategic objective</b>          |                                                     |

## **subject**

Annexation Options

## **motion / recommendation**

Provide direction to city staff.

## **background**

The city staff will present the methods and procedures required for annexations allowed under Chapter 171, Florida Statutes.

The city staff will present an analysis and options for the potential annexation of the areas outlined as annexation reserve areas in the Comprehensive Plan.

## **alternatives / other considerations**

## **fiscal impact**

## **ATTACHMENTS:**

[Nov. 30th\\_Annexation Work Session.pptx](#)

# City Commission *Annexation Work Session*



November 30, 2022

# Chapter 171, Florida Statutes

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Florida Statutes permits annexation in four ways:

- Voluntary annexation by the property owner(s).
- Annexation of Enclaves by Agreement with Orange County.
- Annexation by voter referendum of areas with registered voters.
- Annexation by Agreement with commercial property owners (no registered voters).

# Voluntary Annexations

---



- Must be a contiguous abutting property to city limits.
- Undertake an informal cost/benefit study per Comp. Plan.
- Must provide notice to Orange County prior to advertisements.
- Legal Notice in newspaper two consecutive weeks prior to public hearings.
- Two public hearings by City Commission to adopt.
- Orange County FLU and Zoning stays in place until the City adopts the Municipal FLU and Zoning designations.
- City may change FLU and Zoning from what exists in Orange County.



# Annexation of Enclaves

---



- Must be an enclave or island surrounded by a single city.
- Must be 110 acres or less in size.
- Undertake an informal or formal cost/benefit study per Comp. Plan.
- Request and receive an Interlocal Agreement with Orange County prior to advertisements.
- Area may include registered voters without need for voter referendum.
- Two public hearings by City Commission to adopt.
- Orange County FLU and Zoning stays in place until the City adopts the Municipal FLU and Zoning designations.
- City may change FLU and Zoning from what exists in Orange County.

# Annexation by Referendum

---



- Voter Referendum is required if the area to be annexed holds registered voters.
- Must be contiguous abutting properties to city limits.
- Must undertake a formal cost/benefit study per Comp. Plan.
- Must provide notice to Orange County prior to advertisements.
- Two public hearings by City Commission to sponsor the voter referendum.  
Simple majority decides based on results the referendum vote\*.
- Orange County FLU and Zoning stays in place until the City adopts the Municipal FLU and Zoning designations.
- \*City Code requires a separate voter referendum of City electors to agree to accept such area into the City, if it holds more than 1% of current population.

# Annexation by Agreement with Owners



- Annexation can occur if the area to be annexed has no registered voters, such as a commercial corridor or if the area is/or will be vacant at the time of annexation with no registered voters in place\*.
- City must have signed consents from a majority of the property owners who also represent a majority of the land area to be annexed.
- Must be contiguous abutting properties to city limits.
- Must undertake a formal cost/benefit study per Comp. Plan.
- Must provide notice to Orange County prior to advertisements.
- Two public hearings by City Commission to annex based on results from a majority of the consents obtained to be annexed\*.
- Orange County FLU and Zoning stays in place until the City adopts the municipal FLU and Zoning designations.
- \*City Code requires a separate voter referendum of City electors to agree to accept such area into the City if it constitutes, more than 2% of current land area of the City.

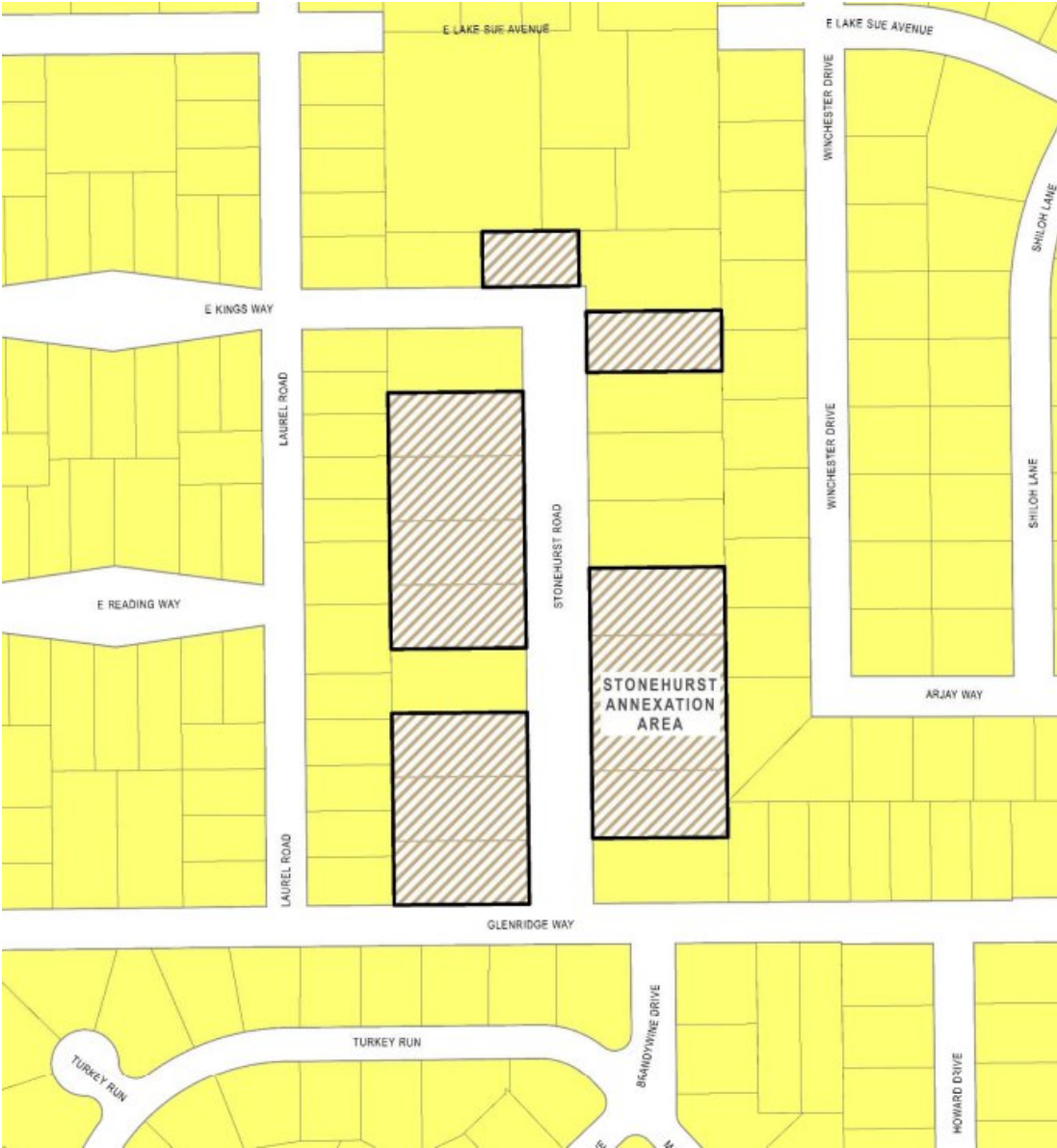


## Comp. Plan Annexation Reserve Areas

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- Stonehurst Drive enclave
- Lake Killarney annexation area
- Lawndale annexation area
- I-4/Formosa annexation area
- Kentucky/Ogelsby annexation area

