8-Step Process for Floodplain Impacts

Project: Lowline Apartments

Federal Agency: U.S. Department of Housing and Urban Development (HUD)

Responsible Entity: City of Charleston

Date: December 9, 2024

Purpose

The City of Charleston, as the Responsible Entity on behalf of NHE, intends to carry out actions which may affect or be affected by floodplains. NHE is proposing to use United States Department of Housing and Urban Development's (HUD) Project-Based Vouchers (PBV) Program for eligible residents at the Lowline Apartments, a to-be-built multi-family, residential apartment development on approximately 2.37 acres of wooded and partially disturbed land. The Charleston County tax parcels that comprise the site include 460-04-04-118, -034, -035, 036, and a portion of the South Carolina Department of Transportation (SCDOT) right-of-way (ROW) under the U.S. Highway 17 overpass. The proposed project consists of a new five-story, multi-family apartment complex with parking. An additional single-story building containing an office, maintenance, a fitness center, and common space will also be constructed. Upgrades to the existing, adjacent City of Charleston Housing Authority housing complex include new fire hydrants, light poles for increased safety, parking upgrades, bicycle racks, and EV charging station infrastructure. Approximately 40 additional parking spaces are proposed under the SCDOT U.S. Highway 17 overpass to accommodate additional tenants. Other features of the development include underground stormwater detention and landscaped areas.

The site address is 678 King Street, Charleston, Charleston County, South Carolina 29403. Approximate center coordinates for the site are 32.7975°N Latitude and -79.9441°W Longitude.

In accordance with Executive Orders 11988 and 13690, The City of Charleston has determined that the project will be located on a site that includes a floodplain. The City of Charleston will be identifying and evaluating practicable alternatives to locate the action within the floodplain, as required by the Executive Orders, in accordance with HUD regulations at 24 CFR 55.20 Subpart C Procedures for Making Determinations on Floodplain Management and Protection of Wetlands.

This document pertains to proposed activities in a Federal Flood Risk Management Standard (FFRMS) floodplain as delineated on the latest Federal Emergency Management Agency (FEMA) floodplain maps, whether advisory, preliminary, or final.

Step 1 – Determine if the Proposed Action is in a FFRMS Floodplain

The proposed project site is depicted on FEMA's Flood Insurance Rate Map (FIRM) 45019C0512K, effective January 29, 2021. The FIRM identified the following on the proposed project site:

- The entire project area is located in a 500-year floodplain (Zone X). The nearest 100-year floodplain (Zone AE) with a Base Flood Elevation (BFE) of 10 feet above mean sea level (amsl) is located approximately 180 feet northwest of the site.

A copy of applicable sources from FEMA and Charleston County depicting the FFRMS floodplain are included as **Attachment 1**. Refer to **Attachment 2** for the proposed site plans.

Step 2 – Notify the public for early review of the proposal and involve the affected and interested public in the decision-making process

A public notice describing the project was published on August 21, 2024 on the City of Charleston's website (https://www.charleston-sc.gov/DocumentCenter/View/37161/Lowline-Housing---Early-Notice--Step-2-Draft-Version). The notice targeted local residents, including those in close proximity to the floodplain area. A copy of the published document is attached as **Attachment 3**. The required 15 calendar days were allowed for public comment. As required by regulation, the notice also included the name, proposed location and description of the activity, and the HUD official or responsible entity contact for information as well as the location and hours of the office at which a full description of the proposed action can be viewed. No comments were received from the public.

Step 3 – Search for Practicable Alternatives

The project consists of the Lowline Apartments, a multi-family, five-story, residential apartment development for local residents. Practical alternatives were considered, as well as various factors for each such as feasibility, technology, hazard reduction, mitigation costs, and environmental impacts. The evaluation of each is summarized below.

Charleston City/County Lands

Charleston County is one of eight coastal counties in South Carolina and abuts the Atlantic Ocean to the east. The Coastal Zone in South Carolina is a mostly tidally influenced area that is nearly level and dissected by many broad, shallow valleys with meandering stream channels; most of the valleys terminate in tidal estuaries along the coast; elevations range from sea level to about 25 feet.

According to the U.S. Census Bureau, Charleston County is comprised of approximately 1,358 square miles, of which 918 square miles is land and 440 square miles (32 percent) is water. The waterbody features in the county include large sounds (St. Helena, Wadmalaw, Hamlin, and Copahee), harbors (Charleston and Cape Romain) bays (Bulls and Sewee), large tidal rivers (South Edisto, North Edisto, Dawhoo, Wadmalaw, Stono, Ashley, Cooper, Wando, and South Santee), the Intracoastal Waterway, and numerous freshwater and tidal creek, marshes, inlets, and wetlands.

According to South Carolina Department of Environmental Services (SCDES) watershed studies, within the Ashley River watershed (hydrologic unit code 03050201-06), there are a total of 113 stream miles, 421 acres of lake waters, and 3,862 estuarine acres. More specifically, land use/land cover in the watershed includes: 46.71 percent urban land, 20.93 percent forested wetland, 15.71 percent forested land, 8.67 percent non-forested wetland, 5.47 percent open water, and 2.31 percent agricultural land. Approximately 50.78 percent of all land use in the watershed consists of a water-related environment (open water or wetland).

Due to its coastal location, much of Charleston County is low-lying and near the aforementioned waterbodies. Based on review SCDES watershed parameters for Charleston County and the Charleston County Comprehensive Five-Year Review (2024), approximately 68 percent of the county consists of floodplain. The buildable portions of the Special Flood Hazard Area (SFHA) cover 45 percent of the County as of the 2021 FEMA map update.

Per City of Charleston floodplain officials, approximately 28,000 residential and commercial parcels are located within a SFHA (Zones AE or VE). Within the City of Charleston, there are approximately 44,228 acres of SFHA, excluding river/harbor open water, with about 10,000 acres as open space, marsh, or protected areas that are unlikely to be developed. The SFHA covers roughly half of the City of Charleston's total area. The FFRMS floodplain, which includes the 500-years floodplain, covers most of the remaining areas of the City limits on the peninsula (**Attachment 4**).

Very few areas in the downtown Charleston are not located within a FFRMS floodplain. The current location of Lowline Apartments is located in a 500-year floodplain. As such, practicable off-site locations not located in the FFRMS floodplain are rare. Therefore, additional off-site considerations were eliminated as alternatives.

Alternative Sites Investigated

The following sites (vacant or developed land) in the Charleston area were evaluated, and the reasons for not pursuing or pursuing the proposed project at these locations have been provided:

Alternative Site Address	Size	Explanation for Project Infeasibility/Feasibility
20 Felix Street	0.1	Size is not large enough to meet development needs. Incompatible with City goals. Site located partially within 100-year floodplain with remainder in 500-year floodplain.
68-68½ Lee Street	~0.1	Size is not large enough to meet development needs. Historic structures on site. City was going to have difficulty demolishing abandoned structures due to historic nature. Site located entirely within 100-year floodplain.
190 Nassau Street	~0.1	Size is not large enough to meet development needs. Historic structures on site. City was going to have difficulty demolishing

Alternative Site Address	Size	Explanation for Project Infeasibility/Feasibility
		abandoned structures due to historic nature. Site located entirely within 100-year floodplain.
678 King Street	2.37	Preferred alternative site as it meets criteria for development with minimal environmental impacts. See below for additional details.

Refer to **Attachment 4** for an exhibit depicting the alternative sites assessed for the project.

Preferred Site – On-Site Alternatives

The preferred site is located on approximately 2.37 acres of partially wooded (~0.38 acre) and previously disturbed land and is addressed at 678 King Street in Charleston, Charleston County, South Carolina 29403. Selecting a site outside the FFRMS floodplain would not meet the goal of the proposed project. Selection of an alternative site would be cost-prohibitive as the availability of properties in the area that could accommodate the scale of the project are extremely limited.

The preferred site is located entirely within a FFRMS floodplain. At 2.37 acres, this overall site provided enough space to build the proposed development and accommodate for infrastructure such as access roads, utilities, stormwater control, parking, and landscaping. The site was already zoned for multi-family residential and did not need to incur the expense and process of re-zoning. The location provided suitable access to Charleston County/City residents and did not have unusual noise pollution or contamination concerns that could not be mitigated. The site of the proposed apartments is already owned by the City of Charleston and is adjacent to the existing apartments owned by the Housing Authority of the City of Charleston; thus, additional funds to purchase property are not needed. For these reasons, this site was chosen as the most practicable for the residential development.

The on-site alternatives traditionally focus on the site layout in terms of positioning the proposed project within the site in a manner that incorporates the considerations of accessibility, efficiency, and the site's environmental impacts. Each alternative considered by the applicant in the development of the proposed project was in coordination with the requirements, needs, and specifications of the site. As the entire site is within the FFRMS floodplain, alternatives were primarily focused on raising the elevation of the buildings above the FFRMS, providing proper stormwater control, and limiting impervious surfaces, where practicable, while still meeting the project purpose and need.

"No-Action" Alternative

Under the "No Action" Alternative, no impacts would occur to the FFRMS floodplain. The site is likely to remain undeveloped and will not be used to create value by generating tax revenue, creating affordable housing for local residents, and improving the character and neighborhood dynamics of the area, which are of greater benefit to the community than leaving the site vacant. The housing needs for residents identified will not be recognized. If construction (and vouchers) with federal funding does not occur, the site could be purchased and developed for market-value residential or commercial uses and similar FFRMS floodplain impacts could be proposed. The "No

Action" Alternative would not satisfy the project's purpose and need. Thus, the "No Action" Alternative is not feasible in relation to the desired objective of creating affordable housing options in the Charleston area.

Step 4 – Identify Adverse Impacts and Beneficial Values and Functions

Direct Adverse Impacts of Proposed Project

Direct impacts include clearing, grading and cut/fill activities for construction of a new five-story, multi-family apartment complex and an additional single-story building containing an office, maintenance, a fitness center, and common space. Approximately 40 additional parking spaces are proposed under the SCDOT U.S. Highway 17 overpass. Underground stormwater detention is proposed. Minor ground disturbances for new fire hydrants, light poles, parking upgrades, bicycle racks, and EV charging station infrastructure are also proposed.

These activities include clearing and grading (sedimentation) the building pads and the addition of impervious surfaces (pavements and structures). Reducing sedimentation with be alleviated with Best Management Practices (BMPs) such as silt fences and temporary/permanent seeding for stabilization. With the addition of impervious surfaces, stormwater runoff is expected to increase. The expected increase in runoff volume will be accounted for in the stormwater control measures improvements.

In summary, approximately 2.37 acres of FFMRS floodplain are located on the site with disturbed areas (the entire site) being directly impacted.

Indirect Adverse Impacts of Proposed Project

Indirect impacts are not anticipated as the entire site is in the FFRMS floodplain. The proposed project is not expected to increase flooding frequency, fragment the existing floodplain, or change local drainage patterns.

Cumulative Adverse Impacts

Cumulative effects to floodplains can be caused by the aggregate of past, present, and reasonably foreseeable future actions. Additional cumulative impacts from other actions are not anticipated.

