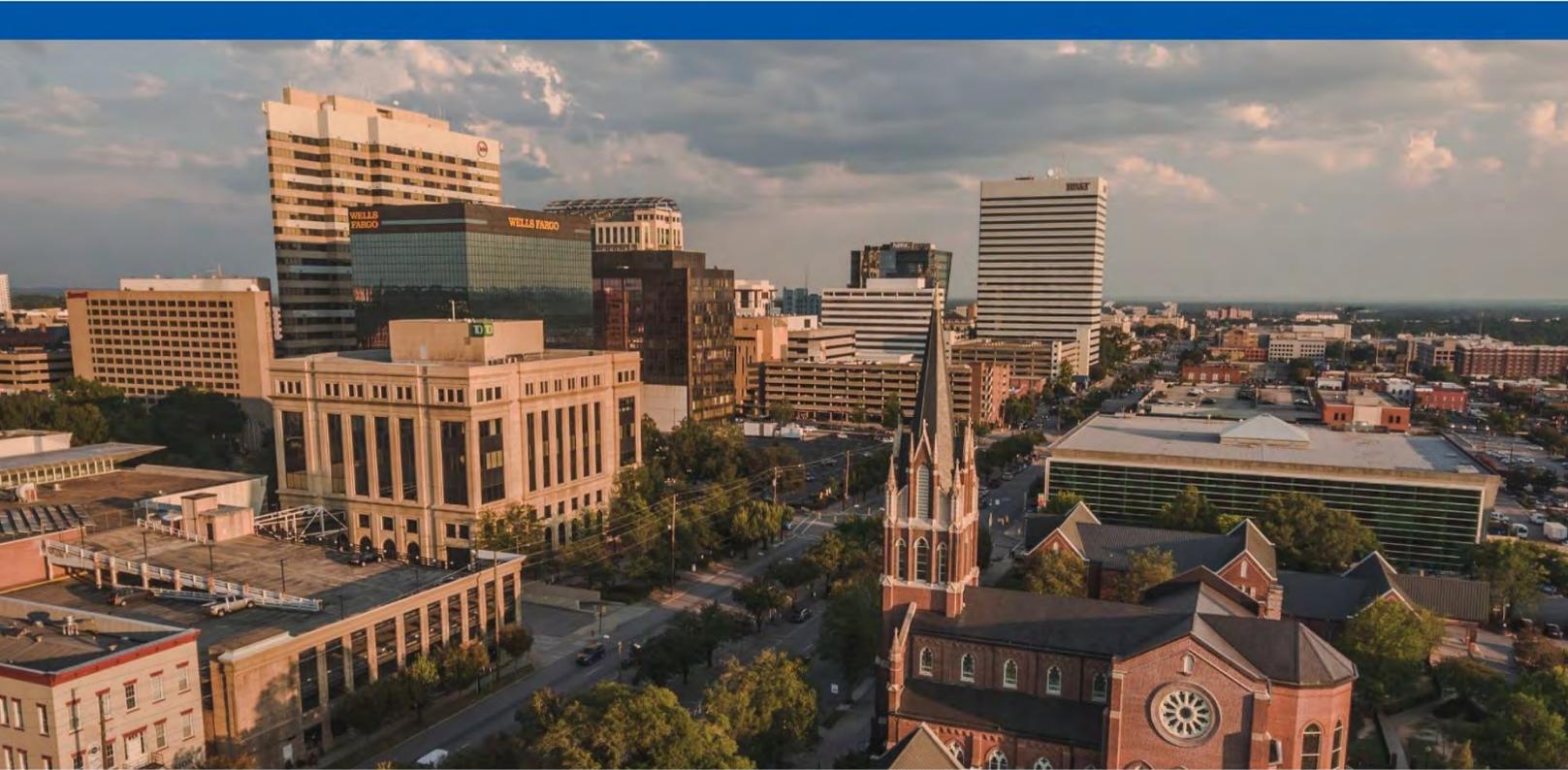


We Are Columbia

# ACTION PLAN

## CITY OF COLUMBIA

COMMUNITY DEVELOPMENT BLOCK GRANT MITIGATION  
(CDBG-MIT)



Submitted to HUD  
May 1, 2020  
Approved by HUD  
June 29, 2020

Citizens are encouraged to provide comments on the City of Columbia's Community Development Block Grant Mitigation Action Plan. Comments can be submitted:

On the Website: <https://mit.columbiasc.gov>

By Email: [CityMitigation@columbiasc.gov](mailto:CityMitigation@columbiasc.gov)

Virtual Public Hearing: Public Hearing - April 6, 2020  
6:00 P.M.

Join Online: <https://zoom.us/j/846466498> or click [here](#)

Join by phone: 253-215-8782

Meeting ID: 846 466 498

Public comments will be accepted from March 16, 2020, 5:00 pm until April 30, 2020, 11:59 pm.

Reasonable modifications and equal access to communications will be provided upon request. **For assistance please call 803-545-3373 or dial 7-1-1 TDD, or email at [CommunityDevelopment@ColumbiaSC.gov](mailto:CommunityDevelopment@ColumbiaSC.gov).**



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## 1.0 Executive Summary

In October 2015, the City of Columbia experienced unprecedented and historical rainfall and flooding resulting from an upper atmospheric low-pressure system that funneled tropical moisture from Hurricane Joaquin. This heavy and extended rainfall exceeded a once in a thousand-year flood event with more than 2 feet of rainfall in less than 48 hours. The rain and flooding caused extensive damage to many dams, bridges, roads, homes, and businesses in the state's capital. As a result, approximately 400 homes and 60 businesses received rain and/or flood damage at an estimated value of \$65 million. In addition, the City sustained more than \$75 million in infrastructure losses.

The flooding also impacted the City's utilities, wastewater treatment systems, and drinking water treatment and collection systems. Ground surfaces were saturated from rainfall in September, resulting in runoff that caused multiple dam failures in the City and a massive breach in the Columbia Canal. Flooding caused a 60-foot section of the Columbia Canal to wash away and the water level to drop below the level necessary for the City to pump water into its water treatment facility through normal operations. Wastewater stations were completely submerged, and multiple sewer and water lines were ruptured or broken. The canal breach combined with numerous line breaks throughout the water system and led to a 10-day disruption of clean drinking water for more than 375,000 residents who received boil water notices. The flooding and disruption of drinking water severely impacted the operations of local hospitals, universities, military installations, and city and state government.

In February 2018, Congress, recognizing that it was not sufficient to fund only repair of damage caused by the disasters, passed historic legislation that enabled storm-impacted jurisdictions to become more proactive in addressing the impacts of these disasters on their communities. The Further Additional Supplemental Appropriations for Disaster Relief Requirements Act, 2018 (P.L. 115-123) made funding available to enable communities to carry out strategic, high-impact activities that increase resilience to disasters and reduce or eliminate the long-term risk of loss of life and property, and the suffering it causes by lessening the impact of future disasters.

The City of Columbia conducted a Mitigation Needs Assessment and determined that the primary risks facing the community continue to be flooding, tornadoes, thunderstorms, lightning, hurricanes, and tropical storms.

In 2017, the City launched a program to be more proactive in addressing the stormwater hazards and flooding problems in Columbia, issuing bonds using the Stormwater Utility Fund. This resulted in the implementation of a comprehensive Stormwater Management Capital Improvement Program. The City now intends to

utilize the CDBG-MIT funding to take additional actions to make Columbia more resilient.

The City acknowledges the high probability that these extreme weather conditions will continue to affect Columbia’s residents and city services and may become more severe or more frequent in occurrence.

The impact of these types of events was taken into consideration as the City made critical decisions around project selection and how each project will affect the City’s ability to deliver critical services to its residents.

The City has identified projects that will have a significant and long-term impact on the welfare of Columbia’s residents – replacement of the Columbia Canal Head Gates, replacement of the Olympia Fire Station, and the addition of permanent backup generators for two of the City’s critical facilities (Police Headquarters and the Fleet Services facility).

These projects demonstrate the City’s commitment to addressing the continuing impact on residents of damage to critical infrastructure that occurred during the 2015 flooding and has yet to be addressed, and to increasing the City’s ability to respond to future disaster events in a manner that improves its ability to protect lives and property.

Category	Project Name	Allocation Level	Estimated LMI Benefit
Infrastructure	Columbia Canal Head Gates and Lock Gate Repair	\$ 8,000,000.00	100%
	Olympia Fire Station Replacement	\$ 7,000,000.00	100%
	Critical Facility Generators	\$ 950,000.00	100%
Planning, Oversight and Monitoring	Planning Activities	\$ 1,705,750.00	
	Administration	\$ 929,250.00	
<b>Total</b>		<b>\$ 18,585,000.00</b>	

In addition, the City will supplement currently limited planning resources in a manner that will allow continual improvement in overall resilience through land use, building code, emergency management, and hazard mitigation planning.

## 2.0 Mitigation Needs Assessment

To align with the requirements in the Federal Register Notice (84 FR 45840), the City of Columbia’s Office of Community Development has developed this risk-based Mitigation Needs Assessment to identify and analyze all significant current and future risks impacting the City. This assessment serves to provide a substantive basis for the mitigation activities proposed in Section 3.0, Approach to Addressing Mitigation Needs.

This assessment:

1. Provides an overview of the City of Columbia’s geographic landscape within the State of South Carolina.
2. Summarizes climate trends and analyzes projections that may contribute to current and future risks.
3. Analyzes vulnerable populations and low- and moderate-income populations.
4. Discusses historic damage patterns that have impacted the City of Columbia.
5. Identifies all considered resources, including South Carolina’s FEMA-approved State Hazard Mitigation Plan and the Central Midlands’ Hazard Mitigation Plan.
6. Assesses current and future risk to the City’s critical service areas or community lifelines.
7. Addresses unmet mitigation needs in response to identified current and future risks.

In order to ensure a comprehensive risk-based Mitigation Needs Assessment, Community Development coordinated with other City departments as pertinent to ensure that full understanding of all risks was known. These included Columbia Water, Planning and Development Services, General Services, Columbia Police Department, Columbia Fire Department, and IT. In addition, the Department of Community Development consulted with the South Carolina Emergency Management Division, the Central Midlands Planning group, and other governmental agencies to collect data and review state and local plans for consideration. This collaboration and analysis of various data sources and planning initiatives were key in ensuring a comprehensive review of the hazards discussed here and subsequent mitigation measures to be implemented.

### 2.1 Overview of City Landscape and Climate Conditions

The City of Columbia is located approximately 13 miles northwest of the geographic center of South Carolina and is the primary city of the Midlands region of the state. It lies at the confluence of the Saluda River and the Broad River, which merge at

Columbia to form the Congaree River (Figure 1). Historically, Columbia’s rivers have been important resources for the City’s growth, supporting both the development of the local economy and establishing Columbia as the final inland point of navigation from the coast. But the City’s location in the center of multiple watersheds has also created vulnerabilities, as demonstrated by Columbia’s history of flooding and related extreme events.

Figure 1. Watersheds and Water Bodies in Columbia, SC



Climate in the Central Midlands is humid and subtropical, with long, hot summers and short, mild winters. On average, temperatures range in Columbia from 32°F to 55°F degrees in January and from 70°F to 92°F in July.<sup>1</sup> The state receives, on average, 49 inches of precipitation annually (Figure 2).