Stonehurst  
Annexation Reserve  
Area





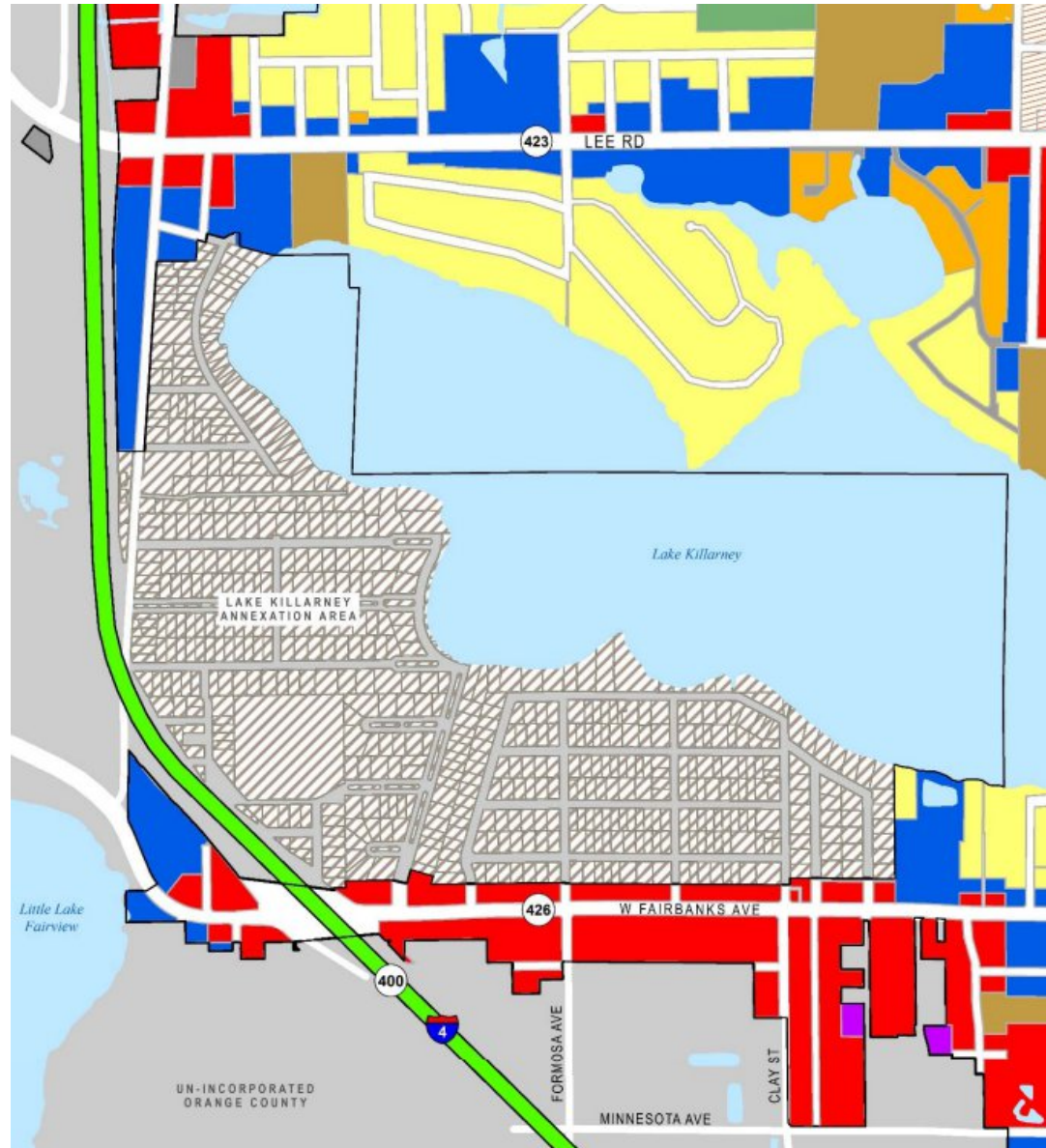
## Stonehurst Drive Annexation Area

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- Stonehurst Drive enclave is 5.6 acres
- Thirteen single family homes
- Population estimated of 30 persons
- City already provides water/sewer service
- City to proceed via Interlocal Agreement with Orange County in 2023 ?

# Lake Killarney Annexation Reserve Area





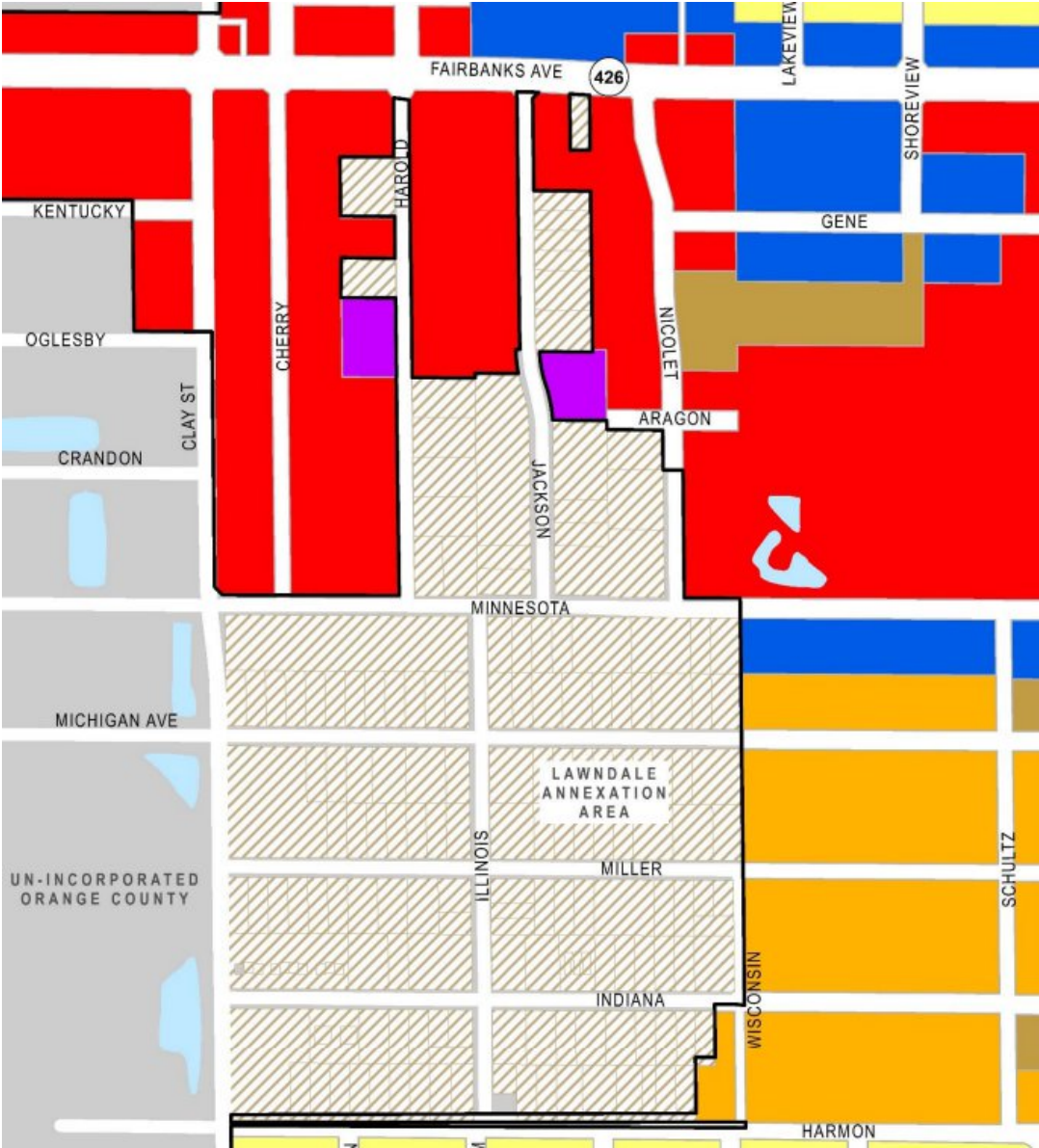


## Lake Killarney Annexation Area

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- Lake Killarney annexation area is 198 acres
- Approx. 508 single family homes; five office buildings and Killarney Elementary School
- Population estimate of 1,118 persons
- City already provides water service
- City to proceed via Annexation referendum in 2023, after update to cost/benefit study ?
- Would need City referendum to accept the annexation