Floodplain Beneficial Values and Functions

The beneficial values and functions associated with floodplain resources can be thought of in terms of environmental quality values such as fish and wildlife habitat and water quality. Floodplains can also be thought of in terms of socioeconomic values, providing either dollar savings (related to flood and storm damage protection) or financial profit (related to increased production from floodplain use). Floodplain resources can be divided into three major categories: 1) water resources; 2) biologic resources; and 3) societal resources. These resources are closely related and interwoven and are described below:

Water Resources	*Natural Flood & Erosion Control*	• Provide flood storage and conveyance • Reduce flood velocities • Reduce flood peaks • Reduce sedimentation
	Surface Water Quality Maintenance	• Filter nutrients and impurities from runoff • Process organic wastes • Moderate temperature of water
	Groundwater Recharge	• Promote infiltration and aquifer recharge • Reduce frequency and duration of low surface flows
Biological Resources	*Biological Productivity*	• Support high rate of plant growth • Maintain biodiversity • Maintain integrity of ecosystem
	Fish and Wildlife Habitats	• Provide breeding and feeding grounds • Create and enhance waterfowl habitat • Protect habitats for rare and endangered species
Societal Resources	*Harvest of Wild and Cultivated Products*	• Enhance agricultural lands • Provide sites for aquaculture • Restore and enhance forest lands
	Recreational Opportunities	• Provide areas for active and passive uses • Provide open space • Provide aesthetic pleasure
	Areas for Scientific Study and Outdoor Education	• Contain cultural resources (historic and archaeological sites • Provide opportunities for environmental and other studies

Adapted from FEMA's Natural and Beneficial Functions of Floodplains (https://www.fema.gov/media-library/assets/documents/2128?id=1546)

Impact Analysis

Natural Environment

The site includes a small, wooded section (~0.37 acre) consisting of mixed hardwoods while the remainder of the site consists of previously disturbed areas (parking lots, other pavements, areas under the overpass, etc.) No wetlands or streams are located on the site. Approximately 2.37 acres of land will be cleared, graded, or improved to support the project. Mature trees are potential suitable foraging and/or roosting habitat for the proposed endangered tricolored bat (*Perimyotis subflavus*) occurs within the site. To minimize potential impacts to this species, the applicant is prepared to conduct necessary tree clearing activities during the South Carolina Department Natural

Resources (SCDNR) recommended clearing moratorium (May 1-July 31). The proposed project is not expected to negatively affect water sources or significant amounts of fish/wildlife habitat.

Social Concerns

The proposed project is not expected to negatively affect historical, cultural, or recreational resources, create traffic concerns, or alter land use patterns in the area. The Lowline Apartments development is consistent with current land use and zoning requirements. The proposed project will not have negative effects on an Environmental Justice community. The project will benefit the area to address an affordable housing inventory shortage for local residents. The proposed activity will assist the City of Charleston in providing affordable housing options for the local community.

Economic and Engineering Aspects

Underground stormwater detention is common in the downtown Charleston area; thus, its cost and engineering were not deemed a challenge in consideration of developing the site. The proposed project is not expected to have negative effects regarding construction costs or other engineering aspects.

Legal Considerations

Legal agreements with the SCDOT will be implemented prior to construction to use and develop tax parcel 4600404034 and other areas under the overpass for parking purposes.

Climate Change

According to the Climate Mapping For Resilience and Adaptation Tool data for Charleston County, there is a relatively moderate risk (National Risk Index Ratings) of Extreme Heat, Wildfire, and Flooding, and a relatively low risk for Drought and Coastal Inundation. According to the FFRMS CISA Report (**Attachment 1**), the estimated sea level rise for 2050/2070 is estimated to be two feet corresponding to a FFRMS flood elevation of 12 feet amsl. The reviewed data does not present additional significant site concerns with the provided minimal impacts to the FFRMS floodplain and the mitigation proposed.

Summary of Impacts

The primary beneficial values and functions of floodplain on the proposed project area include natural flood and erosion control, surface water quality maintenance, and groundwater recharge. The proposed project is not expected to negatively impact the existing FFRMS floodplain, or its values and functions, due to the minor impacts and mitigation measures proposed.

Step 5 – Mitigate Adverse Impacts

To avoid and minimize adverse impacts to the FFRMS floodplain, the following mitigating conditions were considered:

- The proposed buildings are located in the FFRMS floodplain and face potential future flooding of ground floors. To mitigate the risk of flooding, the new residential building will be constructed at a finished floor elevation (FFE) of 13.8 feet amsl, approximately 3.8 feet above the closest BFE of 10 feet. The other non-residential building will be constructed at a FFE of 12.5 feet amsl, approximately 2.5 feet above the closest BFE of 10 feet. By elevating the new buildings above the BFE, proper mitigation for flood risk was taken. No fill will be used to elevate the structures.
- Use flood-resistant building materials resistant to flood damage capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage.
- Installation of openings at the base of structures to allow for automatic entry/exit of floodwaters.
- Appropriate sediment and erosion control devices (BMPs) will be used during construction and remain in place until site has become stabilized. Appropriate perimeter controls at the construction site will be established to retain or filter concentration runoff before it leaves the site to eliminate sedimentation into nearby storm drains and/or jurisdictional waters. Regular inspection of erosion control measures will be conducted and reassessed after storms during construction.
- The proposed underground stormwater control measures (Cultec) will improve volume capacity and adequately accommodate new stormwater runoff (**Attachment 5**). The stormwater control measures will be maintained according to their design specifications. The stormwater control measures proposed will assist with reducing potential flooding on the site and in the immediate area. Stormwater control measures' primary purpose is flood control, and they are designed to intercept stormwater runoff (precipitation that runs off buildings, roads, parking lots, and sidewalks), but they also provide other services like a place for sediment to settle out of the water column and pollutant removal. Overall, stormwater control measures help mitigate the impacts of urban stormwater runoff while protecting natural waterways from nutrient loading, erosion, sedimentation, and algal blooms. The stormwater control measures provide stormwater retention functions replacing the natural function of the on-site floodplain to be impacted.
- Green infrastructure mitigation measures such as pervious pavements (gravel) in the parking lots are proposed. Native plants will be used in landscaping to filter out pollutants. Additional green infrastructure such as bioswales were considered, but not incorporated into the design plans due to lack of space, costs, and feasibility.
- The proposed project activities will be completed in accordance with all applicable federal, state, and local laws, regulations, and permit requirements and conditions. Permits required for this proposed project shall be obtained before commencing work and appended to the environmental review record when received from the permitting agencies. Thus, there will be minimal to no effect on living resources such as natural systems such as flora and fauna, timber, and food and fiber resources.

Step 6 – Re-evaluate Alternatives

Based on a review of the practical alternatives, the Preferred Alternative is selected as the final agency action; it was deemed practicable as it meets the goals of the proposed project and will have minimal impacts to the FFRMS floodplain with the mitigating activities proposed.

Off-site alternatives, including three sites in the City of Charleston area, were not practicable due to size, the likelihood of additional floodplain impacts (100-year), incompatibility with City goals, and/or historic properties and were eliminated as alternatives. The No Action Alternative was not considered practicable as it did not accomplish the goals of the proposed project and thus was eliminated as an alternative. This determination was based on evaluation of hazards, mitigation, and alternatives and discussed in Steps 1-5.

After a thorough evaluation of the proposed Lowline Apartments site, there is no better alternative location for the project. The site for Lowline Apartments is ideal for the intended use for the following reasons:

- The site is already owned by the City of Charleston and adjacent to similar multi-family housing; thus, additional funds will not be needed to purchase a site.
- The site has adequate access to water, sewer, and electric utilities infrastructure.
- The site has been successfully rezoned for the intended use, without community opposition.
- There are no significant environmental hazards or impacts at the site that cannot be mitigated.
- The site is located in close proximity to retail, services, education, healthcare, places of worship, parks, schools, employment, and public transportation.
- The site has no historical or cultural significance as confirmed by SHPO and THPO.
- The site will not have a negative effect on an Environmental Justice community and will have a positive effect assisting the City of Charleston in providing affordable housing options for the local community.

Relocation of the proposed project to another site would be prohibitive as other properties in the area that can accommodate the development are limited by several factors as discussed in Step 3. Construction of the proposed action will not have a significant impact on the FFRMS floodplain.

Step 7 – Final Public Notice

A final public notice describing the City of Charleston's Finding of No Significant Impact (FONSI) determination that there was no practicable alternative for the construction of the Lowline Apartments development was published on December XXX, 2024 on the City of Charleston's website (https://www.charleston-sc.gov/DocumentCenter/View/37161/Lowline-Housing---Early-Notice--Step-2-Draft-Version). The final notice detailed the reasons why the proposed action must be located in FFRMS floodplain, a list of alternatives considered, and mitigation measures taken to minimize the adverse impacts and preserve the natural and beneficial floodplain values. The required 15 calendar days were allowed for public comment. No comments were received from the public. A copy of the published document is attached as **Attachment 6**.

Step 8 – Implement Proposed Action with Appropriate Mitigation

The proposed action is estimated to be conducted in 2025. The City of Charleston will ensure that this plan, as modified and described above, is executed and necessary language will be included in all agreements with participating parties. The City of Charleston will also take an active role in monitoring the construction process to ensure no unnecessary impacts occur or unnecessary risks are taken. The following mitigation activities are to be completed:

- Elevate the FFEs of the structures above the FFRMS floodplain and obtain elevation certificates.
- Use flood-resistant building materials resistant to flood damage capable of withstanding direct and prolonged contact with floodwaters without sustaining significant damage.
- Install openings at the base of structures to allow for automatic entry/exit of floodwaters.
- Purchase and maintain flood insurance for the new buildings.
- Install and maintain appropriate sediment and erosion control devices (BMPs) during and after construction.
- Install, maintain, and inspect stormwater control measures.
- Annually renew and carry flood insurance on existing buildings and the new building to maintain proper protection against any unforeseen flood-related expenses.
- Install green infrastructure measures such as previous pavements in parking areas and use native plants will be used in landscaping.
- Notify future tenants that the site is located in a FFRMS floodplain, including locations of evacuation routes, emergency notification resources, and the option to obtain flood insurance.
- Obtain permits for land disturbance, state/local building code approvals, and other authorizations prior to construction activities.
- The General Contractor will be responsible for oversight of construction activities including the adherence to construction phasing schedule, including initial clearing, grading, monitoring, and oversight of all construction matters.

Attachment 1 – Floodplain Exhibits (FEMA FIRM, County, FFRMS Report)

National Flood Hazard Layer FIRMette

FEMA

79°56'58"W 32°48'6"N

79°56'21"W 32°47'36"N

0 250 500 1,000 1,500 2,000 Feet

1:6,000

Basemap Imagery Source: USGS National Map 2023

Legend

SEE FIS REPORT FOR DETAILED LEGEND AND INDEX MAP FOR FIRM PANEL LAYOUT

SPECIAL FLOOD HAZARD AREAS
- Without Base Flood Elevation (BFE) *Zone A, V, A99*
- With BFE or Depth *Zone AE, AO, AH, VE, AR*
- Regulatory Floodway

OTHER AREAS OF FLOOD HAZARD
- 0.2% Annual Chance Flood Hazard, Areas of 1% annual chance flood with average depth less than one foot or with drainage areas of less than one square mile *Zone X*
- Future Conditions 1% Annual Chance Flood Hazard *Zone X*
- Area with Reduced Flood Risk due to Levee. See Notes. *Zone X*
- Area with Flood Risk due to Levee *Zone D*

OTHER AREAS
- NO SCREEN Area of Minimal Flood Hazard *Zone X*
- Effective LOMRs
- Area of Undetermined Flood Hazard *Zone D*

GENERAL STRUCTURES
- Channel, Culvert, or Storm Sewer
- Levee, Dike, or Floodwall

OTHER FEATURES
- 20.2 Cross Sections with 1% Annual Chance
- 17.5 Water Surface Elevation
- Coastal Transect
- Base Flood Elevation Line (BFE)
- Limit of Study
- Jurisdiction Boundary
- Coastal Transect Baseline
- Profile Baseline
- Hydrographic Feature

MAP PANELS
- Digital Data Available
- No Digital Data Available
- Unmapped

N

The pin displayed on the map is an approximate point selected by the user and does not represent an authoritative property location.

This map complies with FEMA's standards for the use of digital flood maps if it is not void as described below. The basemap shown complies with FEMA's basemap accuracy standards

The flood hazard information is derived directly from the authoritative NFHL web services provided by FEMA. This map was exported on 5/24/2024 at 10:16 AM and does not reflect changes or amendments subsequent to this date and time. The NFHL and effective information may change or become superseded by new data over time.

This map image is void if the one or more of the following map elements do not appear: basemap imagery, flood zone labels, legend, scale bar, map creation date, community identifiers, FIRM panel number, and FIRM effective date. Map images for unmapped and unmodernized areas cannot be used for regulatory purposes.