<sup>1</sup> Central Midlands Hazard Mitigation Plan, 2016, p. 10. Accessed on 2/19/2020 at <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

While average annual precipitation levels have remained relatively steady over the past century, extreme rainfall events have taken their toll on the City. The 2015 flood events resulted from extreme precipitation rates combined with an extended duration of rainfall throughout much of the state. As shown in Figure 3, that 4-day rainfall event in Columbia totaled 12.4 inches, exceeding the 500-year rainfall level and coming within less than an inch of a thousand-year rainfall event.

Figure 2. Cumulative Annual Precipitation, University of South Carolina, Columbia, SC, 1895–2010

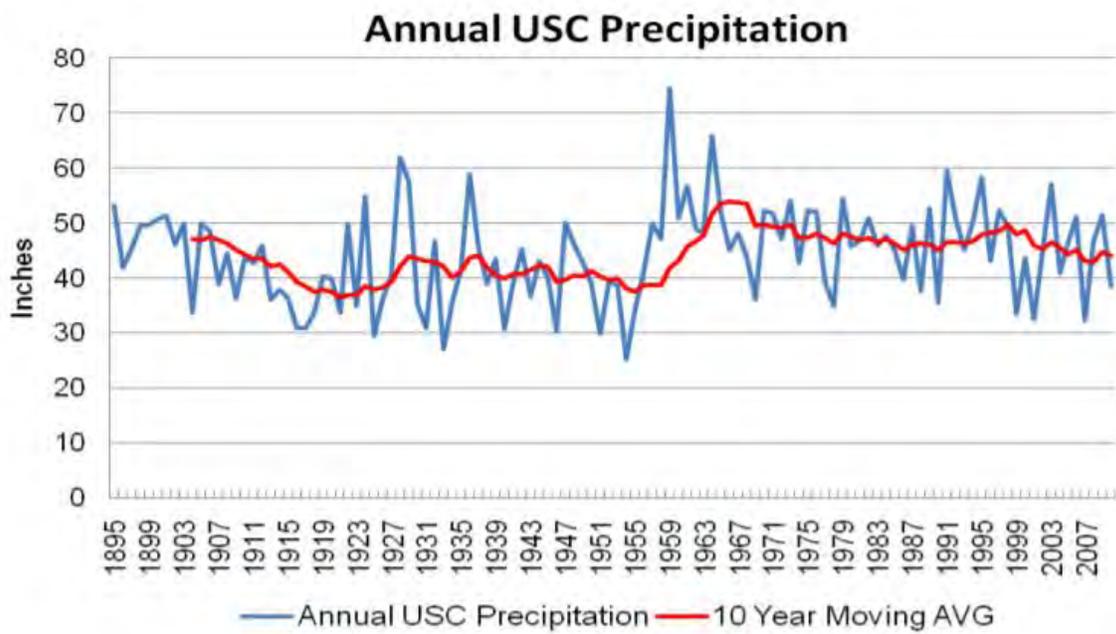


Figure from the South Carolina Department of Natural Resources, Climate Change Impacts to Natural Resources in South Carolina. Retrieved from <http://www.dnr.sc.gov/pubs/CCINatResReport.pdf>

**Figure 3. October 2015 Extreme Rainfall Event.** In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II, Chapter 19, Southeast, 2018.*<sup>2</sup>

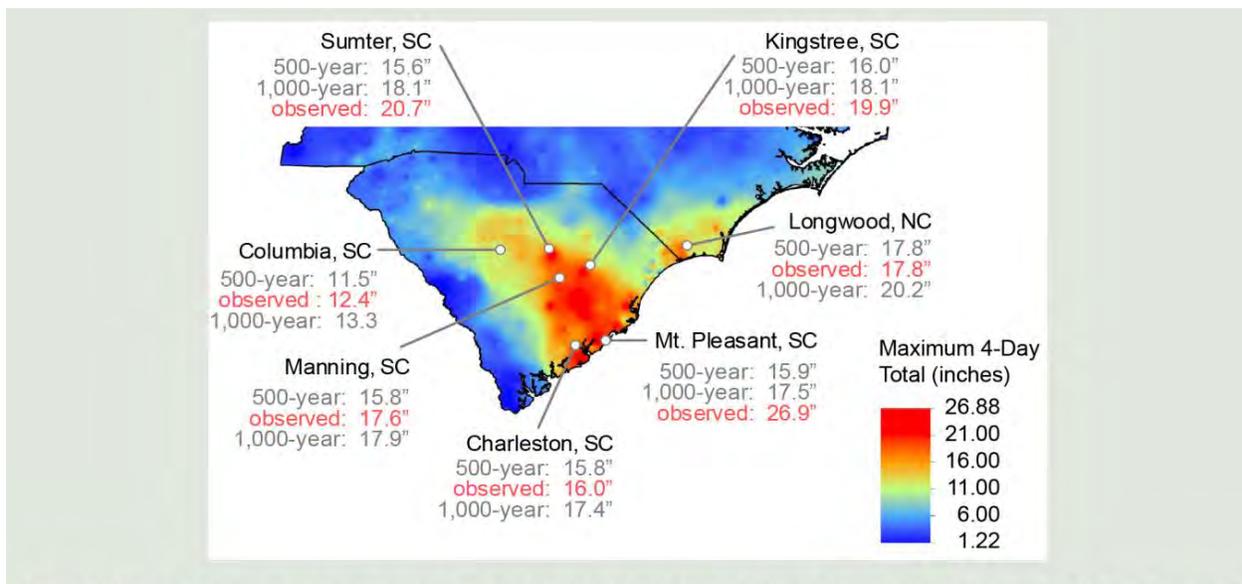


Figure 3 shows rainfall totals from the October 2015 South Carolina flood event. Red colors in the map indicate areas that received excessive rainfall totals that broke all-time records. Some of these totals exceeded the 500-year and 1,000-year return period amounts (rainfall amounts that would be expected to have only a 0.2% or 0.1% chance of occurring in a given year). Extreme precipitation events will likely increase in frequency in the Southeast.

### Projected Climate Conditions

Looking forward, climate conditions in Columbia can be expected to mirror climate changes in much of the interior Southeast. According to the Fourth National Climate Assessment, "The number of extreme rainfall events is increasing. Climate model simulations of future conditions [in the Southeast] project increases in both temperature and extreme precipitation."<sup>3</sup> According to a technical study by the U.S. EPA, "Climate change is projected to increase the frequency of inland flooding in most

<sup>2</sup> Carter, L., A. Terando, K. Dow, K. Hiers, K.E. Kunkel, A. Lascurain, D. Marcy, M. Osland, and P. Schramm. 2018. Southeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, pp. 743–808. doi: 10.7930/NCA4. 2018.CH19. <https://nca2018.globalchange.gov/chapter/southeast>

<sup>3</sup> Ibid.

watersheds of the U.S.,” with the Southeast region experiencing higher inland flooding than some other parts of the country.<sup>4</sup>

An analysis focused on downscaled projections for future temperature and precipitation patterns for the City of Columbia under the RCP 8.5 high emissions scenario<sup>5</sup> is consistent with these regional projections, as discussed below.

### **Precipitation**

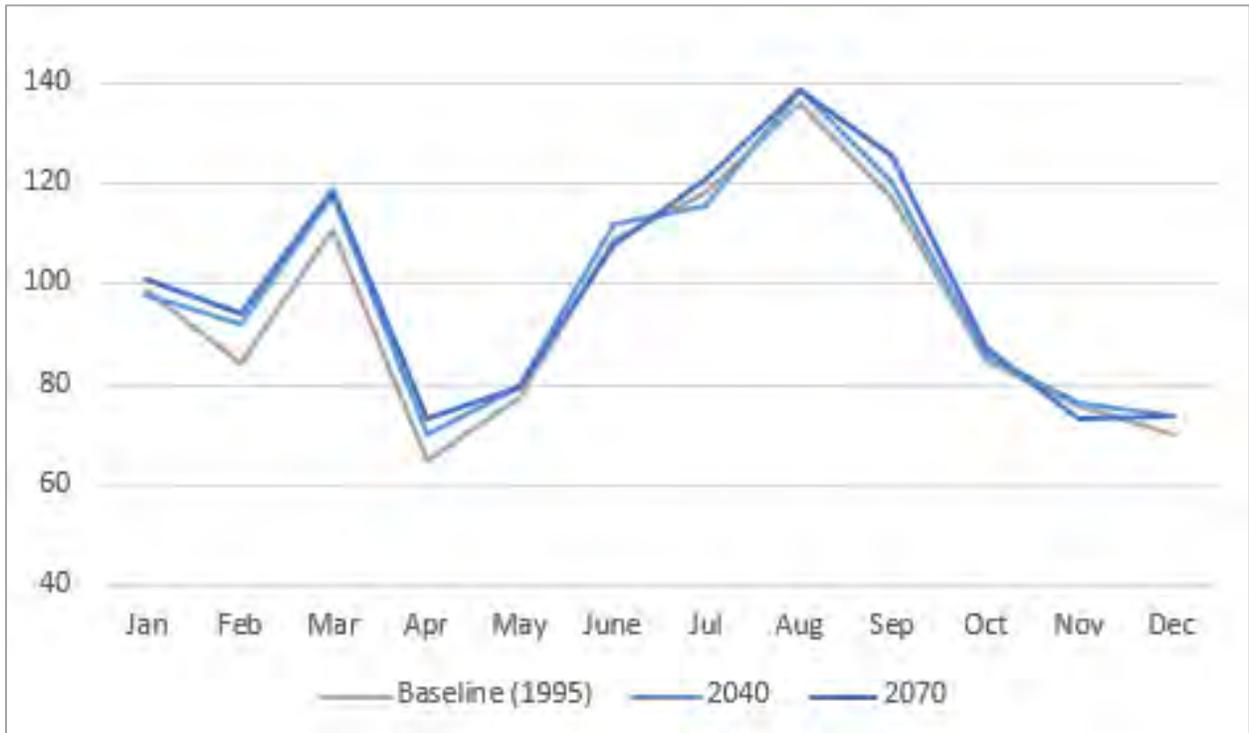
Analysis of a range of climate models for future precipitation levels indicates that over the next 50 years, the City of Columbia will experience seasonal rainfall patterns similar to those it has experienced in the past, with most rainfall occurring in the summer months and drier conditions during the fall and winter (Figure 4). However, these models also project an increase in the frequency and severity of extreme rainfall events (Figure 5). In 20 years (2040), projections indicate that the average annual number of days of heavy rainfall in Columbia will be between 4.2 and 5.2 days; in 50 years, this will increase to an average of 4.7 to 5.7 days per year. Given the topography of Columbia and its location on three rivers, the likelihood of more and heavier rainfall events increases the risk of flood events.