Lawndale  
Annexation Reserve  
Area



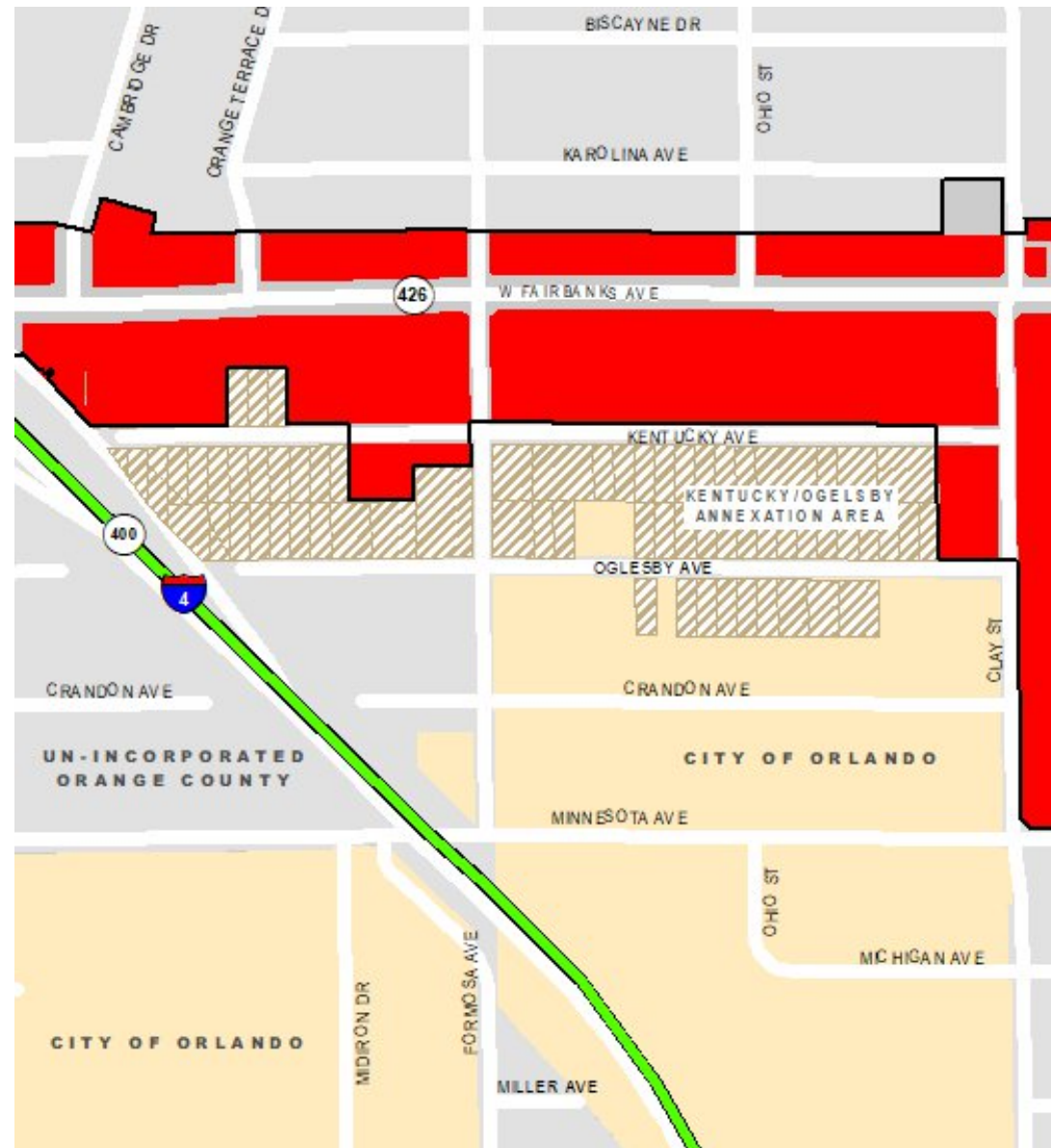


## Lawndale Annexation Area

---

- Lawndale annexation area (including commercial north of Minnesota) is approx. 50 acres
- Approx. 132 single family homes; 25 commercial properties, one private school and one church.
- Population estimate of 290 persons
- City already provides water service
- City to proceed via Annexation referendum in 2023, after update to cost/benefit study ?
- Does not need separate City referendum to accept

## Kentucky/Ogelsby Annexation Reserve Area



# Kentucky/Ogelsby Annexation Area

---



- Kentucky/Ogelsby annexation area (East side) of Formosa Avenue is approx. 8 acres
- Approx. 20 single family homes; 15 commercial buildings
- Population estimate of 44 persons
- City already provides water service
- City to proceed via Annexation referendum in 2023, after update to cost/benefit study ?
- Option is to just pursue annexation of Kentucky frontage commercial properties.



