

## ADDITIONAL FAQ ADDED MAY 3, 2024

1. **The watershed area for which the King Street Drainage Project is handling is 40 acres. The source of water for this system is rainfall generated regularly (occurring) and by major storms. For the system design were these rainfall measures applied to just the 40-acre watershed supplying the King Street system or were there other sources of water?**
  - a. Tidal backflow into the pond is another source of water to the drainage system.
  
2. **For the system design, what [proportions] of the total water being delivered to the tidal basis are based on historical conditions, current conditions, and future conditions?**
  - a. All conditions above have their role. Historical conditions have a role in validating or calibrating models. Current conditions are used as the basis of design. Future conditions are used to check for resilience against anticipated climate change.
  
3. **For the project design was any rain data from hurricanes used in the analysis?**
  - a. No. Data from and conditions documented during recent hurricanes were presented in the study to support validation of models developed and used for analyzing existing conditions and assessing performance during extreme events.
  
4. **Final Report “The Point and Downtown Drainage Study” Section [4.1.4]: “Hourly rainfall stations are currently maintained at the Marine Corps Air Station and Beaufort County Airport. Data from each station and event was found to be inaccurate and erroneous. As a result, radar-based rainfall data acquisition techniques were implemented to obtain historical rainfall data.”**

### **Why was this data found to be erroneous?**

- a. For the specific event(s) analyzed, the engineer found that data varied significantly between the various sources and elected to apply an alternative and standard engineering practice, using radar-based data set.
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5. **Final Report “The Point and Downtown Drainage Study” Section [2.1.1]: “Rainfall data were obtained from the National Oceanic and Atmospheric Administration (NOAA) precipitation frequency data server, specifically from the local NOAA rain gauge located in Southside Park.”**

### **Why was the data from Southside Park found more reliable than data from the National Weather Service station at the Marine Corps Air Station and Beaufort County Airport?**

- a. Standard engineering practice is to use the closest reliable precipitation data; observed precipitation depth can change significantly over distances of less than a mile.

6. **Final Report “The Point and Downtown Drainage Study” Section [4.1.4.3]: “Future rainfall conditions were developed to consider changes in both rainfall total and storm intensity. Fifty-year rainfall totals were forecasted for the City of Beaufort. These estimates were based on historical NOAA rainfall records accompanied by 134 realizations of 21 global climate models across the state of South Carolina. Although 24-hour rainfall totals are expected to increase over the next 50 years, the overall average increase was estimated at approximately 0.30 inches for 2- through 25-year design events.**

**Future rainfall totals were paired with recently revised design storm distributions (i.e., NOAA distributions) published by National Resources Conservation Service (NRCS). Herein the NOAA B rainfall distribution was adopted for the City of Beaufort and is estimated to have a 4-inch per hour increase in the 10-year, 24-hour peak intensity. It is important to note that revised NRCS distributions were developed based on the frequency storm method using recent NOAA.”**

**Why for future conditions did you choose to use the NOAA/NRCS projections versus NOAA rainfall records accompanied with 21 global climate models?**

- a. Engineers and the City elected to check resilience to climate change by using projected future data. The following underlying research is the basis for the future conditions and is based on Climate Model Inter-comparison Project - 5 (CMIP5) Global Climate Model (GCM) data: [Analysis of Climate Change and 24-Hour Design Storm Depths for a Range of Return Periods Across South Carolina \(clemson.edu\)](https://www.clemson.edu/~engr3150/analysis_of_climate_change_and_24-hour_design_storm_depths_for_a_range_of_return_periods_across_south_carolina/).
7. **The purpose of the entire drainage project is to reduce street flooding. How did you determine the rainfall/storm thresholds that would create street flooding?**
- a. Thresholds that would result in street flooding for existing or improved conditions were not determined.
8. **Did your historical data evaluation include frequency of flooding events and the duration of the event?**
- a. No.
9. **Based on the water delivered per hour did you determine how deep the street flooding was?**
- a. Yes.
10. **For current conditions, Page 21 of your 7/15/2022 presentation indicates flooding levels for a 10-year design rain event. What is the definition of a 10-year design rain event?**
- a. The 10-year design (rain) event used was a 24-hour SCS (Soil Conservation Service) Type III storm. The average annual exceedance probability for such an event is 10% and over very long periods of time, that event is expected to be exceeded, on average, once every 10 years.

**11. Rather than using a prospective number, why would you not apply this metric to the actual history of flooding events?**

- a. Standard engineering practice is to base design on data derived from statistical analysis of rainfall events and use of synthetic events of a magnitude that corresponds to a chosen annual exceedance probability or return frequency.

**12. Final Report “The Point and Downtown Drainage Study.” Your map on Page 21 indicates flooding at the corner of King and East Streets of approximately 1 to 2 feet. Do you have data that would show the frequency of this event based on historical records?**

- a. Sufficient historical data for the Tidal Pond does not exist to perform this analysis.

**13. Do you have data that would show the duration of this flooding event when you factor in the level of the tidal waters that affect the outflow of water from the [tidal] basis?**

- a. Sufficient historical data for the tidal pond does not exist to assess this information.

**14. The Davis & [Floyd] August 2022 report contained very detailed cost estimates. I understand that the project is now at about 30% of the design stage. What are the aspects of the current engineering tasks that were not done in the [preparation] of the 2022 report?**

- a. Design elements have been further refined and developed as part of the design process, but no new components have been added or substantive changes made to the design concept.