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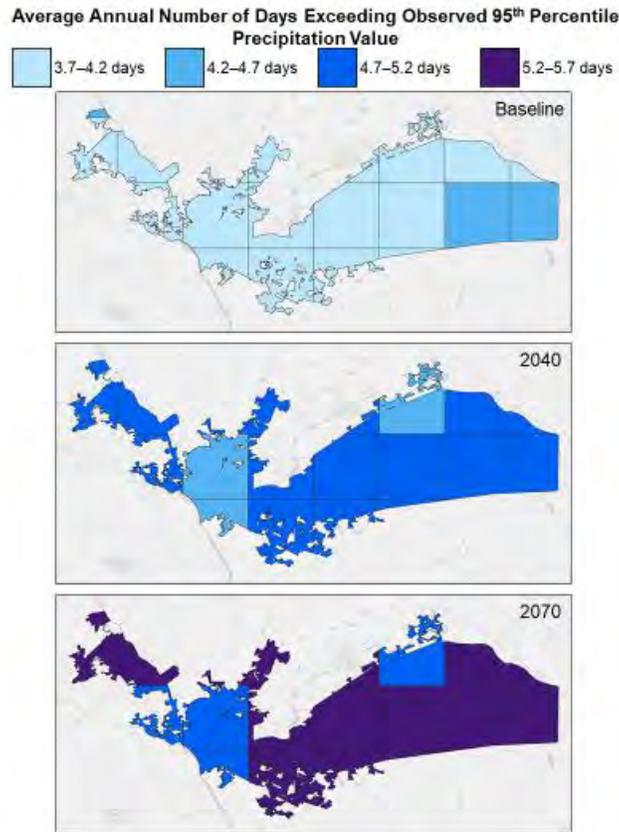
<sup>4</sup> U.S. EPA. 2017. Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment. EPA 430-R-17-001. [https://indecon.com/wp-content/uploads/CIRA2.0\\_TechnicalReportforNCA4.pdf](https://indecon.com/wp-content/uploads/CIRA2.0_TechnicalReportforNCA4.pdf)

<sup>5</sup> A Representative Concentration Pathway (RCP) is a greenhouse gas concentration trajectory adopted by the Intergovernmental Panel on Climate Change. Different RCPs assume different levels of greenhouse gas concentrations and are used to project future climate conditions using climate models. The RCP 8.5 scenario assumes continued increases in greenhouse gas emissions.

Figure 4. Average Monthly Rainfall in Columbia, SC. Historical observed values are shown for the baseline (1986–2005). Projected values are shown for 2040 (2031–2050) and 2070 (2061–2080) for RCP 8.5.



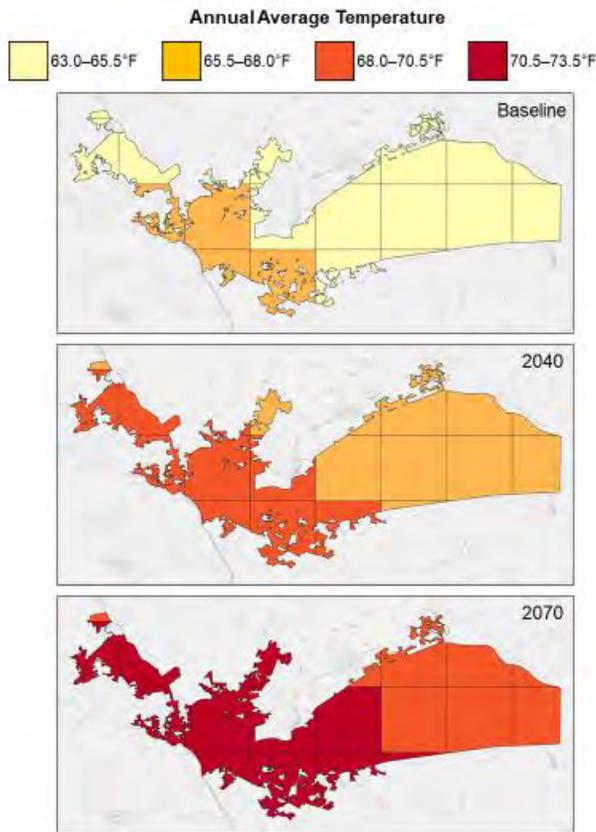
**Figure 5. Average Annual Number of Days Experiencing Very Heavy Precipitation.** Average annual number of days exceeding the observed 95th percentile precipitation value for Columbia, SC. Historical observed values are shown for the baseline (1986–2005). Projected values are shown for 2040 (2031–2050) and 2070 (2061–2080) for RCP 8.5. Values represent the average annual number of days exceeding the observed (1986–2005) 95th percentile precipitation value.



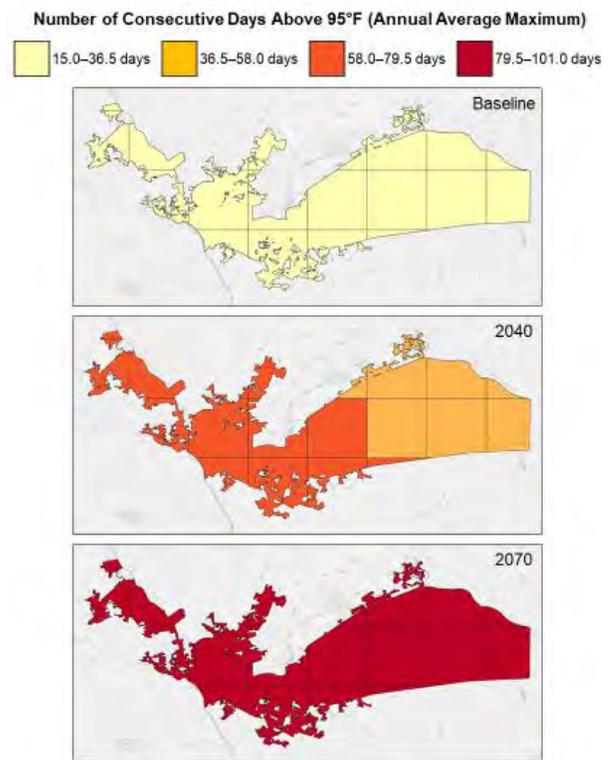
## Temperature

The City also assessed the projected change in average temperatures, and the frequency of very hot days due to climate change over the next 20 and 50 years. Under the high emissions scenario (RCP 8.5), climate models project that average annual temperatures in Columbia will increase from a baseline of 63.0°F to 68.0°F to 65.5°F to 70.5° by 2040, and 68.0°F to 73.5°F by 2070 (Figure 6). Even more significant is the projected increase in the frequency of days with extreme heat during the same timeframe. Climate model projects indicate an increase in the number of high heat days per year (over 95°F) from current levels of 15.0 to 36.5 days to 36.5 to 70.5 days in 2040, and 79.5 to 101.0 days by 2070 (Figure 7). These increases in temperature have implications for public health in terms of changing disease patterns and increased incidence of heat stress. Higher temperatures also trigger changes in vegetation and agriculture, increasing the demand for air conditioning, and greater stress on water resources. Each of these impacts place greater demands on city services and infrastructure.

**Figure 6. Annual Average Projected Temperature for Columbia, SC (degrees Fahrenheit).** Historical observed values are shown for the baseline (1986–2005). Projected values are shown for 2040 (2031–2050) and 2070 (2061–2080) for RCP 8.5. Values are calculated using the average of the daily maximum and minimum temperatures.



**Figure 7. Very Hot Days in Columbia, SC (degrees Fahrenheit).** Historical observed values are shown for the baseline (1986–2005). Projected values are shown for 2040 (2031–2050) and 2070 (2061–2080) for RCP 8.5. Values represent the 95th percentile maximum temperature.



### Population and Demographics

While the frequency and severity of physical hazards vary by location, individuals will not all be affected equally when a disaster occurs. Many factors impact increased vulnerability to disasters, including age, poverty status, disability status, educational attainment, housing, and access to transportation. The population and demographics of the City of Columbia and the state are presented in Table 1.

Table 1. Population and Demographics of Columbia, SC

Total Population	Columbia	South Carolina
Population Estimate (American Community Survey, 2017)	132,236	4,893,444
<b>Age</b>		
Persons under age 5	5.1%	5.9%
Persons under age 18	16.2%	22.3%
Persons age 65 and older	9.7%	16.3%
<b>Race and Ethnicity</b>		
White	52.3%	67.3%
Black or African American	40.9%	27.2%
American Indian and Alaska Native	0.1%	0.3%
Asian	2.6%	1.5%
Native Hawaiian or other Pacific Islander	0.2%	0.1%
Other race	1.2%	1.5%
Two or more races	2.6%	2.1%
Hispanic or Latino	5.8%	5.5%
<b>Education</b>		
High school graduate or higher	88.2%	85.6%
Bachelor's degree or higher	42.3%	26.6%
<b>Disability Status</b>		
With a disability	11.7%	10.4%
<b>Language spoken at home</b>		
English	91.6%	93.1%
Language other than English	8.4%	6.9%
<b>Economy</b>		
In labor force (population age 16 and over)	64.7%	60.7%
Unemployment	8.4%	7.2%
Median Household Income	\$43,650	\$48,781
Persons with no health insurance coverage	10.5%	12.1%
Families and people with income below poverty level	15.2%	12.3%
Families with children under age 18 with income below poverty level	24.1%	20.5%
<b>Housing</b>		
Vacancy rate	13.6%	16.1%
Renter-occupied	54.7%	31.4%
No vehicle available	11.4%	6.5%
Gross Rent as a Percentage of Household Income > 35%	45.0%	21.1%

Source: U.S. Census Bureau, 2013–2017 American Community Survey 5-Year Estimates

As shown above, Columbia has a high proportion of minority residents, renters, and families below the poverty level. Renters in Columbia are also very cost burdened, with more than 40% spending more than 35% of their gross income on rent. Eleven percent of residents also do not have access to a vehicle.

### Social Vulnerability Index

While the frequency and severity of physical hazards vary by location, communities in that location will not all be affected equally when a disaster occurs. Social vulnerability is a measure of the socioeconomic and demographic characteristics that affect the resilience of communities using four components: (1) socioeconomic status, (2) household composition and disability, (3) minority status and language, and (4) housing and transportation. When disaster strikes, the socially vulnerable are more likely to be impacted and have more difficulty recovering over the long term.<sup>6</sup>

Furthermore, research shows that vulnerable populations face a disproportionate impact from stresses driven by climate change. As noted in the Fourth National Climate Assessment, “Climate change tends to compound existing vulnerabilities and exacerbate existing inequities. Already poor regions, including those found in the Southeast, are expected to continue incurring greater losses than elsewhere in the United States.”<sup>7</sup>