# I-4/Formosa Triangle



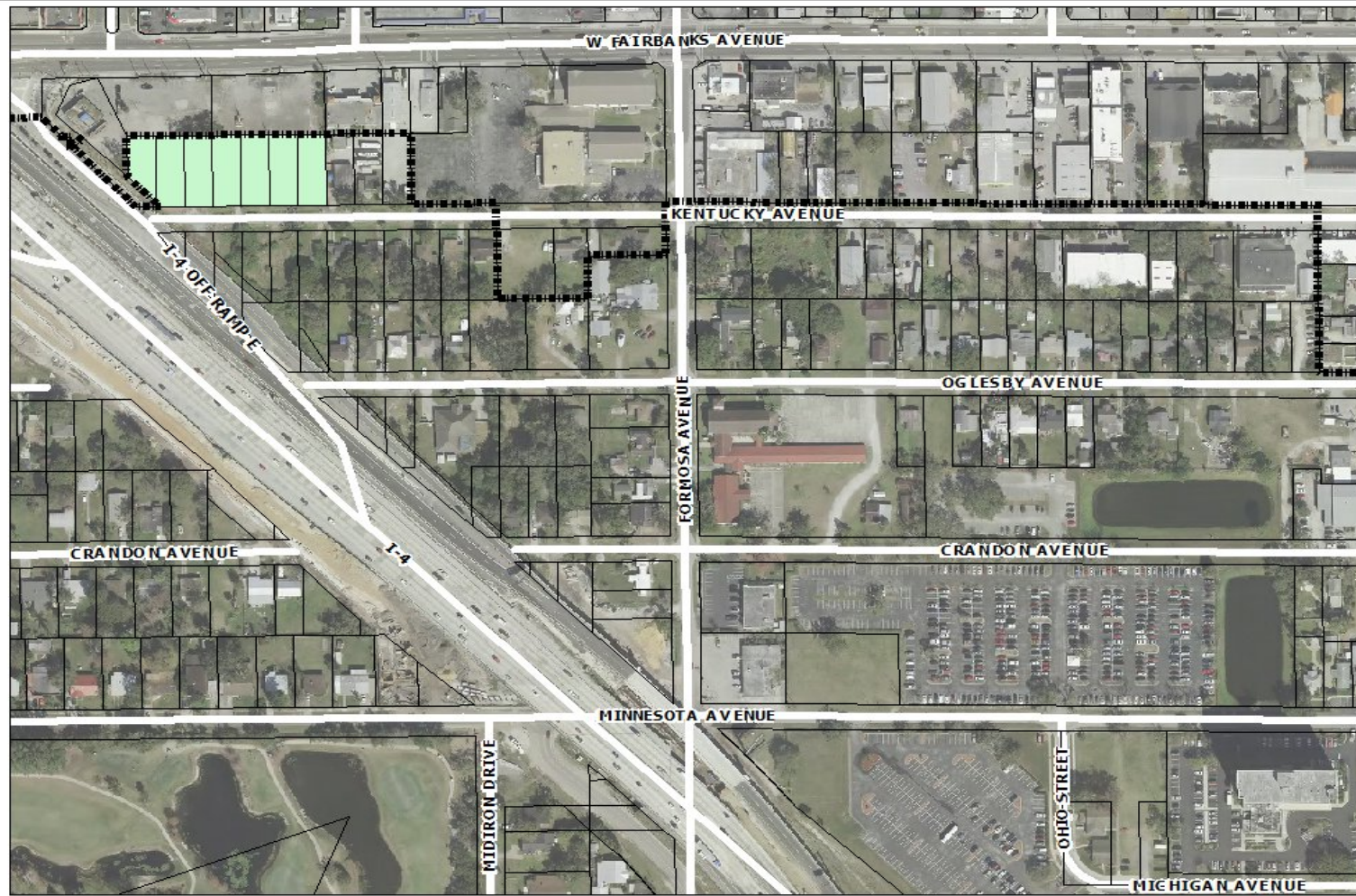




**South of Fairbanks  
Area Analysis**  
City of Winter Park  
Florida

**Legend**

-  Winter Park  
City Limits
-  Proposed  
Annexations





## I-4/Formosa Annexation Area

---

- Seven acres of property on Kentucky, Ogelsby and Crandon Avenues between Interstate 4 and Formosa Avenue.
- Ownership of these 41 properties is in the hands of 2-3 property owners.
- City of Orlando has an Interlocal Agreement with Orange County indicating their desire to annex this entire area. Calvary Church is in Orlando.
- Sanitary Sewer and Water necessary for redevelopment is more accessible from the City of Winter Park.
- City should require annexation into Winter Park in order to control the quality of the development and receive the benefit of the tax base.
- Comprehensive Plan policies entertain ideas for mixed use or higher density given the location for traffic adjacent to I-4.



## Comprehensive Plan Policy Direction for the I-4 and Formosa Triangle



- Policy 1-L-5: Annexation, Rezoning & Redevelopment of Certain Properties, South of Fairbanks Avenue and West of Formosa Avenue The City shall encourage the annexation and redevelopment of properties in the area south of Fairbanks Avenue and west of Formosa Avenue along Fairbanks, Kentucky, Ogelsby and Crandon Avenue. Prior to or at the time annexation of such properties within this area occurs, the City shall consider amendment to the Future Land Use element to create a future land use designation and a corresponding zoning designation and land development code standards that may permit for this area either mixed use development or mixed use projects with urban scale with parking garage components and notwithstanding other limitations within the Future Land Use element, permitted floor area ratios consistent with the appropriate future land use designations. Such density and scale of development is deemed compatible given the location on Fairbanks Avenue adjacent to Interstate 4 and to enhance the appearance of the Fairbanks gateway corridor. Roadway abandonments or vacations necessary for assemblage of properties within this area are also encouraged.



## I-4/Formosa Triangle

---

- Staff will continue the occasional discussions with the property owners and other interested parties in critiquing development proposals. Annexation will be developer driven based on plans/densities approved by the City.
- The Comprehensive Plan indicates that densities including parking garages may be permitted due to the location next to I-4 and lack of neighborhood impact.
- However, the private marketplace will determine the feasibility of potential redevelopment scenarios.
- City shall not agree to provide sanitary sewer unless project annexes into Winter Park in order to control the scale and quality of the project and to benefit from the added tax base.

## Annexations of Areas not in the Comp. Plan

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- Winter Park Estates neighborhood
- Winter Park Pines neighborhood
- Multi-Family/Commercial on West Side SR 436



## Winter Park Estates Annexation Area

---

- Winter Park Estates annexation area is 101.5 acres
- Approx. 386 single family homes and two office buildings
- Population estimate of 850 persons
- City already provides water and sewer service
- City to proceed with update to cost/benefit study ?
- Would need City referendum to accept the annexation





## Winter Park Pines Annexation Area

---



- Winter Park Pines annexation area is 206 acres
- Approx. 899 single family homes
- Population estimate of 1,978 persons
- City already provides water and sewer service
- City to proceed with update to cost/benefit study ?
- Would need City referendum to accept the annexation





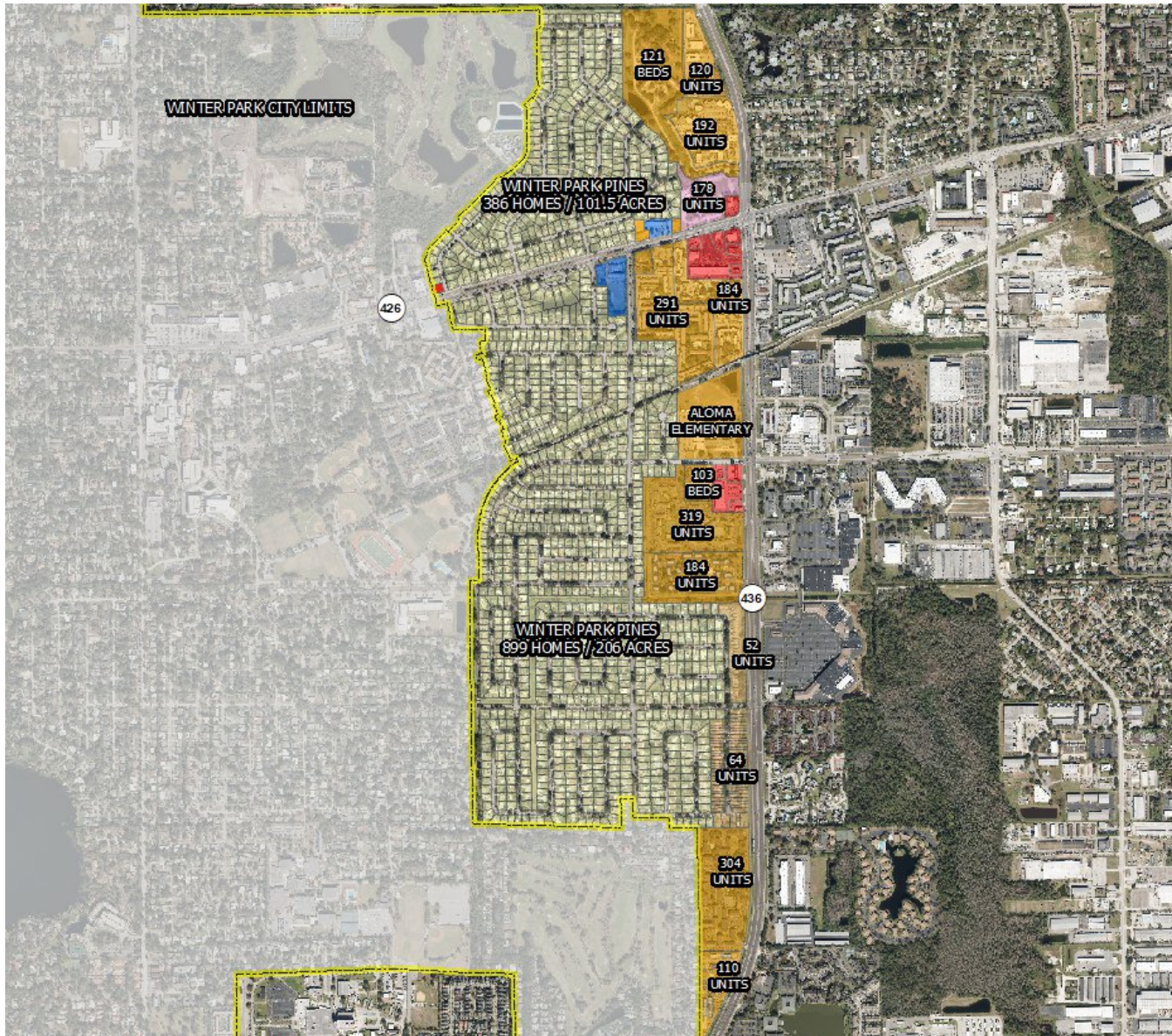


## Multi-Family/Commercial Annexation Area

---



- Adding the multi-family and commercial properties on the west side of Semoran Blvd. (SR 436) is 175 acres
- Seven multi-family complexes with 1,998 units, 224 assisted living/nursing beds, and two shopping centers.
- Population estimate of 4,620 persons
- City already provides water and sewer service
- City to proceed with update to cost/benefit study ?
- Would need City referendum to accept the annexation





|                            |                               |
|----------------------------|-------------------------------|
| item type Staff Updates    | meeting date February 1, 2023 |
| prepared by Victoria Tabor | approved by                   |
| board approval             |                               |
| strategic objective        |                               |

## subject

Lakes Management

## item list

- Water Quality
- Hydrilla treatments
- Algae bloom in the Cove/Canal

## motion / recommendation

## background

- Hurricane preparedness plan update following City Commission Workshop.
- Feasibility study update for Shoreview outfall project improvement plan that includes the seven outfalls (when available).
- Water elevation policy draft update (future).
- Presentation on pool pollution arranged by Ms. Volpe (future).