FEMA Flood Maps

Charleston County GIS
Charleston County GIS

Summary

FEMA Flood Maps effective January 29, 2021

View Full Details

Details

Application
Web Mapping Application

December 2, 2022
Date Updated

June 26, 2019
Published Date

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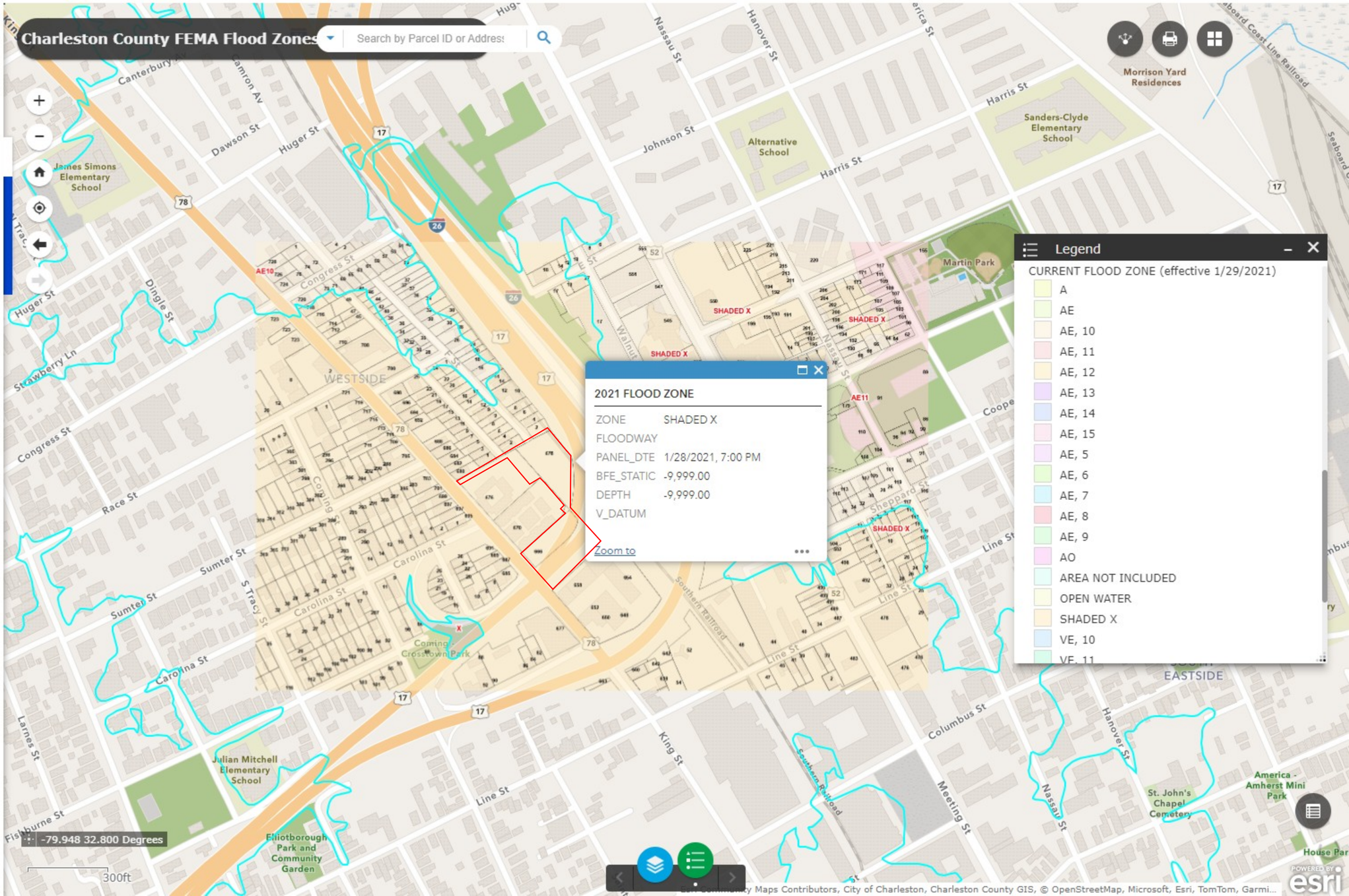
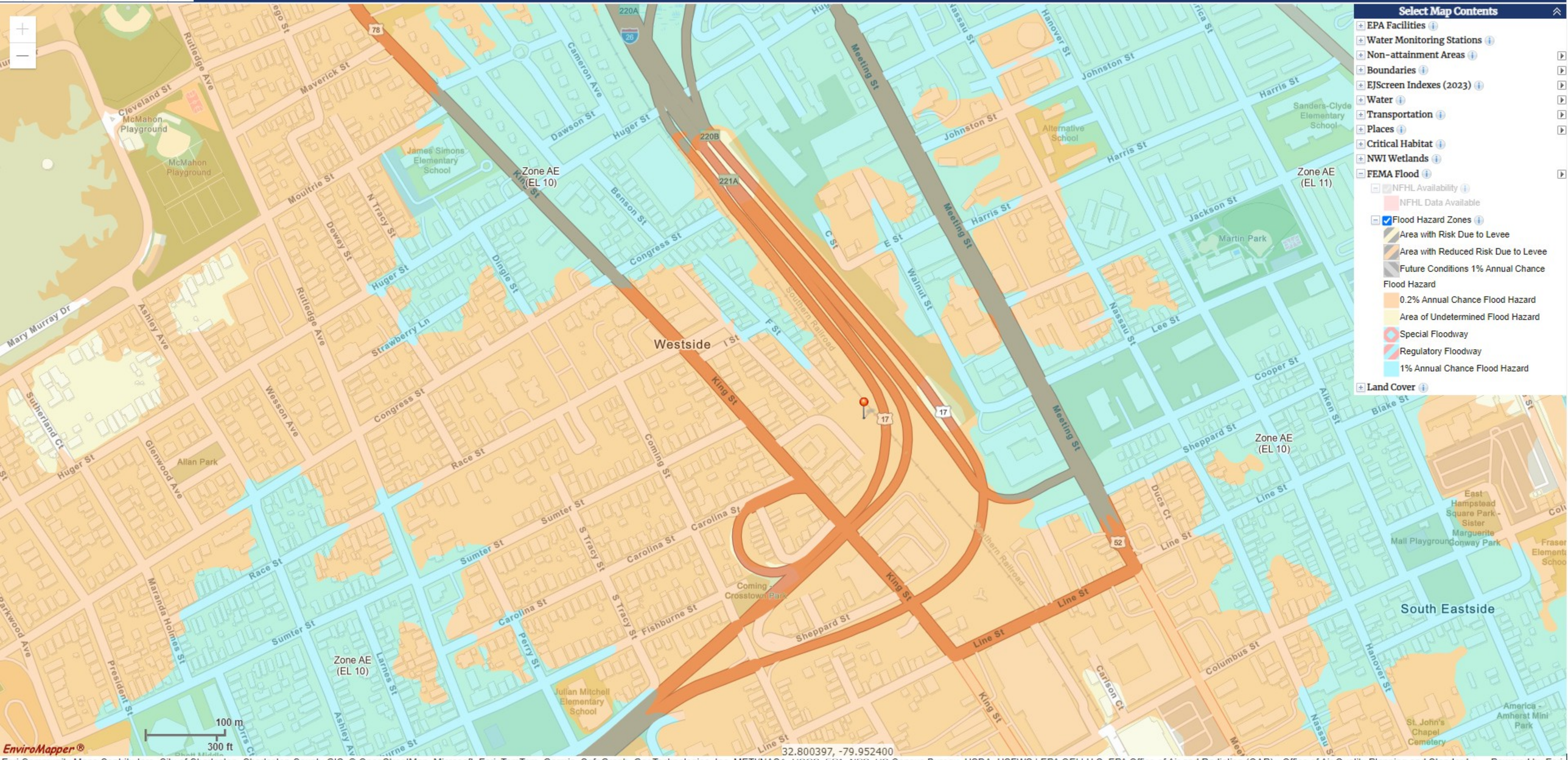


Find address or place | Basemap | Imagery | Draw | Erase | Save Session | Tools | More Data



FFRMS CISA Report

Created: 7/24/2024

Summary

Based on the user-defined location, service life (46 Years), and non-critical designation, the proposed action is in the FFRMS floodplain.

The 2050 estimated sea-level rise amount is 2 ft, corresponding to a FFRMS flood elevation of 12 FT NAVD88.

The 2070 estimated sea-level rise amount is 2 ft, corresponding to a FFRMS flood elevation of 12 FT NAVD88.

The North American Vertical Datum of 1988 (NAVD88) is the datum used on FEMA Digital Flood Insurance Rate Maps (DFIRMs) for Base Flood Elevations (BFEs).

Projects located in the FFRMS floodplain should be designed consistent with the applicable policies and directives of the agency taking or approving the action.

Proposed Action Details

Location centroid (Latitude, Longitude): 32°47'50.28"N 79°56'38.4"W

Service criticality: Non-critical Service Life: Through 2070

Consult with the applicable agency to identify any agency-specific policies, guidance, protocols, or direction on the critical action determination. The services of a professional engineer, architect, or other licensed design professional are recommended for designing critical actions or assets with long intended service life, and for other situations where risk tolerance is low because of unique characteristics of the action.

Considerations of CISA approach at this location

No additional considerations at this location.

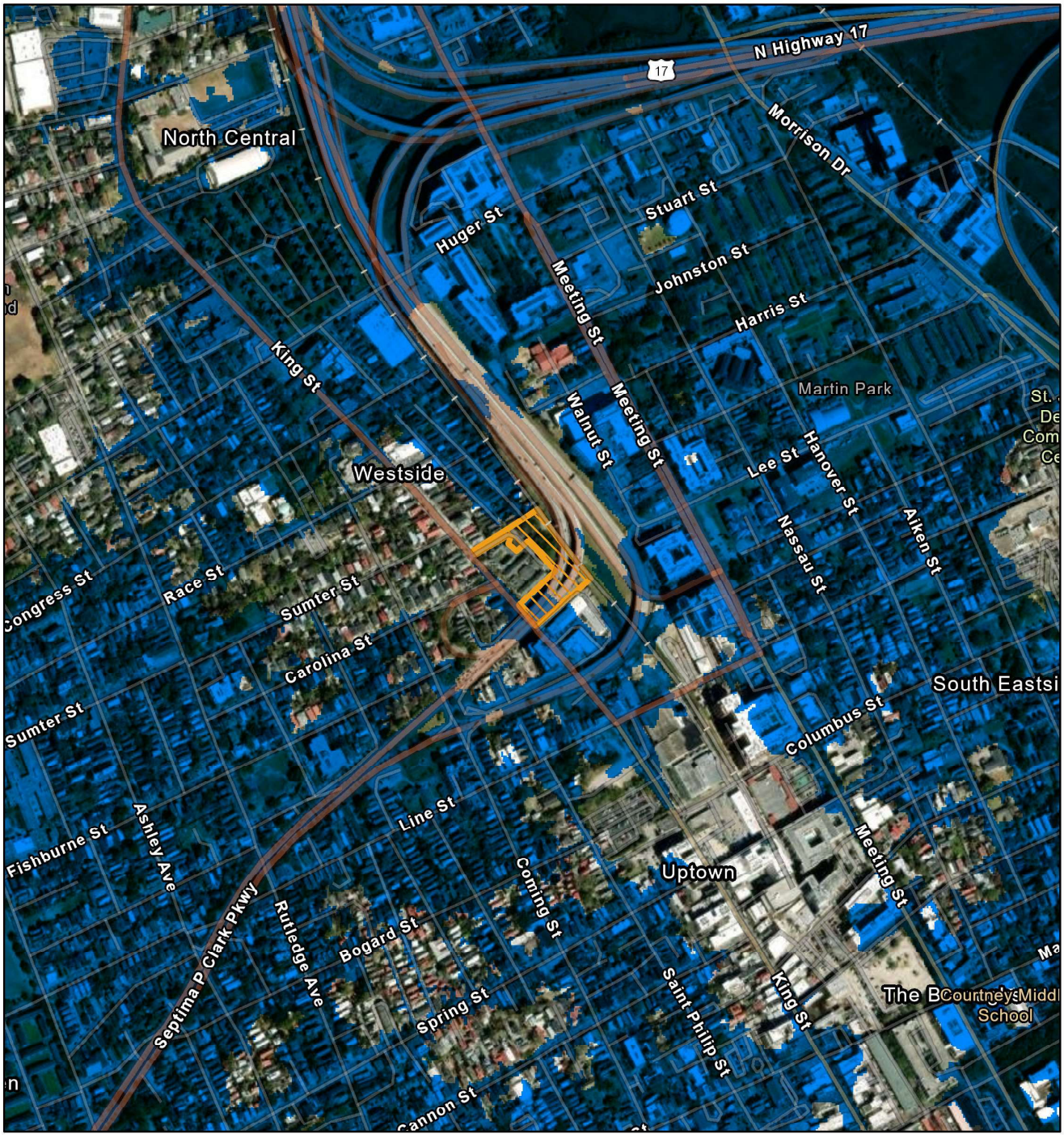
Next Steps

This is the Step 1 of the 8-step decision-making process required in section 2(a) of Executive Order 11988, Floodplain Management (Determine if the proposed action within the FFRMS floodplain). Follow the remainder of the 8-step process outlined in the Implementation Guidelines (2015), page 4, including Step 5 which include minimizing harm and restoring and preserving natural and beneficial values. (Please refer to the Nature Based Solutions section). A licensed design professional should be contacted for the design or engineering of the action. If an action is in the FFRMS floodplain and its location is the only practicable alternative, then you may need the services of a professional engineer, architect, or other licensed design professional to determine how to minimize the impacts of flood and make the action resilient (e.g., elevation, flood-proofing and/or nature-based solutions), especially when dealing with critical actions.