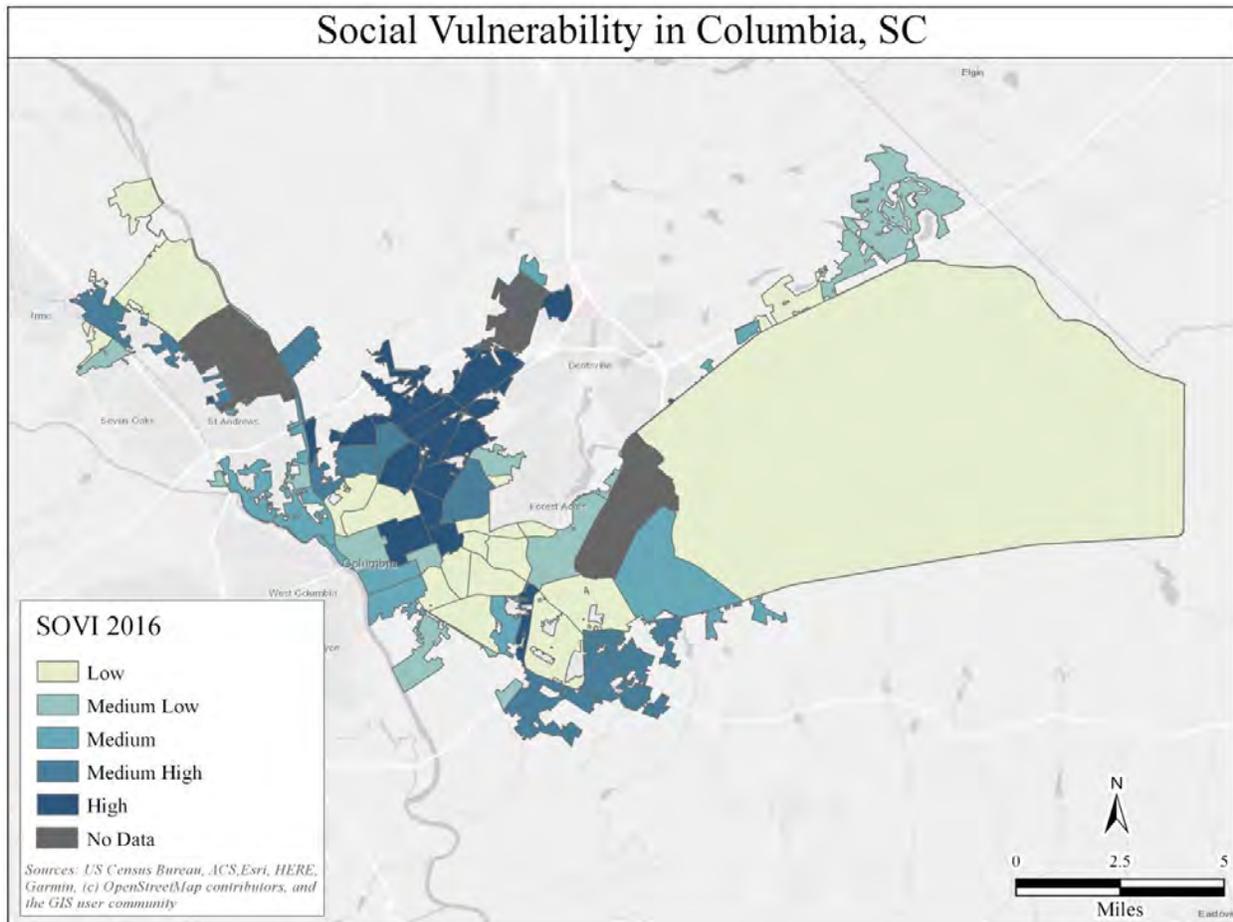
The map below displays social vulnerability by census tract in the City of Columbia in 2016. Census tracts in the northern part of the City have the highest levels of social vulnerability.

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<sup>6</sup> Flanagan, B.E., E.W. Gregory, E.J. Hallisey, J.L. Heitgerd, and B. Lewis, 2011. A Social Vulnerability Index for Disaster Management, *Journal of Homeland Security and Emergency Management*, 8(1), Article 3.

<sup>7</sup> Carter, L., A. Terando, K. Dow, K. Hiers, K.E. Kunkel, A. Lascurain, D. Marcy, M. Osland, and P. Schramm. 2018. Southeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, pp. 743–808. doi: 10.7930/NCA4. 2018.CH19.  
<https://nca2018.globalchange.gov/chapter/southeast>

Figure 8. Social Vulnerability in the City of Columbia

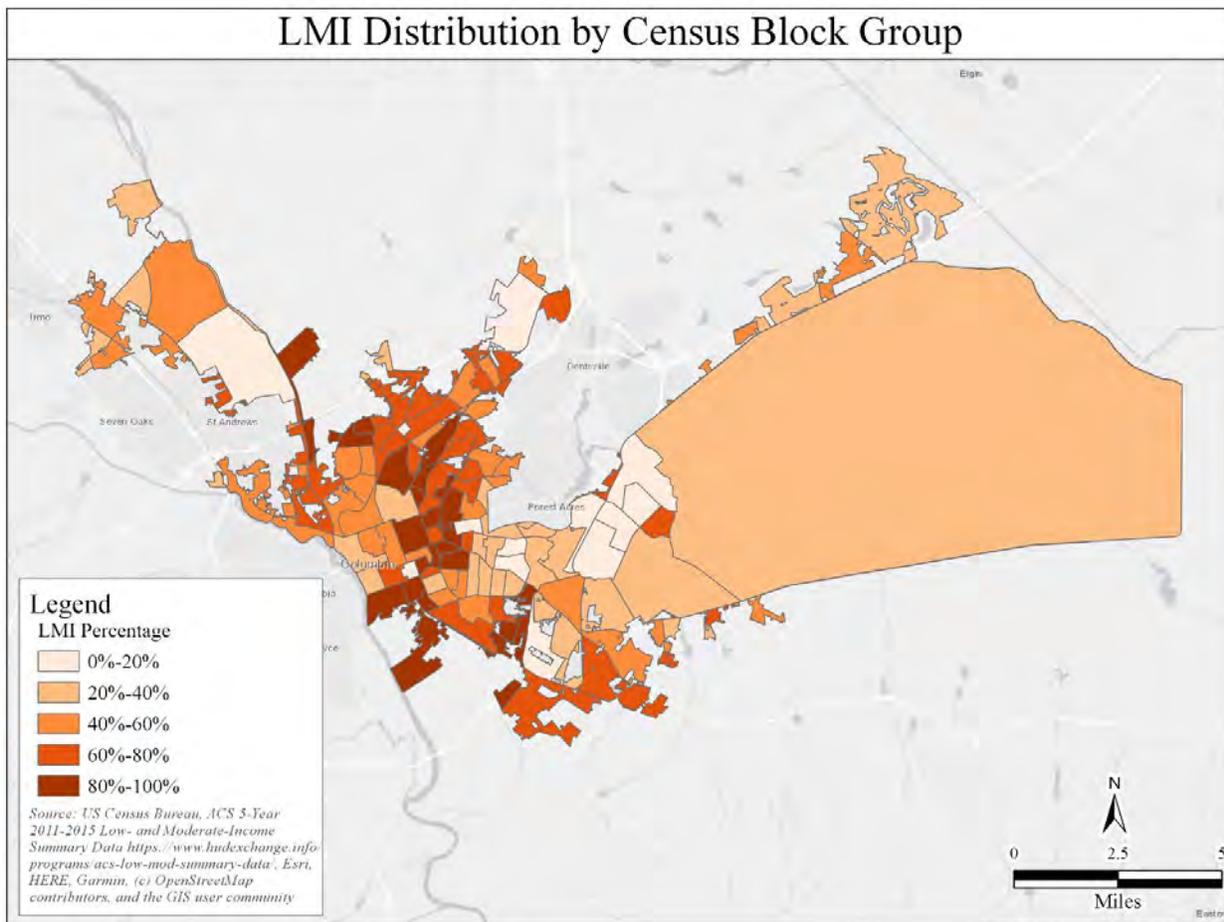


### Low and Moderate Income (LMI)

As discussed above, income is a component of social vulnerability. All programs funded by CDBG grants must meet one of the program’s three National Objectives: (1) benefiting LMI populations, (2) aiding in the prevention of slum and blight, or (3) meeting a particularly urgent need.

LMI households are defined as households that do not exceed 80% of the median income for their area, as defined by U.S. HUD. For CDBG-MIT programs, 50% of the funding must benefit LMI persons. The map below (Figure 9) shows LMI percentages by block group, with darker shades indicating higher concentrations of LMI individuals. In conjunction with the risk assessment below, these data were used by the City to select areas for CDBG-MIT project implementation.

Figure 9. LMI Distribution by Census Block Group, Columbia, SC



## 2.2 Historic Damage

The State of South Carolina has experienced many declared flood- and hurricane-related disasters or emergencies. Every county in the state has been impacted by one or more of these events. Of these declared disasters, Table 2 shows those that were declared statewide, or specifically for Richland County and subsequently the City of Columbia.

Table 2. Major Disasters Declared for Richland County, 1950–2019

Disaster No.	Year	County	Declaration Date	Incident Type	Title
4346	2017	Statewide	10/16/2017	Hurricane	HURRICANE IRMA
3378	2016	Richland	10/06/2016	Hurricane	HURRICANE MATTHEW
4286	2016	Richland	10/11/2016	Hurricane	HURRICANE MATTHEW
3373	2015	Richland	10/03/2015	Severe Storm	SEVERE STORMS AND FLOODING
4241	2015	Richland	10/05/2015	Flood	SEVERE STORMS AND FLOODING
3369	2014	Richland	2/12/2014	Severe Ice Storm	SEVERE WINTER STORM
3233	2005	Richland	9/10/2005	Hurricane	HURRICANE KATRINA EVACUATION
1509	2004	Richland	2/13/2004	Severe Ice Storm	SEVERE ICE STORM
1566	2004	Richland	10/07/2004	Hurricane	TROPICAL STORM FRANCES
1313	2000	Richland	1/31/2000	Severe Storm	SEVERE WINTER STORM
1299	1999	Richland	9/21/1999	Hurricane	HURRICANE FLOYD MAJOR DISASTER DECLARATIONS
3145	1999	Richland	9/15/1999	Hurricane	HURRICANE FLOYD EMERGENCY DECLARATIONS
843	1989	Richland	9/22/1989	Hurricane	HURRICANE HUGO
3047	1977	Richland	8/04/1977	Drought	DROUGHT
44	1955	Statewide	8/20/1955	Hurricane	HURRICANES
29	1954	Statewide	10/17/1954	Hurricane	HURRICANE

The City was not able to identify any currently available data sets that could be used to create the maps that would more clearly delineate between the intersection of the location of vulnerable populations, their functional needs, the risk of adverse effects of disasters, and historic patterns of service and under-service.

The maps included in this section were taken from the Central Midlands HM Plan in the format seen in Columbia’s CDBG-MIT submission. They were created from data provided by the University of South Carolina’s Hazards and Vulnerability Research Institute (HVRI) and not from any dataset available for use by the City of Columbia. The City approached HVRI with a request for assistance when developing the MNA and was told that the Institute was under contract to Richland County for similar work, and thus considered working for the City to be a conflict of interest.

Time and financial constraints made it unfeasible to conduct independent research on vulnerable populations, surveying for factors not currently available from any data sources.

While the State’s 2018 HM Plan update does not include city level data, it does note that Richland County, home to Columbia, is one of the five wealthiest counties in the state. When analyzing service area data for the proposed CDBG-MIT projects, it became apparent that the county’s wealth lies largely outside the City of Columbia or in residential pockets within the City surrounding a number of man-made lakes. It was for this reason that the City focused CDBG-MIT resources on community lifelines that would improve all-hazard response capability in areas that include populations with high social vulnerability. All of the proposed project service areas had populations of low- and moderate-income individuals that exceeded 50%. The percentage of socially vulnerable populations, including people of color, and the elderly potentially impacted by the proposed projects, increased as the project service areas decreased in size from the largest (Head Gates) to the smallest (Olympia Fire Station).