## alternatives / other considerations

## fiscal impact

## ATTACHMENTS:

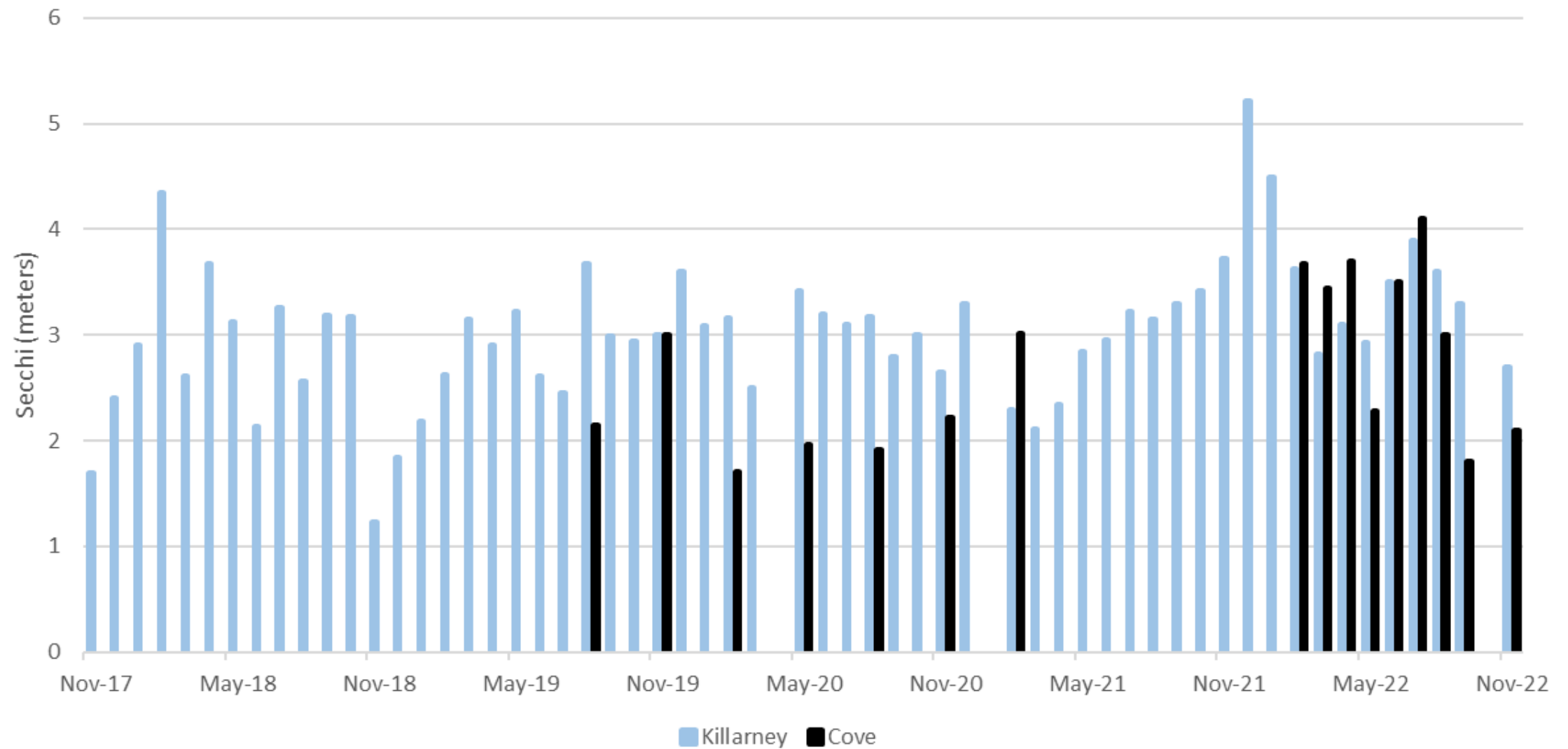
[Killarney Lakes Update 02.2023](#)



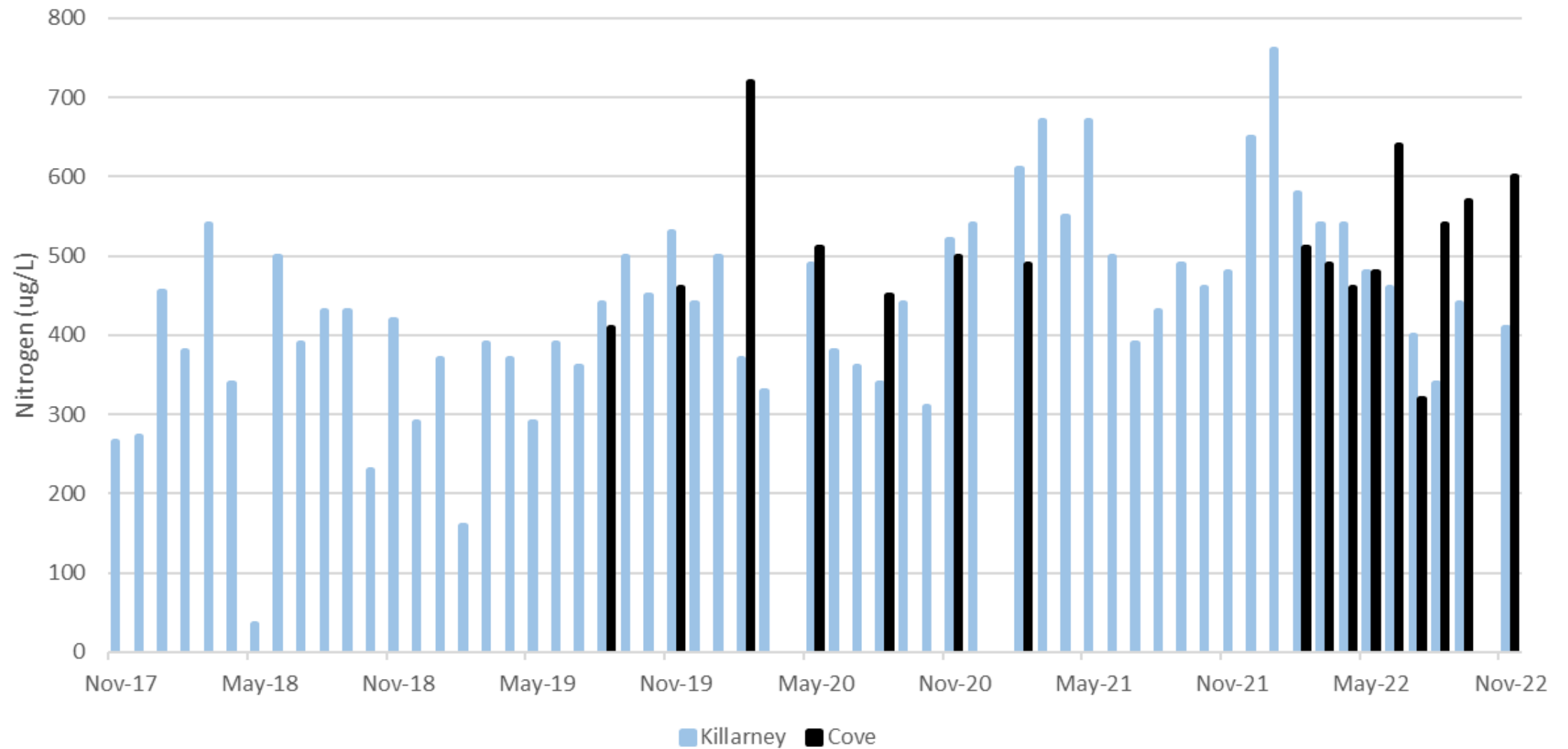
# LAKE UPDATE:

- Water Quality- Post-storm effects
- Hydrilla spot treatments on South Shore
- Maintenance and efforts:
  - 240 gal debris
  - 30 gal trash
- Algae bloom in the Cove/Canal

## Clarity Comparison

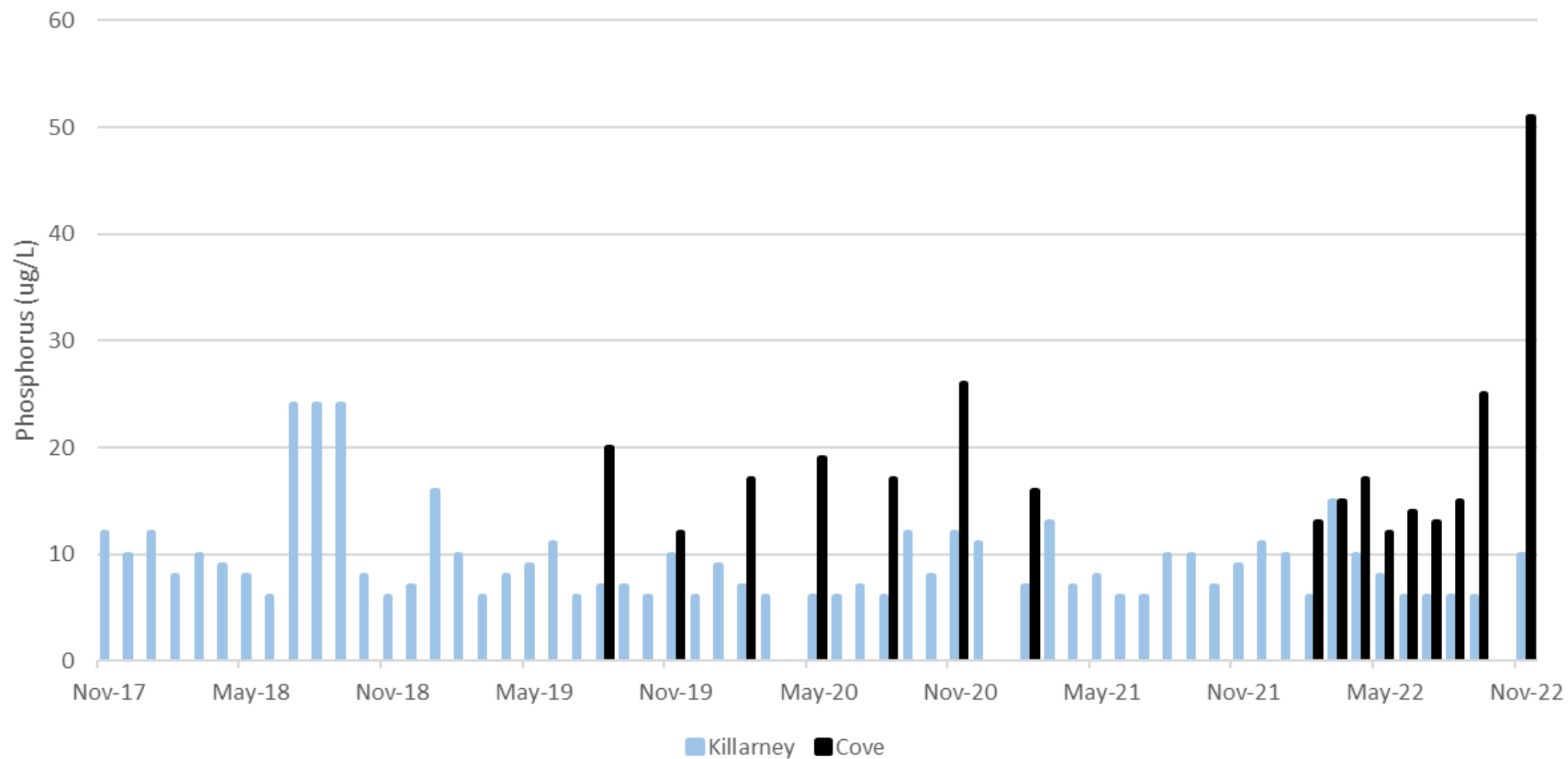