Assistance

To contact the FEMA Regional Floodplain Management & Insurance FFRMS Point of Contact for assistance, e-mail FEMA at FEMA-FFRMS-SUPPORT-REQUEST@fema.dhs.gov

2050 Project Location



July 24, 2024

Project Location

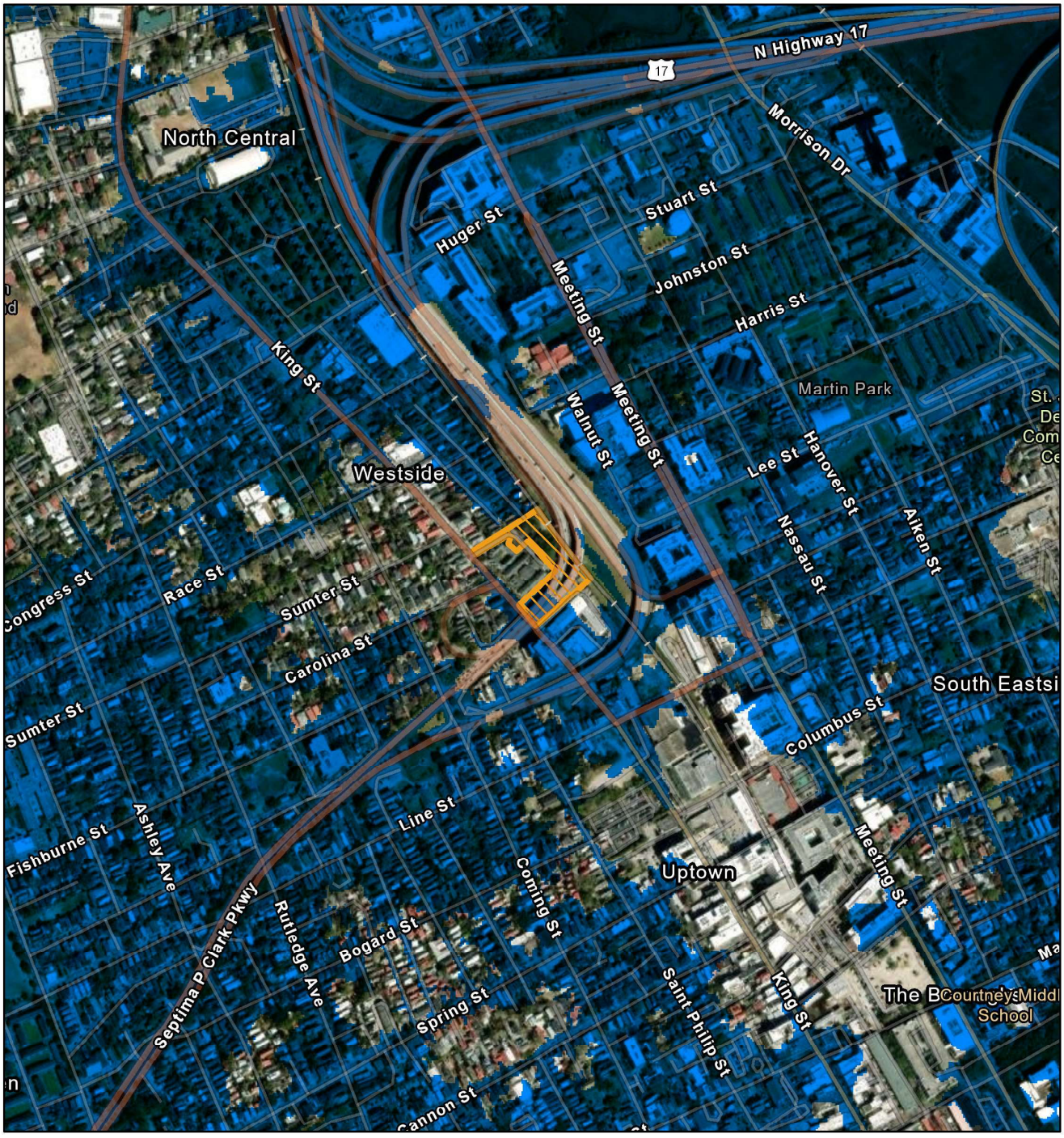
FFRMS Floodplain

1:10,185

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

2070 Project Location



July 24, 2024

Project Location

FFRMS Floodplain

1:10,185

0 0.05 0.1 0.2 mi

0 0.1 0.2 0.4 km

Attachment 2 – Site Plans

GRADING, DRAINAGE, & UTILITY NOTES:

1) NEW STORM DRAINAGE AND SANITARY SEWER SHALL BE LAID UPGRADE FROM LOW POINT IN SYSTEM AFTER CONFIRMATION OF EXISTING INVERT ELEVATIONS.

2) CONTRACTOR IS RESPONSIBLE FOR SETTING ALL NEW AND EXISTING SSMH TOPS, INLET TOPS, FIRE HYDRANTS, VALVES, CLEAN OUTES, & ETC TO FINISHED GRADE. MINOR ADJUSTMENTS MAY BE NECESSARY.

3) ALL DISTURBED AREAS SHALL BE TEMPORARILY STABILIZED IN ACCORDANCE TO GRASSING & SEEDING SCHEDULE SEE SHEET C500.

4) CONTRACTOR SHALL FIELD VERIFY EXISTING CONDITIONS PRIOR TO BEGINNING WORK.

5) THE CONTRACTOR WILL BE RESPONSIBLE FOR ALL SWPPP INSPECTIONS, REPORTS, AS-BUILT DRAWINGS, MEETINGS, CERTIFICATIONS, AND NOTICE OF TERMINATION AS REQUIRED BY THE APPROVED NPDES PERMIT FOR STORMWATER DISCHARGE FROM LARGE AND SMALL CONSTRUCTION ACTIVITIES SCR100000 (2012 CGP) AND AS REQUIRED BY TOWN OF SUMMERVILLE MS4.

6) CONSIDERABLE EFFORT HAS BEEN MADE TO DETERMINE THE LOCATION OF UNDERGROUND UTILITIES. SOME LOCATIONS ARE ACTUAL FIELD MEASUREMENTS AND SOME ARE TAKEN FROM UTILITY RECORDS OR LOCATIONS MARKED IN THE FIELD BY THE VARIOUS UTILITY COMPANIES. THIS SURVEY DOES NOT WARRANT THAT UTILITIES ARE SHOWN ACCURATELY NOR THAT ALL UTILITIES ARE SHOWN. CALL PALMETTO UTILITY PROTECTION SERVICE (P.U.P.S.) AT 811 A MINIMUM OF 3 WORKING DAYS BEFORE DIGGING.

7) LITTER, CONSTRUCTION DEBRIS, CONCRETE WASHOUT, OILS, FUELS AND BUILDING PRODUCTS EXPOSED TO STORMWATER SHALL BE PREVENTED FROM BECOMING A POLLUTANT SOURCE IN STORMWATER DISCHARGES.

8) CONTRACTOR WILL BE RESPONSIBLE FOR FINAL AS-BUILTS & CERTIFICATIONS IN ACCORDANCE TO SUMMERVILLE CPW & TOWN OF SUMMERVILLE MS4 SPECS.

9) NEW UTILITY ENCROACHMENTS OR HORIZONTAL RELOCATIONS OF EXISTING LINES WILL REQUIRE SEPARATE ENCROACHMENT PERMITS FROM THE UTILITY COMPANY(IES).

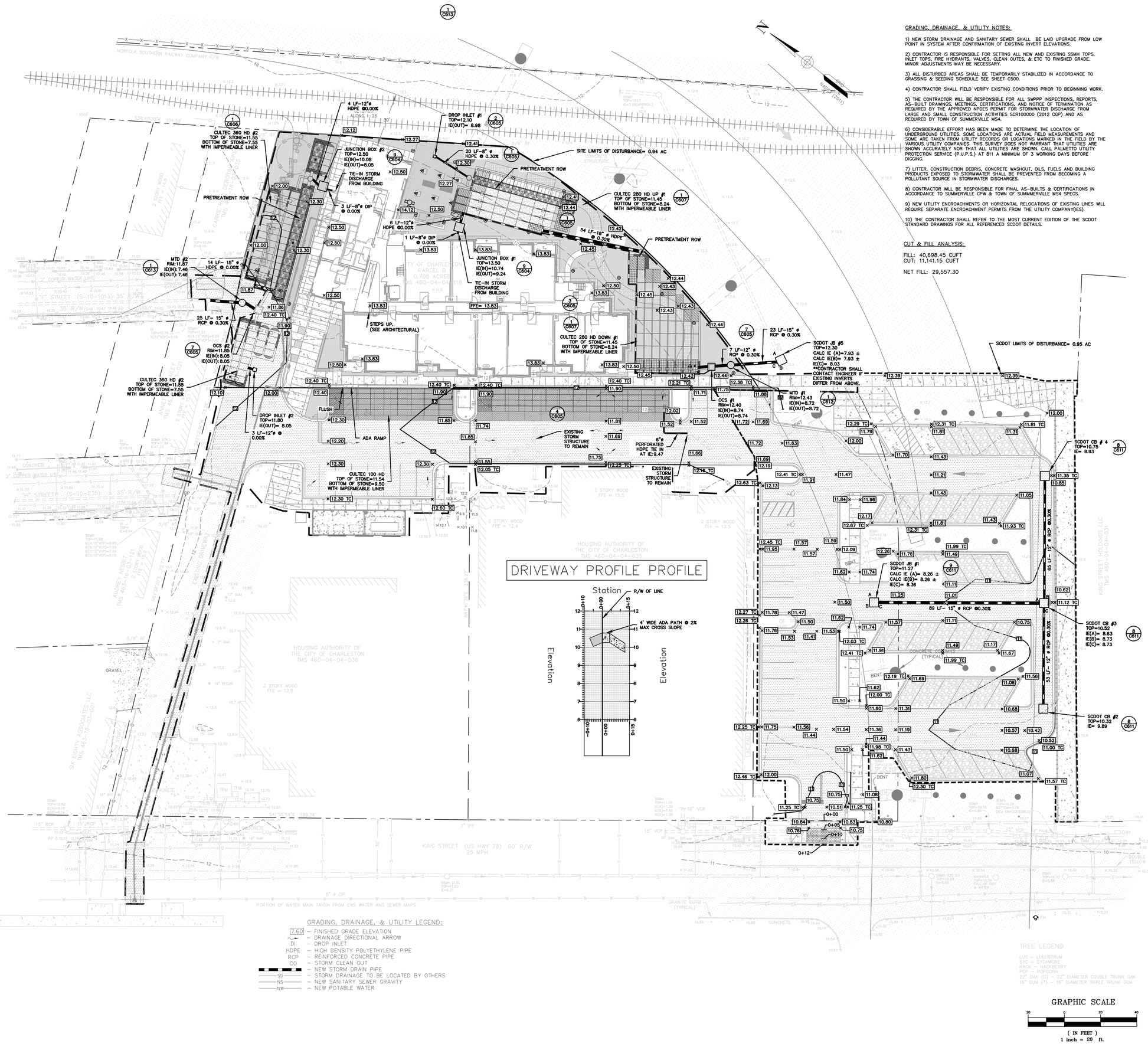
10) THE CONTRACTOR SHALL REFER TO THE MOST CURRENT EDITION OF THE SCDOT STANDARD DRAWINGS FOR ALL REFERENCED SCDOT DETAILS.