### 2.3 Data Sources and Documents Utilized to Conduct Mitigation Needs Assessment

The City of Columbia Office of Community Development certifies that, in responding to this action plan requirement and presenting the required information, the City has reviewed and considered all applicable sources, including, but not limited to, the following:

1. FEMA Hazard Mitigation Planning Resources  
<https://www.fema.gov/hazard-mitigation-planning-resources>
2. FEMA State Mitigation Planning Resources  
<https://www.fema.gov/state-mitigation-planning-resources>
3. FEMA State Mitigation Planning Key Topics Bulletins  
<https://www.fema.gov/media-library/assets/documents/115780>
4. FEMA Local Mitigation Planning Resources  
<https://www.fema.gov/local-mitigation-planning-resources>
5. U.S. Forest Service Wildland Fire Resources  
<https://www.fs.fed.us/managing-land/fire>
6. National Interagency Coordination Center  
<https://www.nifc.gov/nicc>
7. HUD CPD Mapping Tool  
<https://egis.hud.gov/cpdmaps>
8. DHS Office of Infrastructure Protection

<https://www.dhs.gov/topic/critical-infrastructure-security>

#### 9. FEMA Community Lifelines Implementation Toolkit

<https://www.fema.gov/media-library/assets/documents/177222>

In addition, the state has reviewed and coordinated with the following plans/data sources in the sections below.

##### 2.3.1 State of South Carolina Hazard Mitigation Plan – 2018 Update

The State of South Carolina’s 2018 Hazard Mitigation Plan is the state’s most recent risk assessment completed through FEMA’s Hazard Mitigation Plan process. This plan serves as the foundation for the City of Columbia’s Risk-Based Mitigation Needs Assessment in this action plan. The FEMA-approved State Hazard Mitigation Plan was completed by South Carolina’s State Emergency Management Division. The state’s Hazard Mitigation Plan is the result of a systematic evaluation of the nature and extent of vulnerability to the impacts of natural hazards present in the State of South Carolina.<sup>8</sup> The plan also includes the actions necessary to minimize future vulnerability to those hazards. The City of Columbia has, at a minimum, addressed the risks included in the state’s Hazard Mitigation Plan in this Risk-Based Mitigation Needs Assessment. The City of Columbia has also used the state’s most recent risk assessment completed through the FEMA Hazard Mitigation Plan process as one of the resources to inform the use of CDBG-MIT funds.

The plan update began immediately after the 2013 plan was adopted by South Carolina and approved by FEMA on October 19, 2013. The State Hazard Mitigation Coordinating Committee (ICC) met each quarter starting in 2014 to discuss the schedule of updates, revisions to the old plan, new mitigation initiatives for inclusion in the update, modifications to mitigation goals and strategies, and innovative risk assessment methodologies to be utilized in the update. All members of the ICC participated in the quarterly conference calls and meetings. The highlight of the plan update process was the meeting of the State Hazard Mitigation Team. The meeting, or more accurately titled the State Government Mitigation Actions Workshop, was a time for all state agencies to gather to comment on the Hazard Mitigation Plan. While all sections of the plan were updated to reflect current mitigation information and planning priorities, special attention was focused on improving the risk assessment, updating state agency mitigation actions, and integrating lessons learned from the several declared disasters. To document all changes, a subsection was included in each section of the plan that summarizes the information changed in the updated plan.

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<sup>8</sup> 2018 South Carolina Hazard Mitigation Plan, p. 5.

<https://www.scemd.org/media/1391/sc-hazard-mitigation-plan-2018-update.pdf>

### 2.3.2 Central Midlands Hazard Mitigation Plan – 2016 (Currently undergoing update)

The Central Midlands Hazard Mitigation Plan provides a vulnerability and risk assessment, as well as a mitigation plan for all natural hazards impacting the Central Midlands region of South Carolina where the City of Columbia is located. This plan is developed in coordination with the Central Midlands Council of Governments and the Hazards and Vulnerability Research Institute at the University of South Carolina. The plan is for use by the municipalities and jurisdictions of Fairfield, Lexington, Newberry, and Richland counties. Within the context of this plan, the City of Columbia is captured within Richland County. This Hazard Mitigation Plan represents the lowest jurisdictional level available at the time of this action plan’s development. At the time of this action plan’s development, the City coordinated with the Central Midlands Hazard Mitigation planning group to confirm that they had not begun compiling data for the 2021 update. The data on risks impacting Richland County have been utilized here as the most recent available for alignment in Section 2.0, Mitigation Needs Assessment.

### 2.3.3 South Carolina Emergency Operations Plan

The South Carolina Emergency Operations Plan (SCEOP) is an all-hazards plan developed for use by state government departments and agencies to ensure a coordinated and effective response to natural, technological, or human-caused disasters that may occur in South Carolina.<sup>9</sup> The plan is organized to correspond to the four phases of emergency management: mitigation, preparedness, response, and recovery. For the Mitigation Needs Assessment in this action plan, the City of Columbia has reviewed and referenced findings in SCEOP’s Attachment F, Hazards and Vulnerabilities Analysis, and Annex 1, Hazards and Vulnerabilities Consequence Analysis Chart.

### 2.3.4 City of Columbia Disaster Impact Data

The City of Columbia’s GIS Division provides the city government with access to comprehensive and accurate geospatial data. The data are used to accurately map city assets at extremely high detail, such as fire hydrants, water meters, manholes, and so forth. This type of spatial and attribute information is the foundation of the City’s operations. In addition, the Division maintains data on impacts from disasters, such as properties impacted during the 2015 event, areas of known flooding, repetitive-loss properties, and so forth. The City utilized the data as part of this Mitigation Needs Assessment for this action plan.

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<sup>9</sup> Accessed on 2/17/2020 at <https://www.scemd.org/em-professionals/plans/emergency-operations-plan>

## 2.4 Analysis of Current and Future Disaster Risks

The City of Columbia is in the Central Midlands region of the state, which faces a multitude of natural hazards, mostly meteorological and hydrological.<sup>10</sup> These include the following:

1. Flooding
2. Tornadoes
3. Severe thunderstorms
4. Lightning
5. Hurricanes and tropical storms
6. Wind
7. Hail
8. Fog
9. Winter weather and ice storms
10. Temperature extremes
11. Wildfires
12. Droughts
13. Earthquakes

### 2.4.1 Assets at Risk

Table 3 reflects the assets at risk to the hazards noted above. The values are provided by Richland County and are capped based on the maximum taxable amount according to the county tax code.<sup>11</sup>

Table 3. City of Columbia Appraised and Assessed Values of Buildings Only as of March 28, 2016

Town/Type of Use	Number of Buildings	Assessed Value	Appraised Value
Single Family	28,059	\$193,801,772	\$3,440,506,500
Mobile Homes	33	\$6,780	\$130,000
Multi-Family	6,507	\$69,854,998	\$1,156,408,800
Commercial	2,020	\$96,453,632	\$2,766,037,100
Industrial	395	\$12,265,870	\$201,585,900
Institutional	45	\$2,528,520	\$169,961,100
TOTAL	37,059	\$374,911,572	\$7,734,629,400

Data from Central Midlands Hazard Mitigation Plan, 2016, p. 394.

<sup>10</sup> Central Midlands Hazard Mitigation Plan, 2016, p. 26. Accessed on 2/19/2020 at <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

<sup>11</sup> Ibid, p. 394. Accessed on 2/19/2020.

The City of Columbia contains most of the critical infrastructure for Richland County and the surrounding areas. These include emergency operations centers, a 911 communications center, major hospitals, airports, several wastewater treatment plants, and administrative buildings, as well as numerous law enforcement, fire/EMS, and school facilities.<sup>12</sup> The distribution of critical facilities in the City of Columbia and the surrounding areas of Richland County are shown in Figure 10.

Figure 10. Critical Facilities in Columbia, SC, and Surrounding Areas

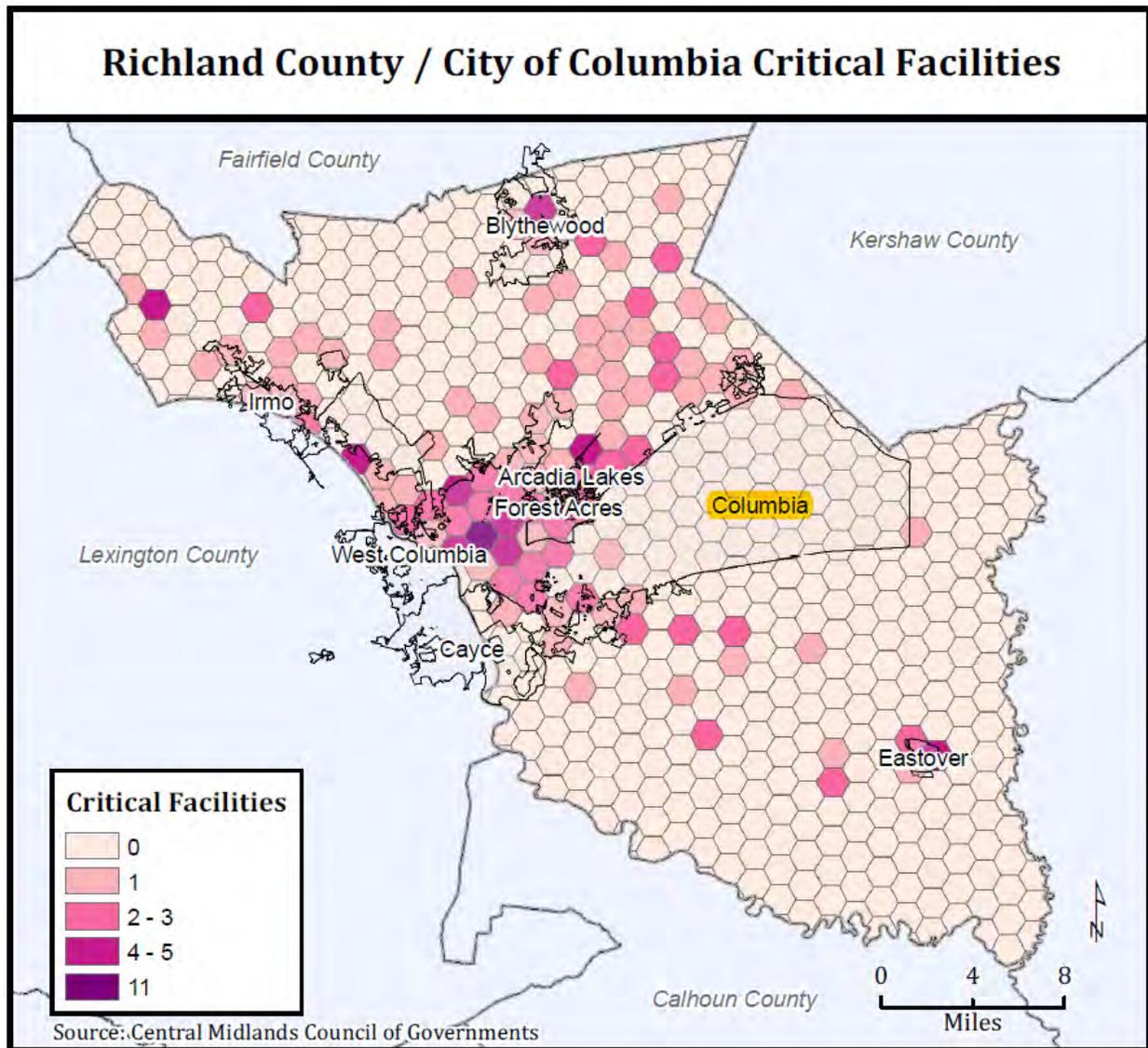


Figure from Central Midlands Hazard Mitigation Plan, 2016.