## Nitrogen Comparison

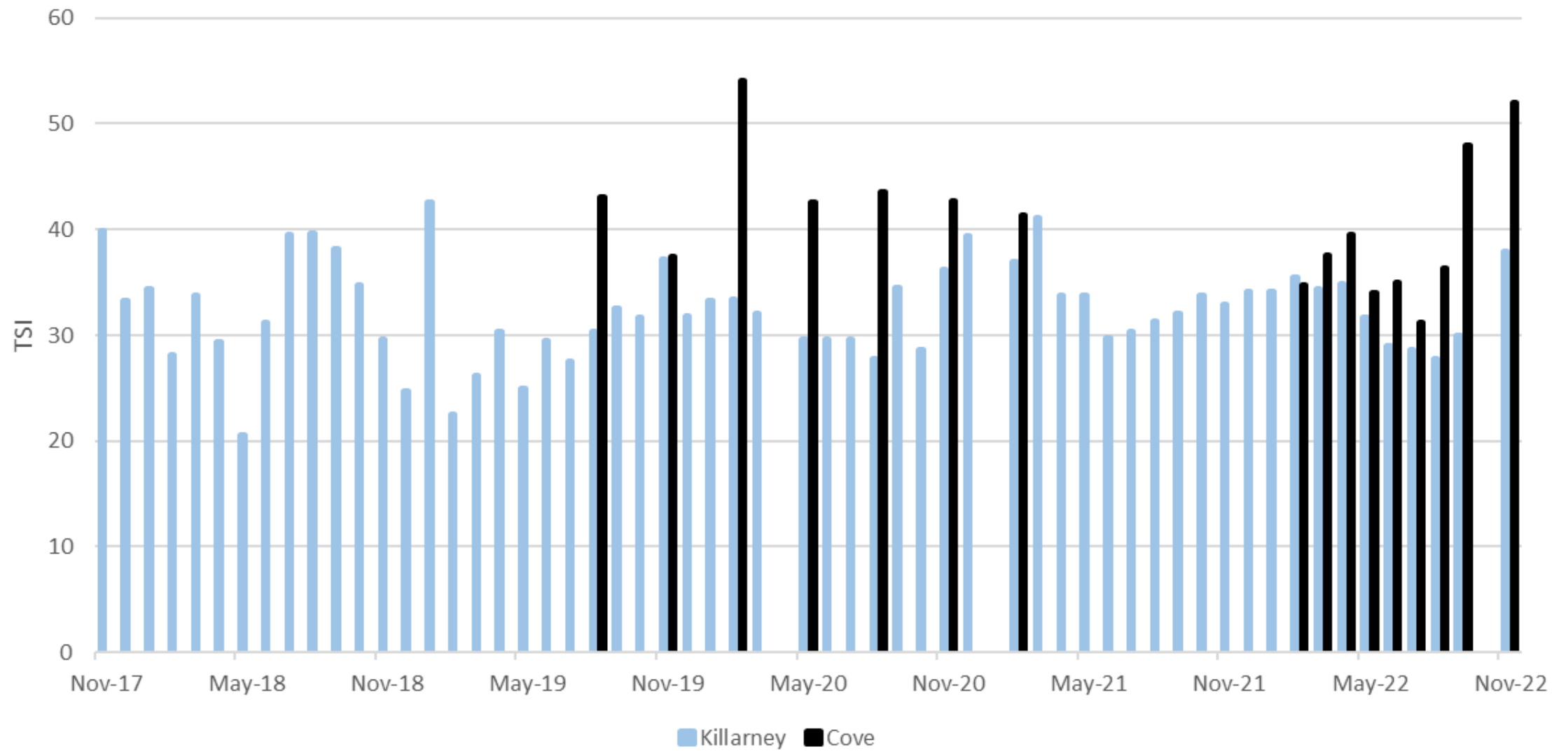




## Phosphorus Comparison

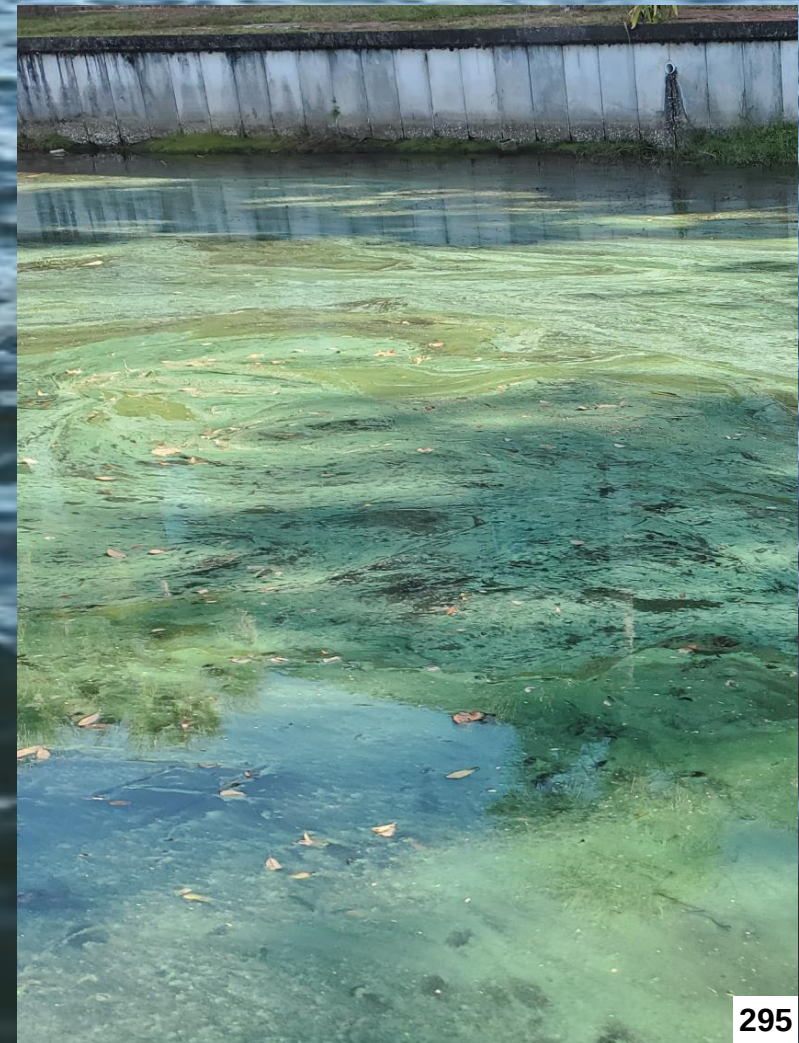
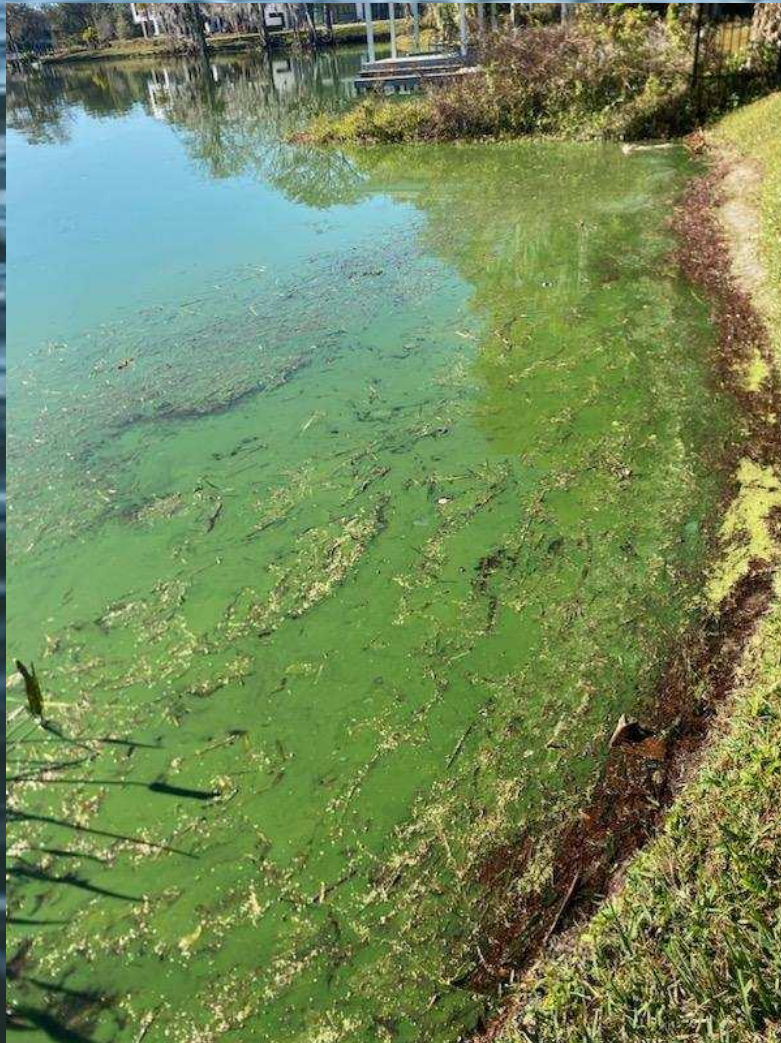