CUT & FILL ANALYSIS:

FILL: 40,698.45 CUFT
CUT: 11,141.15 CUFT

NET FILL: 29,557.30

DRIVEWAY PROFILE PROFILE



GRADING, DRAINAGE, & UTILITY LEGEND:

7.60	– FINISHED GRADE ELEVATION
	– DRAINAGE DIRECTIONAL ARROW
DI	– DROP INLET
HDPE	– HIGH DENSITY POLYETHYLENE PIPE
RCP	– REINFORCED CONCRETE PIPE
CO	– STORM CLEAN OUT
	– NEW STORM DRAIN PIPE
SD	– STORM DRAINAGE TO BE LOCATED BY OTHERS
NS	– NEW SANITARY SEWER GRAVITY
NW	– NEW POTABLE WATER

TREE LEGEND

LUG – LUGUSTRUM
SYC – SYCAMORE
HACK – HACKBERRY
POP – POPCORN
22" OAK (D) – 22" DIAMETER DOUBLE TRUNK OAK
16" GUM (T) – 16" DIAMETER TRIPLE TRUNK GUM

GRAPHIC SCALE

20 0 20 40
(IN FEET)
1 inch = 20 ft.

CONSIDERABLE EFFORT HAS BEEN MADE TO DETERMINE THE LOCATION OF UNDERGROUND UTILITIES. SOME LOCATIONS ARE ACTUAL FIELD MEASUREMENTS AND SOME ARE TAKEN FROM UTILITY RECORDS. THIS PLAN DOES NOT WARRANT THAT UTILITIES ARE SHOWN ACCURATELY NOR THAT ALL UTILITIES ARE SHOWN. THE CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING THE EXACT LOCATION OF ALL UTILITIES PRIOR TO BEGINNING DIGGING OPERATIONS. CALL PALMETTO UTILITIES PROTECTION SERVICE AT 1-888-721-7877 A MINIMUM OF 3 WORKING DAYS BEFORE DIGGING. ANY UTILITIES UTILITIES DAMAGED OR DISTURBED DURING CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION AT THE CONTRACTOR'S EXPENSE. ADDITIONALLY, THE CONTRACTOR SHALL CONFIRM THE CONNECTION POINTS OF NEW UTILITIES TO EXISTING UTILITIES PRIOR TO BEGINNING NEW CONSTRUCTION.

FORSBERG ENGINEERING AND SURVEYING, INC.
1597 SAVANNAH HIGHWAY SUITE B
P.O. BOX 30575
CHARLESTON, SOUTH CAROLINA 29417
(843) 571-2300 FAX (843) 571-2309
CIVIL ENGINEERING, SURVEYING AND LAND PLANNING

SOUTH CAROLINA CERTIFICATE OF AUTHORIZATION
FORSBERG ENGINEERING & SURVEYING, INC
No. C00343

GRADING & DRAINAGE PLAN

TMS # 460-04-04-034 & 118, PORTIONS OF ADJACENT PARCELS, INCLUDING KING STREET, "I" STREET, & "H" STREET
CITY OF CHARLESTON, CHARLESTON COUNTY, SOUTH CAROLINA

SOUTH CAROLINA PROFESSIONAL ENGINEER
GADSDEN A LINTON III
NOT FOR CONSTRUCTION

GADSDEN A LINTON III

DATE	AUGUST 15, 2024
DRAWN/CHECKED	AEF/TL
LAST REVISED	~~~
APPROVED	TL
SCALE	1" = 20'
PROJECT NO.	4880-5
SHEET NUMBER	C401

Attachment 3 – Initial Public Notice

EARLY NOTICE AND PUBLIC REVIEW OF A PROPOSED ACTIVITY IN A 500-Year Floodplain

To: All Interested Federal, State, Local Government Agencies, Groups, and Individuals

This is to give notice that the City of Charleston has determined that the following proposed action under U.S. Department of Housing and Urban Development's (HUD) Project-Based Vouchers (PBV) Program is located in 500-year Floodplain and a Federal Flood Risk Management Standard (FFRMS) floodplain, and the City of Charleston will be identifying and evaluating practicable alternatives to locating the action in the floodplain and the potential impacts, the floodplain, from the proposed action, as required by Executive Orders 11988 (floodplains) and 13690 (floodplains), in accordance with HUD regulations at 24 CFR 55.20 Subpart C Procedures for Making Determinations on Floodplain Management and Protection of Wetlands. The City of Charleston has received an application from NHE to use PBVs from HUD to construct the Lowline Apartments (hereinafter, the "Proposed Activity").

The Proposed Activity entails construction of a new multi-family, affordable housing project consisting of one, five-story building containing 55 units on an approximate 2.37-acre site. Thirteen (13) units will receive PBVs. Features of the development will include entrance drives, parking areas, underground stormwater detention, a multi-purpose community room, an office, and exercise/fitness room, common space, and landscaping. The residential development is needed to address an affordable housing inventory shortage for the Charleston area. The Proposed Activity will assist the City of Charleston in providing affordable housing options for the local community.

The activity will impact approximately 2.37 acres of FFRMS floodplain (500-year) as the site is located entirely within the 500-year floodplain. These impacts will include earth-moving activities to construct the building, stormwater detention system, parking areas, and landscaping. Clearing of vegetation and grading for silt fencing are also planned within the limits of disturbance. The floodplain in these impact areas provides limited natural flood and erosion control, minimal groundwater recharge, and minimal habitat for flora and fauna. This area is also assessed as having minimal educational, recreational, scientific, historic, or cultural value. The project, Lowline Apartments, is located at 678 King Street, Charleston, Charleston County, SC.

There are three primary purposes for this notice. First, people who may be affected by activities in floodplains and those who have an interest in the protection of the natural environment should be given an opportunity to express their concerns and provide information about these areas. Commenters are encouraged to offer alternative sites outside of the floodplain, alternative methods to serve the same project purpose, and methods to minimize and mitigate impacts. Second, an adequate public notice program can be an important public educational tool. The dissemination of information and request for public comment about floodplains can facilitate and enhance federal efforts to reduce the risks and impacts associated with the occupancy and modification of these special areas. Third, as a matter of fairness, when the federal government determines it will participate in actions taking place in floodplains, it must inform those who may be put at greater or continued risk.

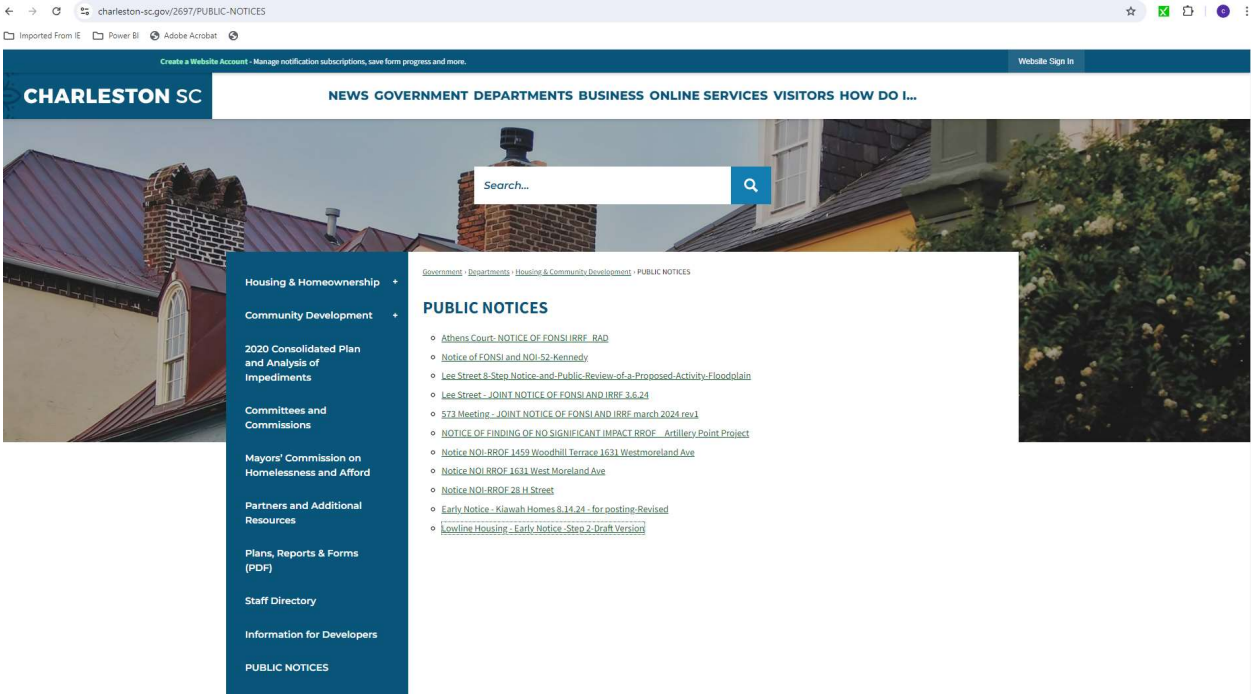
Written comments must be received by City of Charleston, Department of Housing and Community Development at the following address on or before September 6, 2024, at City of Charleston, Department of Housing and Community Development, 75 Calhoun Street, Suite 3200, Charleston, SC, 29401, and 843.724.3766, Attention: Geona Shaw Johnson, Director. A full description of the project may be reviewed from 8am to 5pm, Monday through Friday at same as stated above.

Comments may also be submitted via email: hillk@charleston-sc.gov. Attn: Kat Hill, CD Coordinator, City of Charleston, Department of Housing and Community Development.

August 21, 2024

August 21, 2024

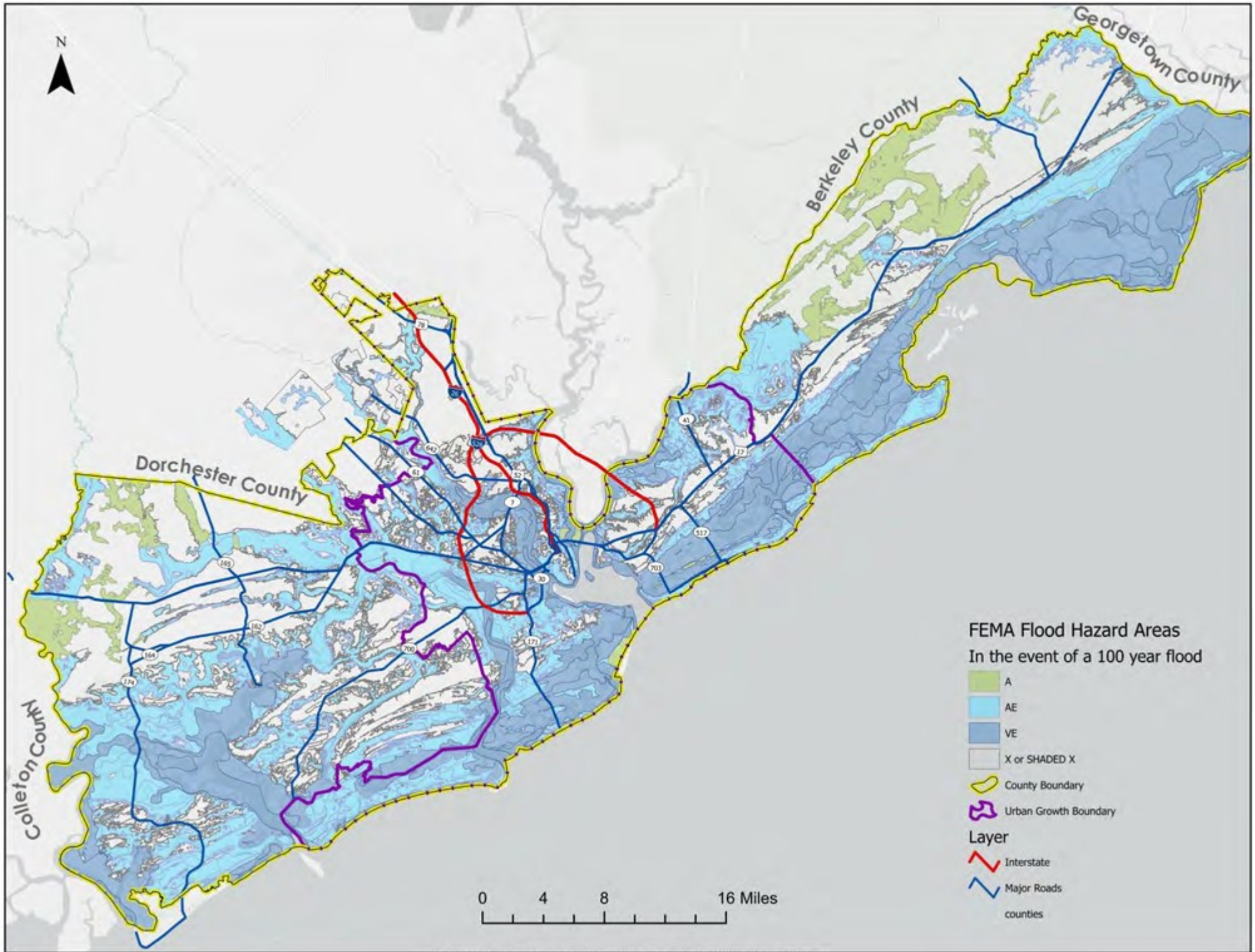
https://www.charleston-sc.gov/DocumentCenter/View/37161/Lowline-Housing---Early-Notice--Step-2-Draft-Version