<sup>12</sup> Central Midlands Hazard Mitigation Plan, 2016, p. 396. Accessed on 2/19/2020 at <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

Prior to the 2015 flood disaster (DR-4241), hurricanes were thought to pose the highest risk to the area. Table 4, below, from the Central Midlands Hazard Mitigation Plan, contains the summary of natural hazards and their impact on Richland County, and subsequently the City of Columbia.

Table 4. Summary of Natural Hazards and Their Impact on Richland County/City of Columbia

	Direct Losses (Property and Crop)	Direct Injuries and Fatalities	No. of Loss- Causing Events (No. of Events)	Frequency	Recurrence Interval (in years)	Future Changes
Flooding	\$3,611,182*	3*	89 (103) *	191%*	0.5*	▲
Hurricane	\$96,540,101	31	8 (12)	22%	4.6	▲
Tornadoes	\$25,402,320	21	15 (34)	62%	1.6	▲
Thunderstorm	\$1,685,500	9	48 (62)	113%	0.9	▲
Lightning	\$6,400,734	62	64 (278,105)	1030019% **	Several times per day	▲
Wind	\$12,909,454	8	181 (469)	853%	0.12	▲
Hail	\$1,576,679	7	64 (242)	440%	0.2	▲
Fog	Not available	Not available	Not available	> 8%**	> 12.6 days	◀▶
Winter Storm	\$10,093,420***	1	28 (45)	53%	1.9	▼
Cold	\$16,925,275	4	31 (31)	56%	1.7	▼
Heat	\$21,263,066	6	13 (13)	24%	4.2	▲
Drought	\$24,345,640	0	17 (17)	31%	3.2	▲
Wildfire	\$366,633	0	3 (1,996)	23%**	4.4 days	▲
Earthquake	0	0	0 (3)	3%	39	◀▶
TOTAL	\$219,543,325	152				
Hazards of Major Concern for the City of Columbia						

\* Excludes 2015 flood losses

\*\* Daily frequency/recurrence calculations instead of years

\*\*\* Excludes 2004 ice storm losses

▲ indicates that future increase in occurrence and/or impacts is likely.

▼ indicates that future decrease in occurrence and/or impacts is likely.

◀▶ indicates that either no change in future occurrence or impacts is expected or that a determination of future changes cannot be made.

Data from Central Midlands Hazard Mitigation Plan, 2016, p. 343.

Based on the above, flash flooding, thunderstorms (which for the purposes of this Mitigation Needs Assessment include lightning, wind, and hail), and tornadoes are the most frequent occurrences. While heat and drought also pose serious threats to the City, they are difficult to quantify in loss figures or maps due to their impacts being underreported or a lack of data.<sup>13</sup>

#### 2.4.2 Overall Vulnerability

The 2016 Central Midlands Hazard Mitigation Plan includes a vulnerability assessment for each hazard above that identifies assets at risk (e.g., people, critical infrastructure) and estimates potential losses from the hazards identified. Overall vulnerability was quantified into low, medium, and high categories and overlaid with information on social vulnerability, critical infrastructure, population, and building stock.<sup>14</sup> The 2016 Central Midlands Hazard Mitigation Plan discusses hazard-specific vulnerabilities for each hazard. For the purposes of this Mitigation Needs Assessment, the City of Columbia defers to that 2016 Central Midlands Hazard Mitigation Plan for individual, hazard-specific vulnerability assessments, but presents the summary findings when vulnerability information was combined across all hazard types in Figure 11.

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<sup>13</sup> Central Midlands Hazard Mitigation Plan, 2016, p. 343. Accessed on 2/18/2020 at <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

<sup>14</sup> Ibid, p. 392. Accessed on 2/19/2020.

Figure 11. Vulnerability to Natural Hazards in the City of Columbia/Richland County

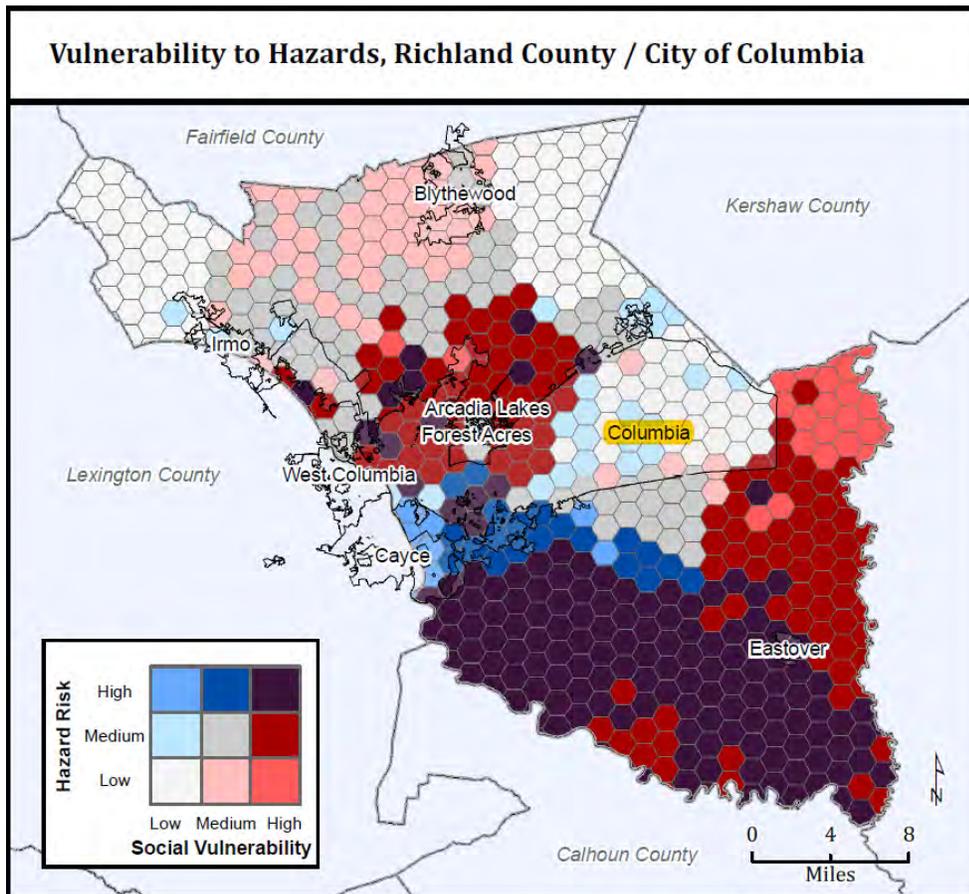


Figure from Central Midlands Hazard Mitigation Plan, 2016, p. 392.

### 2.4.3 Hazards of Major Concern

Per the Federal Register (84 FR 45838), the City of Columbia addresses all risks included in the most recent Central Midlands Hazard Mitigation Plan (2016) in the section above, but has chosen to present an in-depth analysis of current and future disaster risk for those hazards of major concern that are most frequent, and most threaten property and loss of life.

## Flooding

### Overview of Hazard

Flooding is defined as the partial or complete inundation of land areas that are normally dry as a result of the overflow of inland or tidal water and surface water runoff from any source. Floods are one of the most common natural disasters in the United States and one of the greatest risks facing the City of Columbia, as evident from the impacts of DR-4241. Floods result from excessive precipitation over a span of days, intense rain in a short period of time, river overflow from an ice or debris jam, or failure of water structures (e.g., dams, levees).

The South Carolina 2018 State Hazard Mitigation Plan defines five distinctive types of flooding in the state:

1. **Flash flooding:** Rapid flooding occurs from short, heavy rainfall accumulating in areas faster than the ground can absorb it. Urban flooding occurs because of impervious surfaces (e.g., streets, roads, parking lots).
2. **Riverine flooding:** Occurs when an increase in water volume within a river channel causes an overflow onto the surrounding floodplain.
3. **Coastal flooding:** Occurs when water is pushed inland as a result of storm surge, wind-driven waves, and heavy rainfall produced by hurricanes, tropical storms, nor'easters, and other coastal storms.
4. **Local drainage problems:** Occurs in the City where the ground is flat, where the drainage pattern has been disrupted, or where channels or culverts have not been maintained.
5. **Dam/levee failure:** Sudden release of impounded water, flooding the land downstream.

Of these flood types, the City of Columbia is most susceptible to flash flooding, riverine flooding, and local drainage problems.

#### Historical Impact

The City of Columbia has historically experienced flooding that often impacts residential properties, roadways, and infrastructure. Flooding impacts as total annualized losses and repetitive-loss properties are highlighted in tables 5 and 6 and in Figure 12 below.

Table 5. Historical and Recent Flood Events and Losses

Hazard Occurrence	Historical Impact (1960–2015)			Recent Impacts (2012–2015)			
	County	Annualized Losses	Deaths	Injuries	Annualized Losses	Deaths	Injuries
	RICHLAND*	\$578,395	9	31	\$7,437,650	9	30

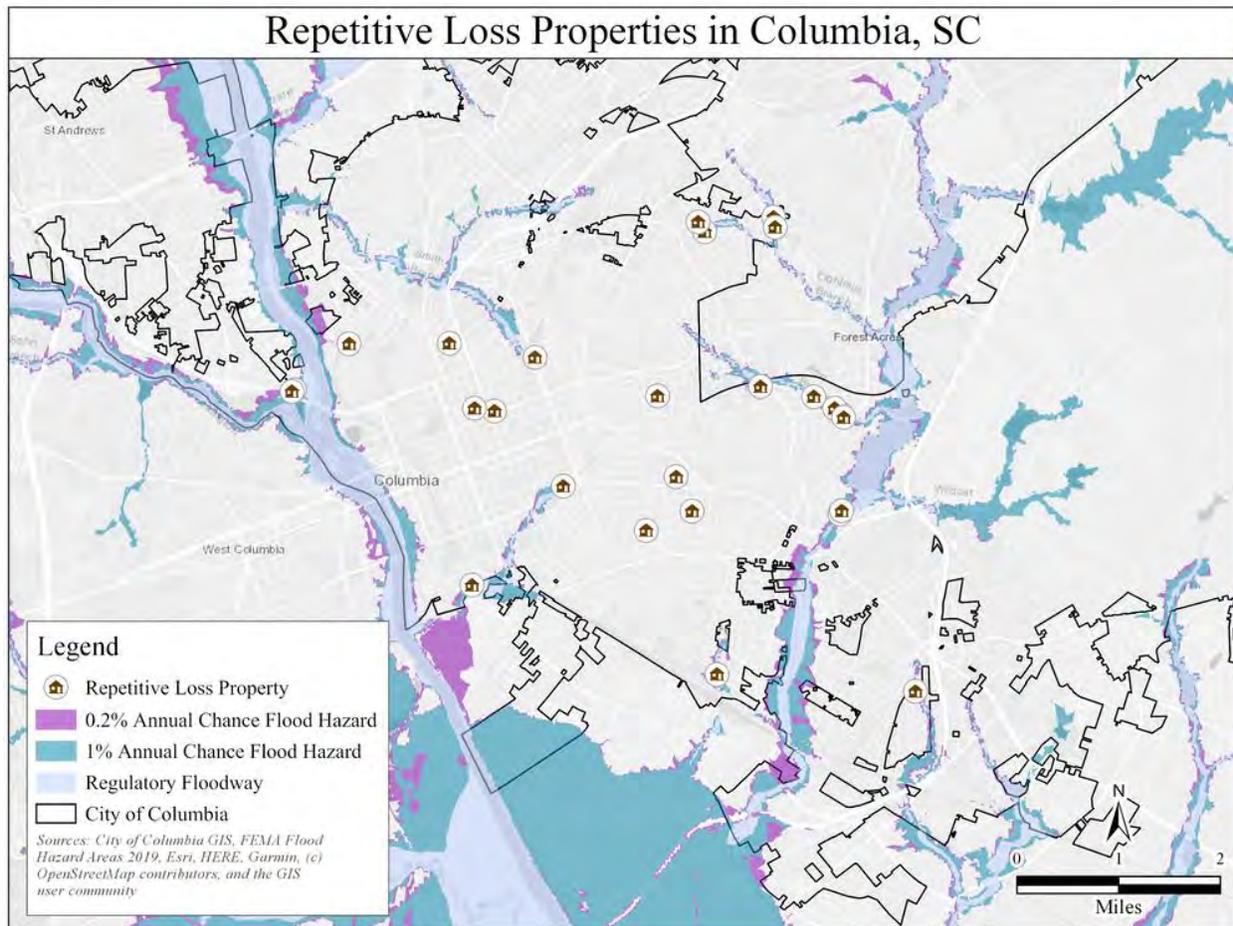
\* The City of Columbia is within Richland County.