## TSI Comparison



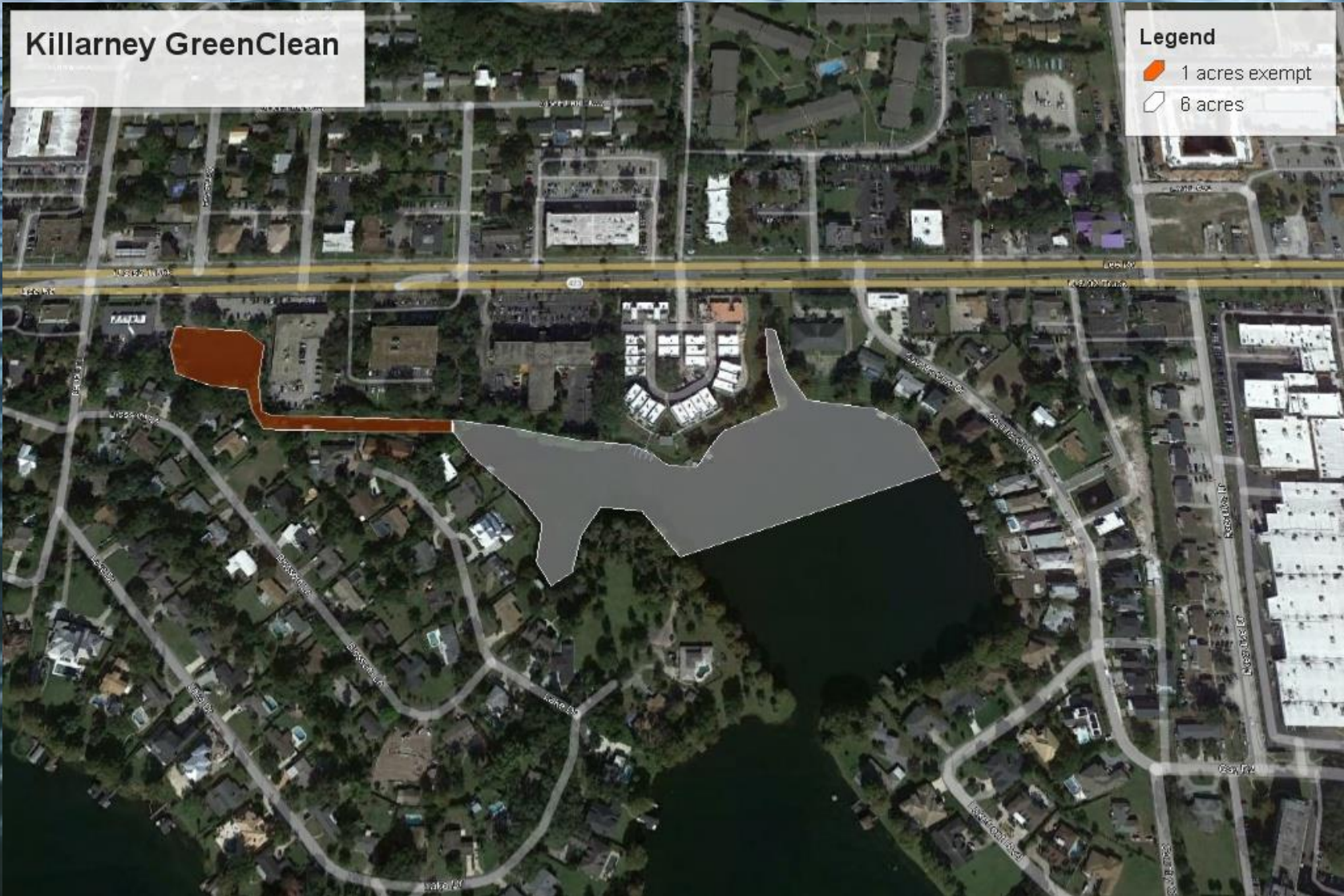


# Algae Bloom





# Algae Bloom





# Algae Bloom post-treatments







|                            |                               |
|----------------------------|-------------------------------|
| item type Staff Updates    | meeting date February 1, 2023 |
| prepared by Victoria Tabor | approved by                   |
| board approval             |                               |
| strategic objective        |                               |

## subject

Stormwater Management

## motion / recommendation

## background

- CIP Update
- Diagram of Lake Killarney and all associated outfalls, including Orange County.
- Killarney Estates Subdivision Property Management update.
- Library and Event Center as-builts provided when acquired.
- Dredging status update along with "major outfall" breakdown for NRCS.
- Hurricane preparedness plan update following City Commission Workshop.
- CRS review update following City Commission Workshop.
- Feasibility study update for Shoreview outfall project improvement plan that includes the seven outfalls (when available).
- Water elevation policy draft update (future).

## alternatives / other considerations

## fiscal impact

## ATTACHMENTS:

[Stormwater Staff Update](#)

# Stormwater Staff Update

## Lake Killarney Advisory Board – Feb 2023

### CITY OF WINTER PARK - STORMWATER CAPITAL IMPROVEMENT PROJECTS UPDATE 2/1/2023

| ACCT # | CIP Title & Description                                                                                                                                                                                                                     | Original Year Funded | Current Balance | Status/Comments                                                                                                                                                                                                                                      |
|--------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------|-----------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 565200 | <b>Drainage Improvements</b> - Recent years of unusually heavy rainfall events have revealed several substandard drainage conditions in various locations throughout the City.                                                              | Annually Funded      | \$223,702       | Several in-house drainage improvements projects to be scheduled for 2022-23, Ward Park ponds pipe construction, Palmer at Old England outfall repair, stormwater outfall dredging, curb implementation.                                              |
|        |                                                                                                                                                                                                                                             |                      |                 | 1) <u>Palmer at Old England outfall repair</u> - A video inspection to be scheduled to determine the existing condition of the outfall pipe. Design and construction will be scheduled as needed. Estimated cost \$20k.                              |
|        |                                                                                                                                                                                                                                             |                      |                 | 2) <u>Stormwater Outfall Dredging</u> - The City recently entered a new contract for dredging and is developing a schedule for several stormwater outfalls.                                                                                          |
|        |                                                                                                                                                                                                                                             |                      |                 | 3) <u>Ward Park ponds construction</u> - Estimated cost \$150k. NE and NW Pond excavation and sodding is complete. The piping to be installed in February 2023.                                                                                      |
|        |                                                                                                                                                                                                                                             |                      |                 | 4) <u>Curb Implementation</u> - Commission approved \$50,000 in the City's FY'23 budget. Locations to be determined and coordinated with asphalt resurfacing projects.                                                                               |
| 565203 | <b>Lk. Bell Weir Outfall Improvements</b> -                                                                                                                                                                                                 | 2009                 | \$69,223        | Repairs may be required on the Lake Bell outfall weir, will continue to assess the condition in 2023.                                                                                                                                                |
| 565221 | <b>Seminole County Ditch Piping (along Arbor Park Dr)</b> – Drainage ditch behind the homes along Arbor Park Drive has a shared drainage basin with Seminole County. Funding is provided for the design and construction to pipe the ditch. | 2016                 | \$733,395       | The Interlocal Agreement was approved by the City Commission on October 13, 2021 and by the Seminole County Commission on December 14, 2021. 60% plans completed and submitted to Seminole County. Process to permit with SJRWMD currently underway. |
| 565205 | <b>Nicolet Ave Stormwater Pond</b> – complete the design and construction of a stormwater treatment pond on City purchased properties located at 796 & 808 Nicolet Avenue                                                                   | 2023                 | \$200,000       | Commission approved \$200,000 in the City's FY'23 budget. Project manager to be assigned, project schedule to be developed, best management practice analysis to be performed.                                                                       |
|        |                                                                                                                                                                                                                                             |                      |                 |                                                                                                                                                                                                                                                      |
|        | <b>TOTALS</b>                                                                                                                                                                                                                               |                      |                 |                                                                                                                                                                                                                                                      |
|        | 3023406 ACTIVE STORMWATER CIP's                                                                                                                                                                                                             |                      | \$1,226,319.59  | <b>BALANCE TOTAL</b>                                                                                                                                                                                                                                 |



# Stormwater Staff Update

Lake Killarney Advisory Board – Feb 2023

## Lake Killarney - Current Lakefront Construction





# Lake Killarney Outfall Inventory



Additional dredging locations outside of Lake Killarney Drainage Basin:

- Fern/Venetian Canals
- Lake Berry
- Lake Osceola
- Lake Maitland
- Lake Knowles
- Lake Midget

## Legend

-  Discharge Points
-  City Boundary

Outfalls boxed in red are to be dredged.



# Future Flood Mitigation Considerations

From City Commission Work Session 1/12/23

- Updating Hurricane Preparedness Plan
- Survey Lowest FFE for Lakefront Properties
- Installing *Smart* Lake Level Gauges
- Additional City-wide Weather Stations
- Lake Level Alterations Policy
- Future CIP Considerations for Lake Interconnects
- Climate & Resiliency Grant

# Stormwater Staff Update

Lake Killarney Advisory Board – Feb 2023

- Follow-up items:
  - BMP feasibility study for Killarney Dr Outfall Consolidation (when available)
  - Killarney Estates Subdivision Property Management update
    - Reached out to HOA
  - Water elevation policy draft update (future)
  - Library and Event Center as-builts provided when acquired.
  - Dredging Status Update
    - Will provide as soon as available. Procurement process is complete.