Attachment 4 – Alternatives Sites Considered


Alternative Sites
Lowline Housing
Legend
Alternative Site
Lowline Housing Phase I ESA Boundary
190 Nassau Street
68 68½ Lee Street
678 King Street (Preferred Alternative)
20 Felix Street
NORTH CENTRAL
CANNONBOROUGH ELLIOTBOROUGH
WRAGGBOROUGH
Palmetto Brewing Co
Taco Boy Charleston
Moxy Charleston Downtown
Huriyali Gardens
Leon's
Hannibal's Kitchen
Mercantile & Mash
Burke High School
Daps Breakfast & Imbibe
Hyatt House Charleston/ Historic District
Charleston Development Academy
The Charleston Museum
Childrens Museum of the Lowcountry
Meeting St
King St
Lee St
Jackson St
Johnson St
Harris St
Stuart St
Huger St
Congress St
Sumter St
Carolina St
Fishburne St
Rutledge Ave
Race St
Line St
Spring St
Morris St
Ann St
Mary St
South St
Amherst St
Reid St
Columbus St
Aiken St
America St
Nassau St
Percy St
Conning St
Septima P. Clark Pkwy
Ashley Ave
Smith St
Drake St
E Bay St
Alexander
Google Earth
2000 ft
N

Map 3.11.4 Charleston County FEMA Flood Hazard Areas

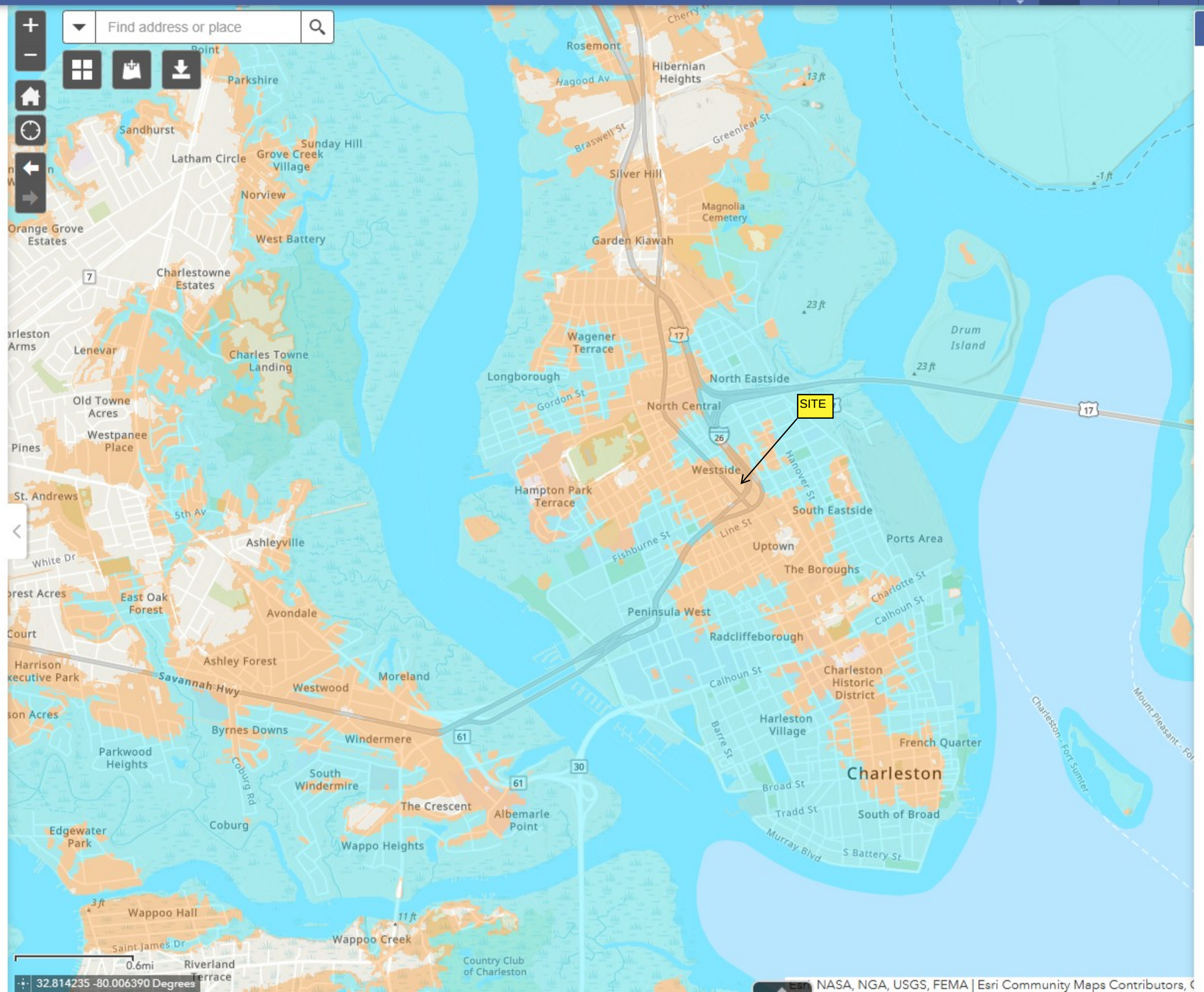


Charleston County GIS, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, EPA, NPS

Map dated January 27, 2023

Layers

- [ ] Watershed Coordinator Contacts
- [ ] River Stages 96 hour Forecast
- [x] Flood Hazard Zones - (Zoom in to view)
- [ ] County Websites
- [ ] Nat'l Watershed Boundaries
- [ ] SCDHEC Regulated Permits
- [ ] Public Water Supply
- [ ] Water Quality Monitoring
- [ ] Adopt-a-Stream Volunteer Monitoring
- [ ] Water Quality Assessments
- [ ] Nonpoint Source Program
- [ ] Water Advisories
- [ ] MS4 - For reference only
- [ ] NERR and OCRM Critical Area
- [ ] NHD Labeled Streams - Zoom in to view
- [ ] Water Classifications - PROVISIONAL - Zoom in to view
- [ ] Ecoregions
- [ ] National Land Cover 2019



Legend

Flood Hazard Zones - (Zoom in to view)

- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area with Risk Due to Levee

Attachment 5 – Underground Stormwater Details

CULTEC Recharger® 360HD Stormwater Chamber

The Recharger® 360HD is a 36" (914 mm) tall, high capacity chamber. Typically when using this model, fewer chambers are required resulting in less labor and a smaller installation area. The Recharger® 360HD has the side portal internal manifold feature. HVLV® FC-48 Feed Connectors are inserted into the side portals to create the internal manifold.

Recharger 360HD Chamber

Recharger 360HD End Cap

Recharger 360HD Chamber	
Size (L x W x H)	4.17' x 60" x 36"
	1.27 m x 1525 mm x 914 mm
Installed Length	3.67'
	1.12 m
Length Adjustment per Row - with two end caps installed	2.5'
	0.76 m
Length Adjustment per Row - when not using end caps	0.5'
	0.15 m
Chamber Storage	10.00 ft^3/ft
	0.929 m^3/m
	36.66 ft^3/unit
	1.038 m^3/unit
Min. Installed Storage	15.199 ft^3/ft
	1.412 m^3/m
	55.73 ft^3/unit
	1.58 m^3/unit
Min. Area Required	21.08 ft^2
	1.96 m^2
Chamber Weight	57.0 lbs
	25.85 kg
Shipping	20 chambers/skid
	1,265 lbs/skid
	11 skids/48' flatbed
Min. Center-to-Center Spacing	5.75'
	1.75 m
Max. Allowable Cover	12'
	3.66 m
Max. Allowable O.D. in Side Portal	10" HDPE, 12" PVC
	250 mm HDPE, 300 mm PVC
Compatible Feed Connector	HVLV FC-48 Feed Connector

Calculations are based on installed chamber length.
All above values are nominal.
Min. installed storage includes 6" (152 mm) stone base, 6" (152 mm) stone above crown of chamber and typical stone surround at 5.75 (1.75 m) center-to-center spacing.

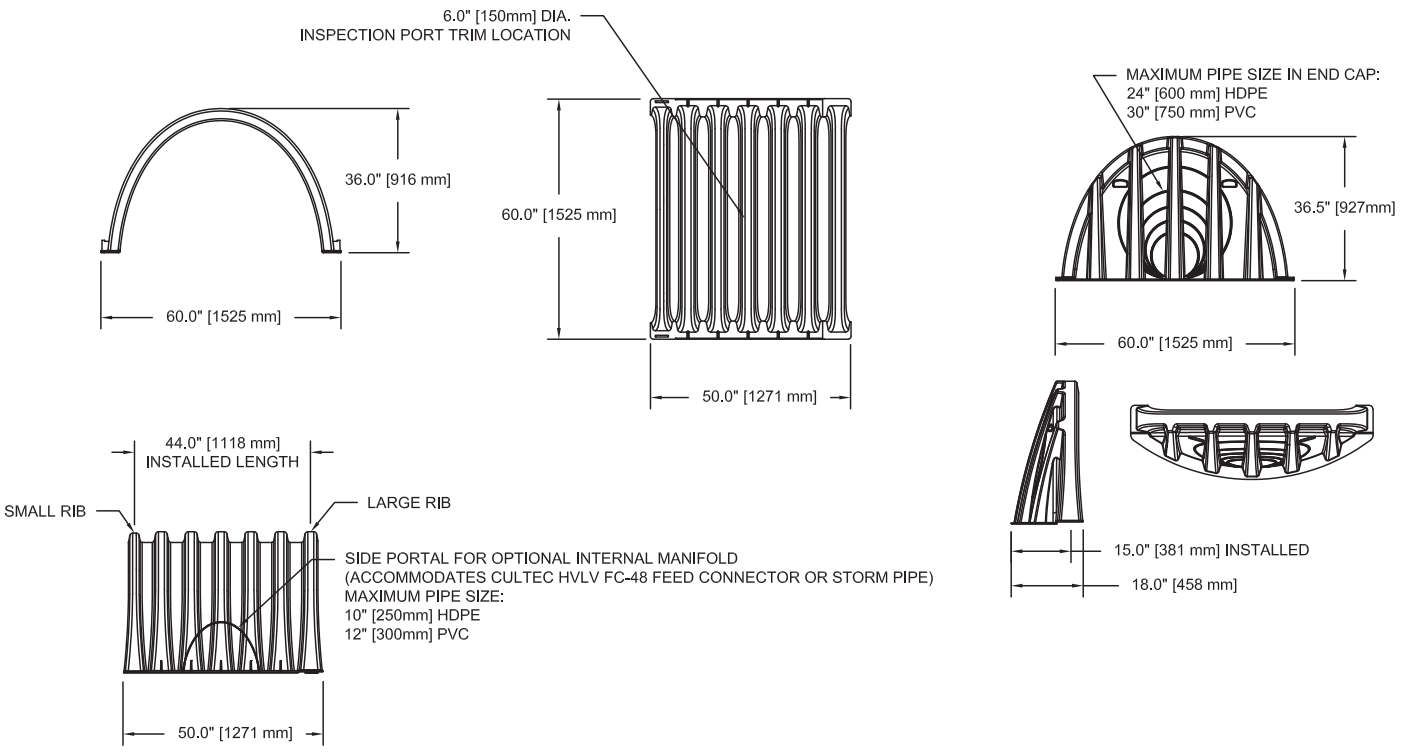
	Stone Foundation Depth		
	6"	12"	18"
	152 mm	305 mm	457 mm
Chamber and Stone Storage Per Chamber	55.73 ft^3	59.95 ft^3	64.17 ft^3
	1.58 m^3	1.70 m^3	1.82 m^3
Min. Effective Depth	4.00'	4.50'	5.0'
	1.22 m	1.37 m	1.52 m
Stone Required Per Chamber	1.77 yd^3	2.16 yd^3	2.55 yd^3
	1.35 m^3	1.65 m^3	1.95 m^3