Table 6. Repetitive-Loss Properties, City of Columbia

Community Name	Content Payments	Total Payments	Average Payment	Losses	Properties
City of Columbia	\$368,684	\$1,690,348	\$19,655	86	31

Table from the South Carolina State Hazard Mitigation Plan, 2018.

Figure 12. Repetitive-Loss Properties in Columbia, SC

**DR-4241**

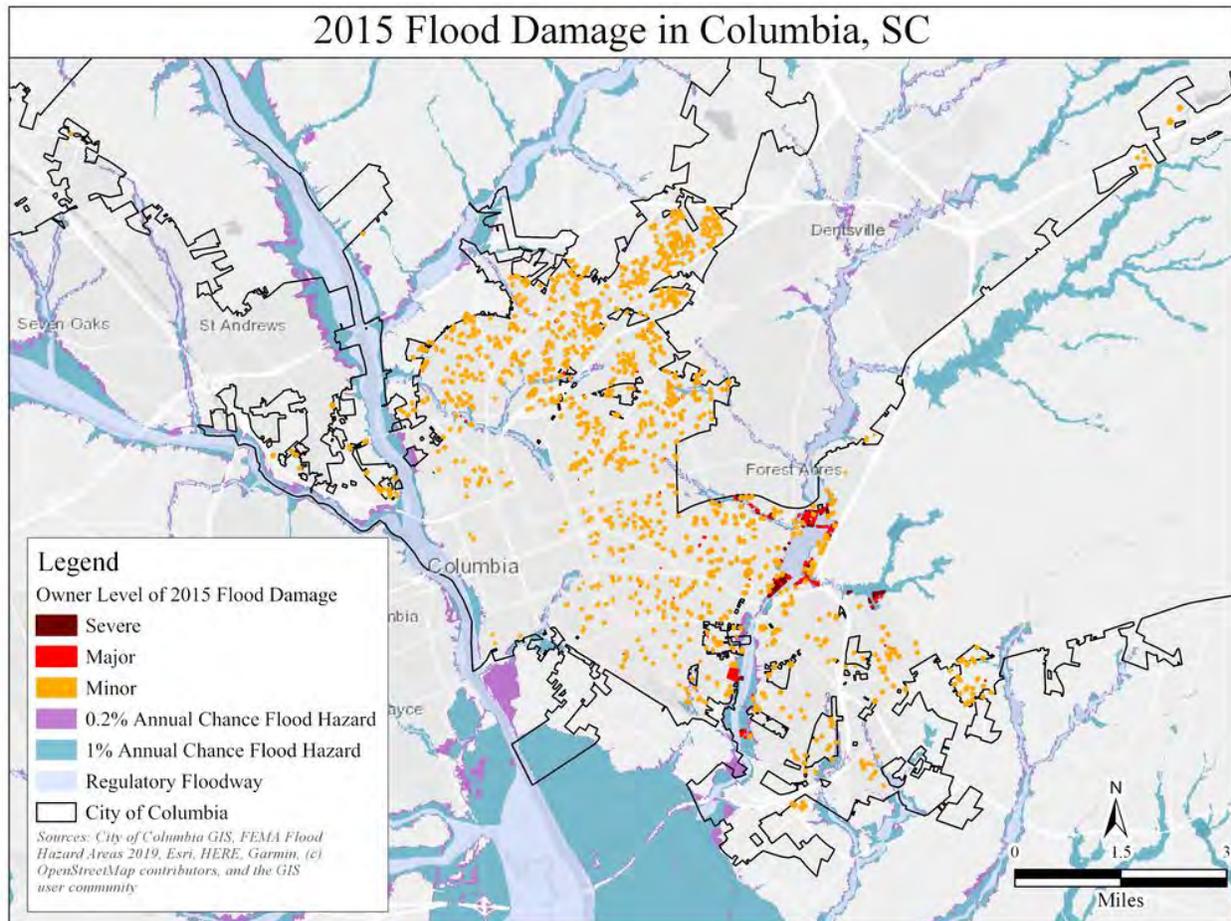
In October 2015, the City of Columbia experienced unprecedented rainfall and flooding resulting from an upper atmospheric low-pressure system that funneled tropical moisture from Hurricane Joaquin. The rain exceeded a once in a thousand-year flood event with more than 2 feet of rainfall in less than 48 hours. The rain and flooding caused extensive damage to many dams, bridges, roads, homes, and businesses in the state’s capital. The City sustained more than \$75 million in infrastructure losses.<sup>15</sup>

Most of the major damage to housing occurred along the banks of Lake Katherine, Central and Lower Gills Creek, Wildcat Creek, and the Penn Branch areas of the City. Numerous city residents had to abandon their homes, and many houses were isolated

<sup>15</sup> City of Columbia, CDBG-DR Action Plan, December 21, 2016. Accessed on 2/23/2020 at <https://dr.columbiasc.gov/wp-content/uploads/2016/08/20161221-COC-Final-Action-Plan-Revisions.pdf>

as more than 100 streets were closed, blocked, or impassable. Residential properties that were damaged as a result are shown in Figure 13.

Figure 13. 2015 Flood Damage in Columbia, SC



In addition to the damage to private residences and businesses, the flooding also caused dam breaches and failures, impacted wastewater treatment systems, and drinking water treatment and collection systems with backwater flooding due to emergency water release from the Lake Murray Dam. As a result, the City was under a systemwide boil water notice, which was the first ever in the City’s history. Broken water lines were submerged in flooded areas and were inaccessible until the water receded. While the water source/supply was in jeopardy due to the breach in the canal, the City was able to sustain operations through a combination of measures until such time that emergency repairs in the canal were completed. Those measures included pushing water from the Lake Murray Water Treatment Plant to portions of the system typically served by the Columbia Canal Water Treatment Plant. Conservation measures, as well as installation of pipes and pumps that allowed water to be withdrawn directly from the river until such time that the canal was stabilized, were also utilized.

A detailed analysis of the impacts on the City’s water supply as a result of the flood is discussed in Section 2.5.2, Food, Water, and Shelter.

The City of Columbia’s CDBG-DR Action Plan, published in December 2016, also notes that the flooding and subsequent disruption of drinking water severely impacted operations of the following, highlighting the critical need for further flood mitigation measures:

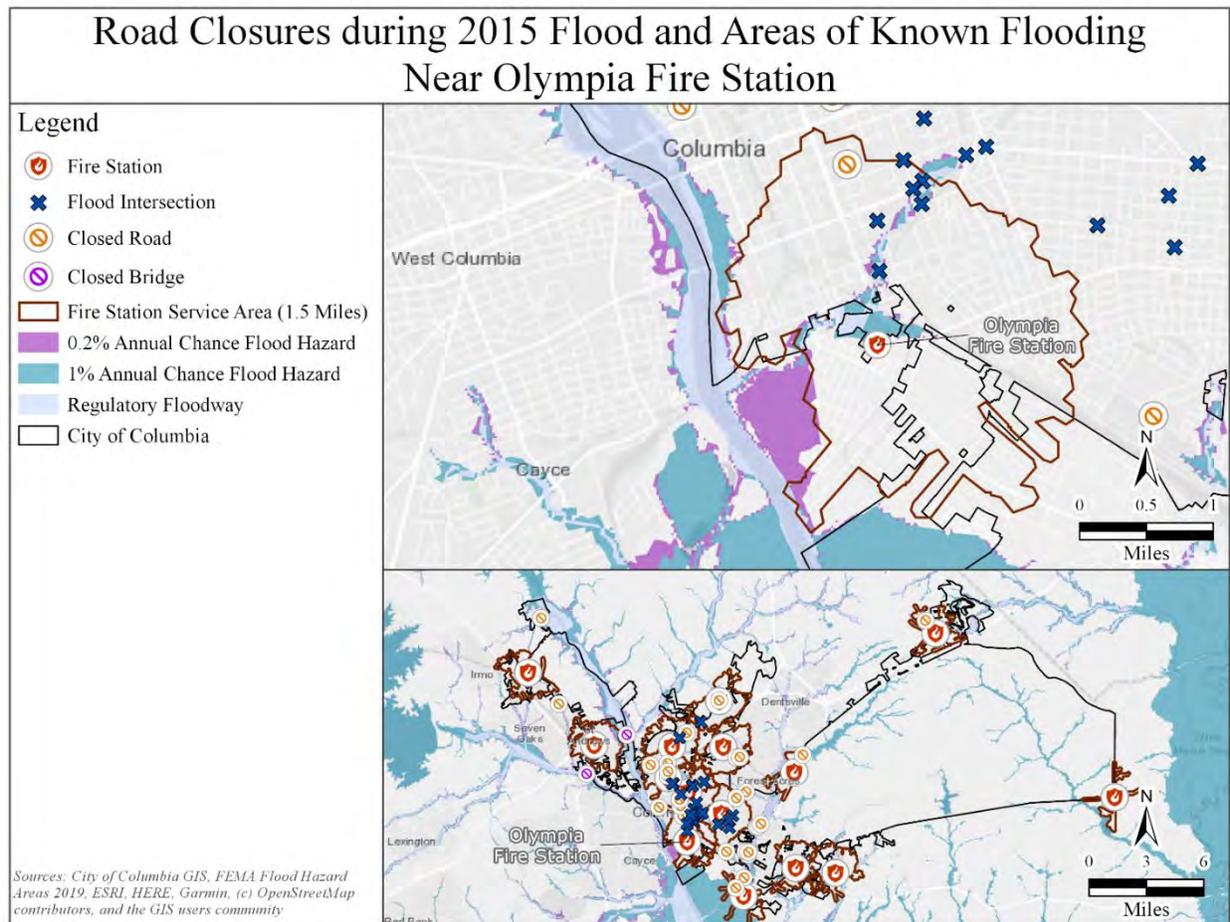
- City Capitol Complex
- Governor’s residential compound
- State agencies
- City Government agencies
- 5 Colleges and 1 major university (40,000 students and 2,000 faculty)
- 5 Hospitals with 2,436 beds (including a Level 1 Trauma Center)
- U.S. military installation – Fort Jackson (3,500 active duty members and 12,000 family members)
- All public, private, and parochial school districts
- Nursing homes and assisted care facilities
- Numerous banking institutions, restaurants, hotels, tourist destinations, and hundreds of other businesses and organizations

In addition to damage to property and the impact on the water supply, debris removal and emergency response costs as a result of the 2015 floods in the State of South Carolina were in excess of \$58 million statewide.<sup>16</sup> Responders and fire officials in the City of Columbia’s Olympia Fire Station faced extreme difficulties when responding to the flood events of 2015, both due to the capacity of the station and the poor location with respect to the areas of flooding. Historically, flash floods often require swiftwater rescues for residents who find themselves suddenly trapped in flooded areas. Columbia’s GIS Division maps intersections of known flooding historically, and the state’s Emergency Management Division maintained a list of road and bridge closures during the 2015 floods that created emergency response difficulties for the Olympia Fire Station. Both are depicted in Figure 14 to highlight the difficulty that response operations faced, and may continue to face, during periods of heavy rain and flooding due to the fire station’s current location and capacity.