**15. Your cost estimates were completed in August 2022. What factor should be applied to these estimates due to subsequent inflation and potential supply constraints?**

- a. No factor can be used. Cost estimates will be updated as design progresses, typically starting once 60% design is reached and systems are sufficiently designed to estimate cost.

**16. I understand grant funds for the entire project have been made and are required to be spent by December 31, 2026. What is the total amount of the funds that have been granted?**

- a. The King Street project was awarded \$9.46 million of the total \$17.78 million awarded to City of Beaufort for Point drainage projects. However, the SCIIP Grant awarded to the City for the King Street Drainage Project must be used before July 2026, and not December 31, 2026, as with many other ARPA-funded grant

programs.

**17. What is the portion of federal funds?**

- a. The federal American Rescue Plan Act of 2021 (ARPA) directed Coronavirus Fiscal Recovery Funds to both state and local governments as part of a larger effort to combat the effects of the COVID-19 pandemic, including public health and economic impacts. ARPA identifies investments in water, wastewater, and stormwater infrastructure as eligible uses of the fiscal recovery funds. In May 2022, the SC General Assembly allocated \$900M of these ARPA state fiscal recovery funds to the SC Rural Infrastructure Authority for distribution primarily through a competitive grant process. RIA created the SC Infrastructure Investment Program (SCIIP) to distribute these ARPA resources. RIA is using its state grant resources in support of the SCIIP program and eligible grantees may receive approval for SCIIP funds as well as RIA state grant funds. <https://ria.sc.gov/wp-content/uploads/2022/11/SCIIP-Project-Management-Procedures.pdf>

**18. Do the grants include all projects as a package and give the engineering staff the flexibility to re-[allocate] funds to different projects within the package?**

- a. No. Failure to use the funds for the designated project will result in forfeiture to SC Rural Infrastructure Authority.

**19. The City website contains the Davis & Floyd August 2022 report. However, missing from the website are the appendices from A through F which support the information in the report. All these appendices should be added to the City website.**

- a. This is now available. [Link to Appendices.](#)

**20. In your [Frequently Asked General Questions](#), Question #3, you indicate the peak daily observed tide exceeded the elevation of the lower portions on King Street on 93 [occasions] in a 442-day period in 2022 and 2023. You indicate the street elevation was [approximately] 4.5 feet NAVD-88. Please explain what this means as I do not think a street elevation is an approximate average.**

- a. The elevation of lower portions of King Street average approximately 4.5 feet NAVD-88. (NAVD = North American Vertical Datum, which is the standard used in vertical surveying). At this stage (elevation), water is expected to extend across the full width of the road in one or more locations.

**21. By how much did the water level exceed the street level on each of these [occasions].**

- a. In occasions when the tide exceeded 4.5 feet NAVD-88, and there was no rainfall, Federal Street and the tidal gate on the culvert kept the tide (pond stages) from reaching or exceeding elevations of King Street.

**22. You indicate the King Street elevation was exceeded 93 times by the peak daily tide. However, under Question #14 in the [General FAQ](#), you indicate in the collection period of 2022 and 2023 that King Street flooded at least three times adjacent to the pond. It is not indicated the depth of the flooding or its duration.**

- a. Example events with rainfall depth, peak tide elevation, maximum pond stage, and duration of flooding are provided with respective data as follows. Depth of flooding is dependent upon location of interest and corresponding ground elevation.

Date	Rainfall Affecting Pond Elevation [in]	Peak Tide Elevation [feet, NAVD 88]	Maximum Pond Stage [feet, NAVD88]	Duration Exceeding 4.5feet (NAVD88) [hrs:mins]
7/11/2022	NONE	5.19	5.03	1:25
9/9/2022	1.29	5.92	5.29	1:45
12/17/2023	2.78	6.01	4.98	3:25
3/9/2024	1.97	5.52	5.12	1:55

**23. Can one also draw the conclusion that in the other 90 [occasions] the peak tide exceeded the level of King Street that King Street did not flood?**

- a. Yes.

**24. If the tidal water is at the same level or exceeds the level of the pond outfall, does water back up and creates flooding in the streets.**

- a. Assuming the tidal gate is functioning properly, it closes at a predetermined elevation to prevent additional tidal waters from entering the tidal pond, and reduces the risk of dry weather (tidal only) flooding of streets and property upstream of Federal Street.

**25. This flooding is [exacerbated] during king tides.**

- a. Flooding magnitude and duration within the King Street drainage basin is currently heavily influenced by any tidal stages that approach the elevation of the street and not limited to those described as being king tides.

**26. Also, if at low tide during a heavy rainstorm the water flow into the pond exceeds 50 fps (feet per second), street flooding will occur when the capacity of the pond is exceeded. The purpose of the pump station in these high tide events is to increase the water outflow into the Beaufort River to reduce the back-up of water that is flooding the**

**streets. In the absence of a pump station, the duration of street flooding is extended until the elevation of the [tidal] water diminishes with the onset of a low tide. To size the pump station capacity what rainfall/rainstorm measures did you use?**

- a. The design storm for the King Street Drainage Improvements project was a 10-year, 24-hour storm SCS Type III design storm that produces a total of 6.42 inches of rain.

**27. Were these rainfall measures applied to just the 40-acre watershed supplying the king street system.**

- a. Yes.