Recharger 360HD End Cap	
Size (L x W x H)	18" x 60" x 36.5"
	458 mm x 1525 mm x 927 mm
Installed Length	15"
	381 mm
End Cap Storage	5.17 ft^3/ft
	0.48 m^3/m
	6.46 ft^3/unit (interlocked)
	0.183 m^3/unit (interlocked)
Min. Installed Storage	12.40 ft^3/ft
	1.15 m^3/m
	15.50 ft^3/unit
	0.44 m^3/unit
End Cap Weight	22.0 lbs
	9.98 kg
Shipping	20 end caps/skid
	565 lbs/skid
	11 skids/48' flatbed
Max. Inlet Opening in End Cap	24" HDPE, 30" PVC
	600 mm HDPE, 750 mm PVC

Calculations are based on installed chamber length.
Includes 6" (305 mm) stone above crown of chamber and typical stone surround at. 5.75' (1.75 m) center-to-center spacing and stone foundation as listed in table.
Stone void calculated at 40%.

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

Three View Drawing



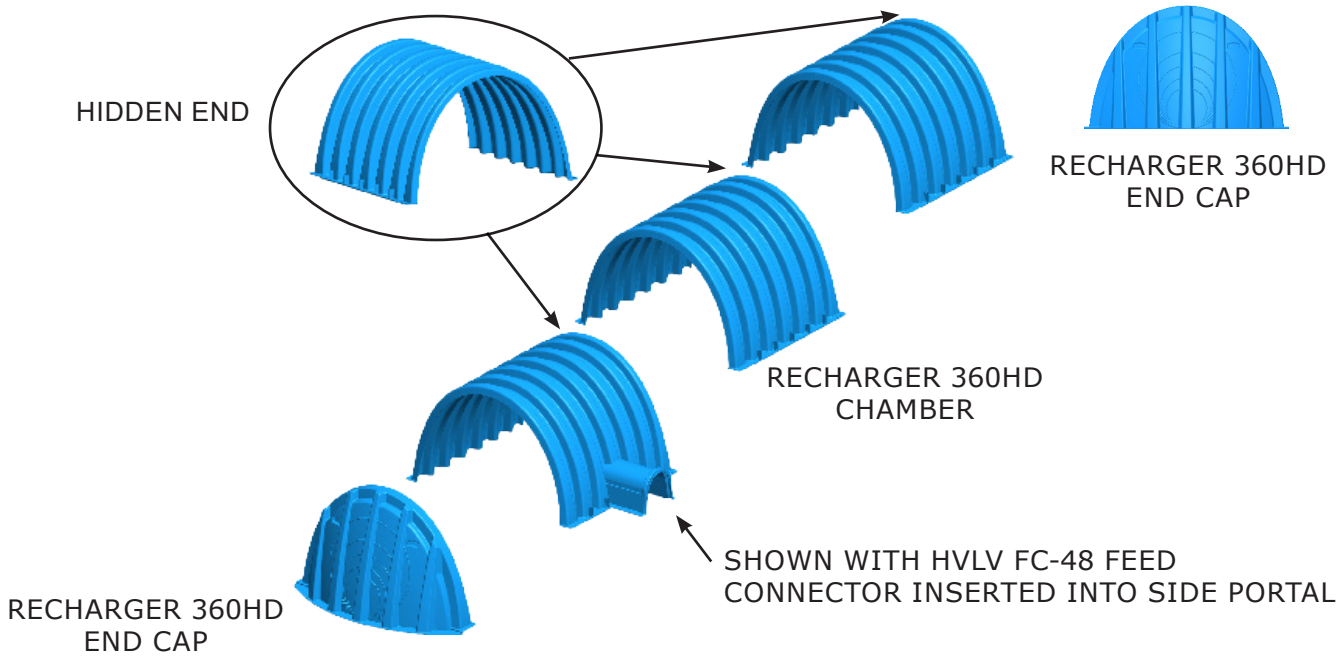
CULTEC RECHARGER 360HD CHAMBER STORAGE = 10.0 CF/FT [.928m³/m]
CHAMBER STORAGE VOLUME = 36.66 CF [1.038m³]
INSTALLED LENGTH ADJUSTMENT = 0.50' [0.15m]
SIDE PORTAL ACCEPTS CULTEC HVLV FC-48 FEED CONNECTOR

Recharger 360HD Chamber

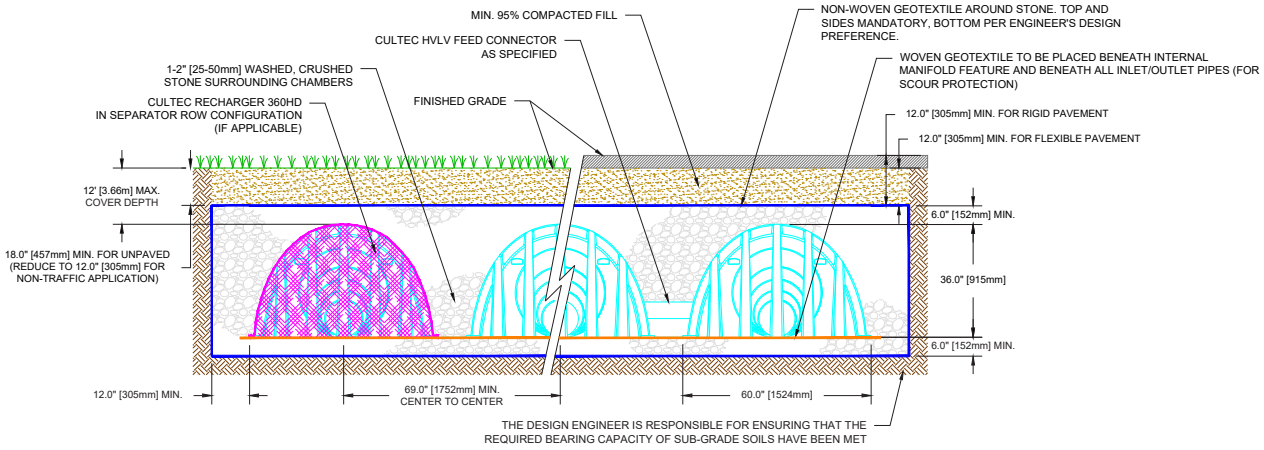
CULTEC RECHARGER 360HD END CAP
STORAGE = 5.17 CF/FT [0.48 m³/m]
END CAP STORAGE VOLUME = 6.46 CF [0.183 m3]
INSTALLED LENGTH ADJUSTMENT = 0.25' [0.08 m]

Recharger 360HD End Cap

Typical Interlock Installation

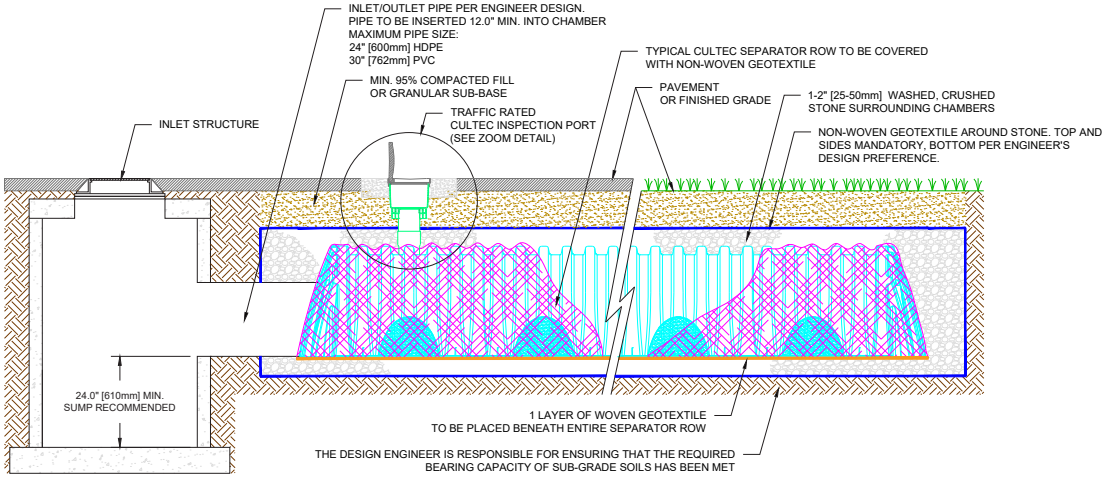


Typical Cross Section for Traffic Application



NOTES:
1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
   1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

Typical Profile View for Traffic Application



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Recharger® 360HD Bare Chamber Storage Volumes

Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft³/ft	m³/m	ft³	m³	ft³	m³
36	914	0.022	0.002	0.08	0.002	3.3658	1.038
35	889	0.046	0.004	0.17	0.005	36.577	1.036
34	864	0.069	0.006	0.25	0.007	36.407	1.031
33	838	0.117	0.011	0.43	0.012	36.154	1.024
32	813	0.148	0.014	0.54	0.015	35.726	1.012
31	787	0.171	0.016	0.63	0.018	35.185	0.996
30	762	0.190	0.018	0.70	0.020	34.560	0.979
29	737	0.206	0.019	0.76	0.021	33.864	0.959
28	711	0.221	0.021	0.81	0.023	33.108	0.938
27	686	0.234	0.022	0.86	0.024	32.298	0.915
26	660	0.246	0.023	0.90	0.026	31.441	0.890
25	635	0.257	0.024	0.94	0.027	30.539	0.865
24	609	0.267	0.025	0.98	0.028	29.598	0.838
23	584	0.276	0.026	1.01	0.029	28.620	0.811
22	559	0.284	0.026	1.04	0.030	27.608	0.782
21	533	0.292	0.027	1.07	0.031	26.565	0.752
20	508	0.300	0.028	1.10	0.032	25.493	0.722
19	483	0.307	0.028	1.12	0.033	24.394	0.691
18	457	0.313	0.029	1.15	0.033	23.239	0.659
17	432	0.319	0.030	1.17	0.033	22.121	0.626
16	406	0.325	0.030	1.19	0.034	20.950	0.593
15	381	0.331	0.031	1.21	0.034	19.757	0.560
14	356	0.336	0.031	1.23	0.035	18.545	0.525
13	330	0.341	0.032	1.25	0.035	17.313	0.490
12	305	0.345	0.032	1.27	0.036	16.064	0.455
11	279	0.350	0.032	1.28	0.036	14.798	0.419
10	254	0.354	0.033	1.30	0.037	13.516	0.383
9	229	0.358	0.033	1.31	0.037	12.219	0.346
8	203	0.361	0.034	1.32	0.038	10.908	0.309
7	178	0.365	0.034	1.34	0.038	9.584	0.271
6	152	0.368	0.034	1.35	0.038	8.247	0.234
5	127	0.371	0.034	1.36	0.039	6.898	0.195
4	102	0.374	0.035	1.37	0.039	5.538	0.157
3	76	0.376	0.035	1.38	0.039	4.168	0.118
2	51	0.379	0.035	1.39	0.039	2.787	0.079
1	25	0.381	0.035	1.40	0.040	1.398	0.040
Total		**9.998**	**0.929**	**36.66**	**1.038**	**36.658**	**1.038**

Calculations are based on installed chamber length of 3.67' (1.12 m).

Recharger® 360HD Bare End Cap Storage Volumes

Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft³/ft	m³/m	ft³	m³	ft³	m³
36	914	0.008	0.0007	0.01	0.000	6.460	0.183
35	889	0.016	0.0015	0.02	0.001	6.450	0.183
34	864	0.024	0.0022	0.03	0.001	6.430	0.182
33	838	0.032	0.0030	0.04	0.001	6.400	0.181
32	813	0.040	0.0037	0.05	0.001	6.360	0.180
31	787	0.048	0.0045	0.06	0.002	6.310	0.179
30	762	0.056	0.0052	0.07	0.002	6.250	0.177
29	737	0.064	0.0059	0.08	0.002	6.180	0.175
28	711	0.072	0.0067	0.09	0.003	6.100	0.173
27	686	0.080	0.0074	0.10	0.003	6.010	0.170
26	660	0.088	0.0082	0.11	0.003	5.910	0.167
25	635	0.096	0.0089	0.12	0.003	5.800	0.164
24	609	0.112	0.0104	0.14	0.004	5.680	0.161
23	584	0.120	0.0111	0.15	0.004	5.540	0.157
22	559	0.128	0.0119	0.16	0.005	5.390	0.153
21	533	0.136	0.0126	0.17	0.005	5.230	0.148
20	508	0.144	0.0134	0.18	0.005	5.060	0.143
19	483	0.152	0.0141	0.19	0.005	4.880	0.138
18	457	0.160	0.0149	0.20	0.006	4.690	0.133
17	432	0.160	0.0149	0.20	0.006	4.490	0.127
16	406	0.168	0.0156	0.21	0.006	4.290	0.121
15	381	0.176	0.0164	0.22	0.006	4.080	0.116
14	356	0.184	0.0171	0.23	0.007	3.860	0.109
13	330	0.192	0.0178	0.24	0.007	3.630	0.103
12	305	0.192	0.0178	0.24	0.007	3.390	0.096
11	279	0.200	0.0186	0.25	0.007	3.150	0.089
10	254	0.208	0.0193	0.26	0.007	2.900	0.082
9	229	0.208	0.0193	0.26	0.007	2.640	0.075
8	203	0.216	0.0201	0.27	0.008	2.380	0.067
7	178	0.224	0.0208	0.28	0.008	2.110	0.060
6	152	0.232	0.0216	0.29	0.008	1.830	0.052
5	127	0.232	0.0216	0.29	0.008	1.540	0.044
4	102	0.240	0.0223	0.30	0.008	1.250	0.035
3	76	0.240	0.0223	0.30	0.008	0.950	0.027
2	51	0.248	0.0230	0.31	0.009	0.650	0.018
1	25	0.272	0.0253	0.34	0.010	0.340	0.010
Total		**5.168**	**0.480**	**6.46**	**0.183**	**6.460**	**0.183**

Calculations are based on installed end cap length of 15" (381 mm).

CULTEC Recharger® 360HD Specifications

GENERAL

CULTEC Recharger® 360HD chambers are designed for underground stormwater management. The chambers may be used for retention, recharging, detention or controlling the flow of on-site stormwater runoff.

CHAMBER PARAMETERS

1. The chambers shall be manufactured in the U.S.A. or Canada by CULTEC of Brookfield, CT (cultec.com, 203-775-4416).
2. The chambers shall be designed and tested in accordance with ASTM F2787 "Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers". The load configuration shall include:
    a. Instantaneous AASHTO Design Truck live load at minimum cover
    b. Maximum permanent (50-year) cover load
    c. 1-week parked AASHTO design truck load
3. The chambers shall meet the requirements of ASTM F3430-20 "Standard Specification for Cellular Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers".
4. The installed chamber system shall provide resistance to the loads and load factors as defined in the AASHTO LRFD Bridge Design Specifications Section 12.12, when installed according to CULTEC's recommended installation instructions. The structural design of the chambers shall include the following:
    a. The Creep Modulus shall be 50-year as specified in ASTM F3430
    b. The minimum safety factor for live loads shall be 1.75
    c. The minimum safety factor for dead loads shall be 1.95
5. The installed chamber system shall be structurally designed to provide resistance to live loads as defined by the AASHTO H-20/HL-93 specification when installed according to CULTEC's recommended installation instructions.
6. The chamber shall be structural foam injection molded of blue virgin high molecular weight impact-modified polypropylene.
7. The chamber shall be arched in shape.
8. The chamber shall be open-bottomed.
9. The chamber shall be joined using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings.
10. The nominal chamber dimensions of the CULTEC Recharger® 360HD shall be 36 inches (915 mm) tall, 60 inches (1525 mm) wide and 50 inches (1275 m) long. The installed length of a joined Recharger 360HD shall be 3.67 feet (1.12 m).
11. Multiple chambers may be connected to form different length rows. Each row shall begin and end with a separately formed CULTEC Recharger® 360HD End Cap. Maximum inlet opening on the end cap is 24 inches (600 mm) HDPE or 30 inches (750 mm) PVC.
12. The chamber shall have two side portals to accept CULTEC HVLV™ FC-48 Feed Connectors to create an internal manifold. Maximum allowable pipe size in the side portal is 10 inches (250 mm) HDPE or 12 inches (300 mm) PVC.
13. The nominal chamber dimensions of the CULTEC HVLV™ FC-48 Feed Connector shall be 12 inches (305 mm) tall, 16 inches (406 mm) wide and 49 inches (1245 mm) long.
14. The nominal storage volume of the Recharger 360HD chamber shall be 10.0 ft^3 / ft (0.928 m^3 / m) - without stone.
    The nominal storage volume of a joined Recharger 360HD shall be 36.66 ft^3 / unit (1.038 m^3 / unit) - without stone.
15. The nominal storage volume of the HVLV™ FC-48 Feed Connector shall be 0.913 ft^3 / ft (0.085 m^3 / m) - without stone.
16. The Recharger 360HD chamber shall have 7 corrugations.
17. The chamber shall be manufactured in a facility employing CULTEC's Quality Control and Assurance Procedures.
18. Maximum allowable cover over the top of the chamber shall be 12 feet (3.66 m).
19. The installed chamber system shall be structurally designed to provide resistance to live loads as defined by the AASHTO H-20/HL-93 specification when installed according to CULTEC's recommended installation instructions.

END CAP PARAMETERS

1. The CULTEC Recharger® 360HD End Cap (referred to as 'end cap') shall be manufactured in the U.S.A. or Canada by CULTEC of Brookfield, CT (cultec.com, 203-775-4416).
2. The end cap shall be structural foam injection molded of blue virgin high molecular weight impact-modified polypropylene.
3. The end cap shall be arched in shape.
4. The end cap shall be joined at the beginning and end of each row of chambers using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings.
5. The nominal dimensions of the end cap shall be 36.5 inches (927 mm) tall, 60 inches (1525 mm) wide and 18 inches (458 mm) long. When joined with a Recharger 360HD Chamber, the installed length of the end cap shall be 15 inches (381 mm).
6. The nominal storage volume of the end cap shall be 5.17 ft^3 / ft (0.48 m^3 / m) - without stone. The nominal storage volume of an interlocked end cap shall be 6.46 ft^3 / unit (0.183 m^3 / unit) - without stone.
7. Maximum inlet opening on the end cap is 24 inches (600 mm) HDPE or 30 inches (750 mm) PVC.
8. The end cap shall be manufactured in a facility employing CULTEC's Quality Control and Assurance Procedures.
9. The end cap shall provide resistance to the loads and load factors as defined in the AASHTO LRFD Bridge Design Specifications Section 12.12.

Attachment 6 – Final Public Notice

Final Notice and Public Explanation of a Proposed Activity in a FFRMS Floodplain

To: All interested Agencies, Groups, and Individuals

This is to give notice that the City of Charleston has conducted an evaluation as required by Executive Orders 11988 and 13690 (floodplains), in accordance with HUD regulations at 24 CFR 55.20 Subpart C Procedures for Making Determinations on Floodplain Management and Protection of Wetlands to determine the potential affect that its activity in the floodplain will have on the human environment under the United States Department of Housing and Urban Development's (HUD) Project-Based Vouchers (PBV) Program.

The proposed project is located at 678 King Street, Charleston, Charleston County, SC. The project includes the construction of the Lowline Apartments, a multi-family/unit residential development on approximately 2.37 acres of partially wooded and previously disturbed land. The project consists of a five-story, 55-unit residential building and an additional single-story building. Thirteen (13) units will receive PBVs. Features of the development will include entrance drives, parking areas, underground stormwater detention, a multi-purpose community room, an office, and exercise/fitness room, common space, and landscaping.

As currently designed, impacts to the Federal Flood Risk Management Standard (FFRMS) floodplain are needed to accommodate various project construction needs such as clearing, excavation, and grading for the buildings, parking areas, stormwater control measures, sedimental and erosion control measures, and landscaping. The entire site is located within the FFRMS floodplain (500-year floodplain, or Zone X [shaded]).

City of Charlotte, Housing and Neighborhood Services has considered the following alternatives to building in a floodplain and has determined that it has no practicable alternative. Environmental files that document compliance with Steps 3 through 6 of Executive Orders 11988, and 13690 are available for public inspection, review, and copying upon request at the time and location designated in the last paragraph of this notice for receipt of comments. This activity will have no significant impact on the environment for the following reasons:

Considered mitigation measures to be taken to minimize adverse significant impacts and to restore and preserve natural and beneficial values include the following: 1.) Locate the activity outside of the floodplain. Selecting a property outside of the floodplain would not meet the goal of the proposed project. Selection of an alternate site would be cost-prohibitive as the availability of properties in the area that could accommodate the scale of the proposed project are limited. 2.) Alternative Actions. An alternative to the proposed project is to design the proposed project to minimize impacts to floodplains on the proposed project site. As currently designed, impacts to the FFRMS floodplain could not be avoided due to the entire site being located in the FFRMS floodplain. 3.) Impact of taking no action, would fail to meet the purpose and need of the proposed action by not constructing the project, thereby decreasing affordable residential opportunities. If construction did not take place, the property could be purchased and developed for market-value residential or commercial sues. Based on this information, the project will be in compliance with applicable floodplain protection procedures and regulations.

There are three primary purposes for this notice. First, people who may be affected by activities in floodplains and those who have an interest in the protection of the natural environment should be given an opportunity to express their concerns and provide information about these areas. Commenters are encouraged to offer alternative sites outside of the floodplain, alternative methods to serve the same project purpose, and methods to minimize and mitigate impacts. Second, an adequate public notice program can be an important public educational tool. The dissemination of information and request for public comment about floodplains can facilitate and enhance federal efforts to reduce the risks and impacts associated with the occupancy and modification of these special areas. Third, as a matter of fairness, when the federal government determines it will participate in actions taking place in floodplains, it must inform those who may be put at greater or continued risk.

Written comments must be received by City of Charleston, Department of Housing and Community Development at the following address on or before December XX, 2024, at City of Charleston, Department of Housing and Community Development, 75 Calhoun Street, Suite 3200, Charleston, SC, 29401, and 843.724.3768, Attention: Geona Shaw Johnson, Director. A full description of the project may be reviewed from 8am to 5pm, Monday through Friday at same as stated above. Comments may also be submitted via email: johnsong@charleston-sc.gov.

December XX, 2024

Commented [WD1]: Date will be 16 days AFTER the publication on the City's website

Commented [WD2]: Date published on City's website