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<sup>16</sup> South Carolina Emergency Operations Plan, Annex 1 – Hazards and Vulnerabilities Consequence Analysis Chart. Accessed on 2/18/2020 at <https://www.scemd.org/media/1453/annex-1-hazard-identification-and-consequence-analysis-chart.pdf>

Figure 14. Road Closures during 2015 Flood and Intersections of Known Flooding in Columbia, SC



### Future Risk

The City of Columbia, like many areas of the Southeast, is projected to experience increasing frequency of extreme precipitation events, as depicted in Figure 5 in Section 2.1 above. Absent mitigation measures, these changes in rainfall patterns will contribute to more frequent flooding and subsequent impacts. Likewise, the projections of increased intensity and duration of hurricanes will contribute to greater flooding, combined with wind damage. The prospect of increased flooding has serious implications across all sectors.

With the most recent Substantial Amendment (#5) to the City's CDBG-DR Action Plan, 74% of the funding is dedicated to housing: homeowner assistance, small rental repair, elevation reimbursement, minor home repair, and multifamily housing. Of that 74%, 99% is set aside for low- and moderate-income households.

## Tornadoes

### Overview of Hazard

A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes may form at any time of the year, but in the United States, peak occurrence is in the spring and early summer months of March through June. Tornadoes are most often generated by thunderstorm activity or any situation of severe weather (sometimes spawned from hurricanes and other coastal storms) when cool, dry air intersects and overrides a layer of warm, moist air, forcing the warm air to rise rapidly.

### Historical Impact

Common consequences of tornadoes in Columbia are damage to homes and businesses, interruption of utility services, and devastation of the local economy at the state level.<sup>17</sup> However, the Central Midlands region, where the City of Columbia is located, experiences mostly weak tornadoes, although EF3s and EF4s have occurred in the past in the counties neighboring the City of Columbia.<sup>18</sup> While tornadoes do not cause as widespread damage as flooding or hurricanes, they can cause devastating localized damage to areas where they impact. In addition, the rapid formation of tornadoes often leaves little time for advanced warning, highlighting the need for proper emergency alert and response measures, as well as measures to protect against loss of life (e.g., community safe rooms).

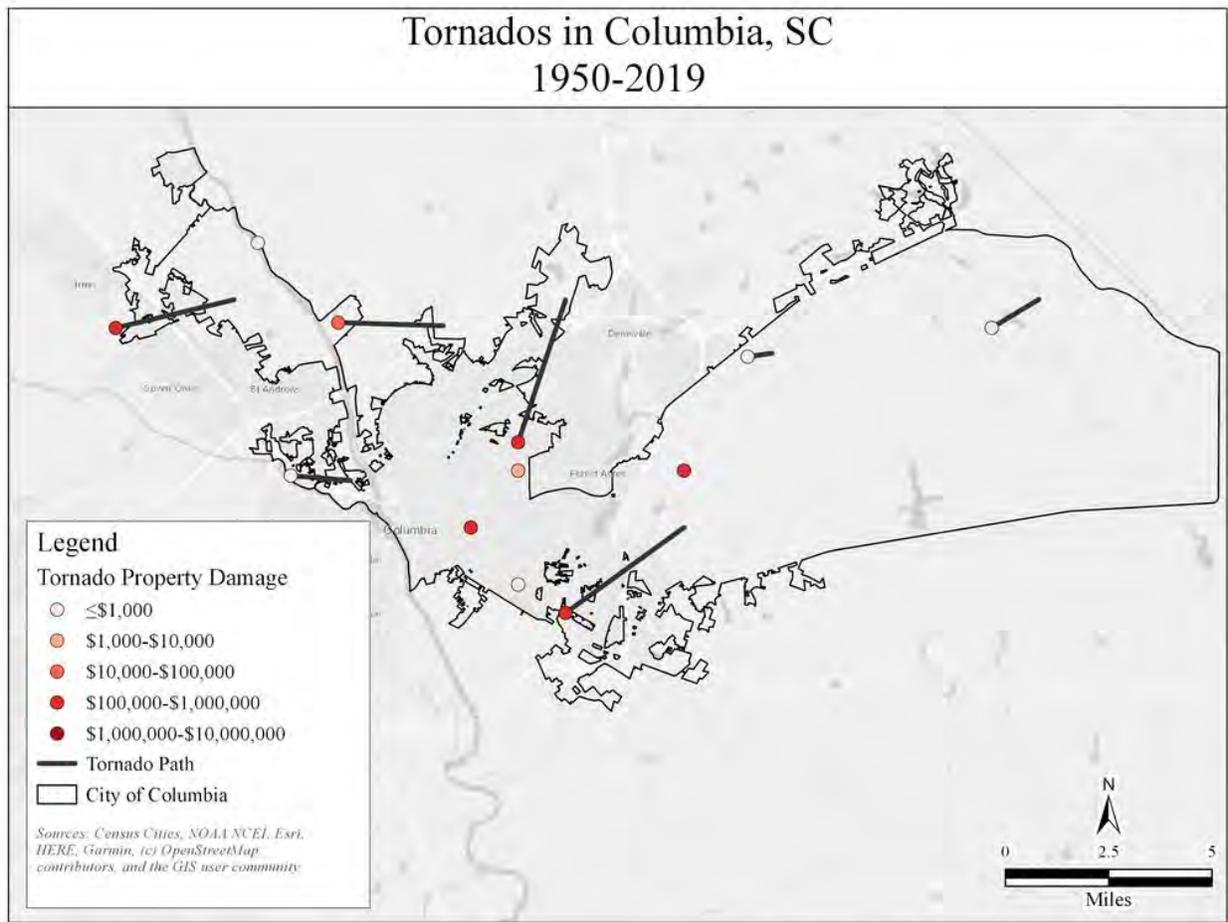
Property damage from tornadoes in the City are shown in Figure 15.

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<sup>17</sup> South Carolina Emergency Operations Plan, Annex 1 – Hazards and Vulnerabilities Consequence Analysis Chart. Accessed on 2/18/2020 at <https://www.scemd.org/media/1453/annex-1-hazard-identification-and-consequence-analysis-chart.pdf>

<sup>18</sup> Central Midlands Hazard Mitigation Plan, 2016, p. 34. Accessed on 2/18/2020 at <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

Figure 15. Tornado Property Damage, 1950–2019



The historical impact of tornadoes with respect to injuries, fatalities, and property damage (including crop damage) is shown in Table 7.

Table 7. Historical Loss-Causing Tornado Events in Columbia, SC, Since 1960

Start Date	End Date	Inj	Fat	Property Damage	Crop Damage	Mag.	Location
7/03/1964	7/03/1964	0	0	\$190,916	\$0	F2	
8/29/1964	8/29/1964	0	0	\$1,909,161	\$0	F2	
5/29/1967	5/29/1967	3	0	\$177,198	\$0	F2	
11/24/1967	11/24/1967	0	0	\$1,771,976	\$0	F1	
1/10/1972	1/10/1972	1	0	\$1,415,885	\$0	F1	
11/12/1975	11/12/1975	7	0	\$1,100,074	\$0	F2	
5/15/1976	5/15/1976	3	1	\$1,040,141	\$0	F2	
6/19/1977	6/19/1977	0	0	\$97,663	\$0	F1	
5/20/1980	5/20/1980	0	0	\$718,252	\$0	F1	
2/11/1981	2/11/1981	0	0	\$65,109	\$0	F1	
8/31/1987	8/31/1987	2	0	\$520,986	\$0	F2	
7/23/1997	7/23/1997	1	0	\$302,373	\$0	F1	Columbia
9/07/2004	9/07/2004	0	0	\$375,970	\$0	F1	Fort Jackson
TOTAL	13	17	1	\$9,685,704	\$0		

From the Central Midlands Hazard Mitigation Plan, 2016, p. 358.

### Future Risk

The occurrence of tornadoes is variable and the relationship between climate change and tornadoes is not fully understood; changes in tornado activity cannot be projected as a direct result of climate change. However, national trends indicate that tornado activity in the United States has become more variable, particularly over the 2000s, with a decrease in the number of days per year with tornadoes and an increase in the number of tornadoes on these days – known as “tornado outbreaks” – and an extended season during which tornadoes occur.<sup>19</sup> For Columbia, the increased risk of damage from tornado activity is likely to be a function of the value of increased development and assets exposed to tornadoes in future years.

<sup>19</sup> Kossin, J.P., T. Hall, T. Knutson, K.E. Kunkel, R.J. Trapp, D.E. Waliser, and M.F. Wehner. 2017. Extreme storms. In *Climate Science Special Report: Fourth National Climate Assessment, Volume I* [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, pp. 257–276, doi: 10.7930/J07S7KXX.

## Severe Thunderstorms and Lightning

### Overview of Hazard

Severe thunderstorms are rain showers in which thunder occurs that are defined as *severe* by the National Weather Service when containing one or more of the following: hail 1 inch or greater, winds gusting in excess of 50 knots (57.5 mph), or a tornado.<sup>20</sup> A thunderstorm is also an event during which thunder is audible due to lightning. Therefore, all thunderstorms have lightning.<sup>21</sup> Lightning is a spark of static electricity in the atmosphere that results from the buildup of electrical energy between positively and negatively charged areas among clouds, the air, and the ground. Tall objects within the City of Columbia, such as trees and skyscrapers, are commonly struck by lightning. While forecasters can detect the likelihood of intense lightning activity, it is impossible to forecast individual strikes since lightning is so widespread, frequent, and random.

In the Central Midlands region of South Carolina, where the City is located, thunderstorms and lightning frequently occur during the spring and summer months. On average, the Central Midlands region experiences between 50 and 60 thunderstorm days per year.<sup>22</sup>

### Historical Impact

Historical damage associated with thunderstorms throughout the City is noted in Figure 16.

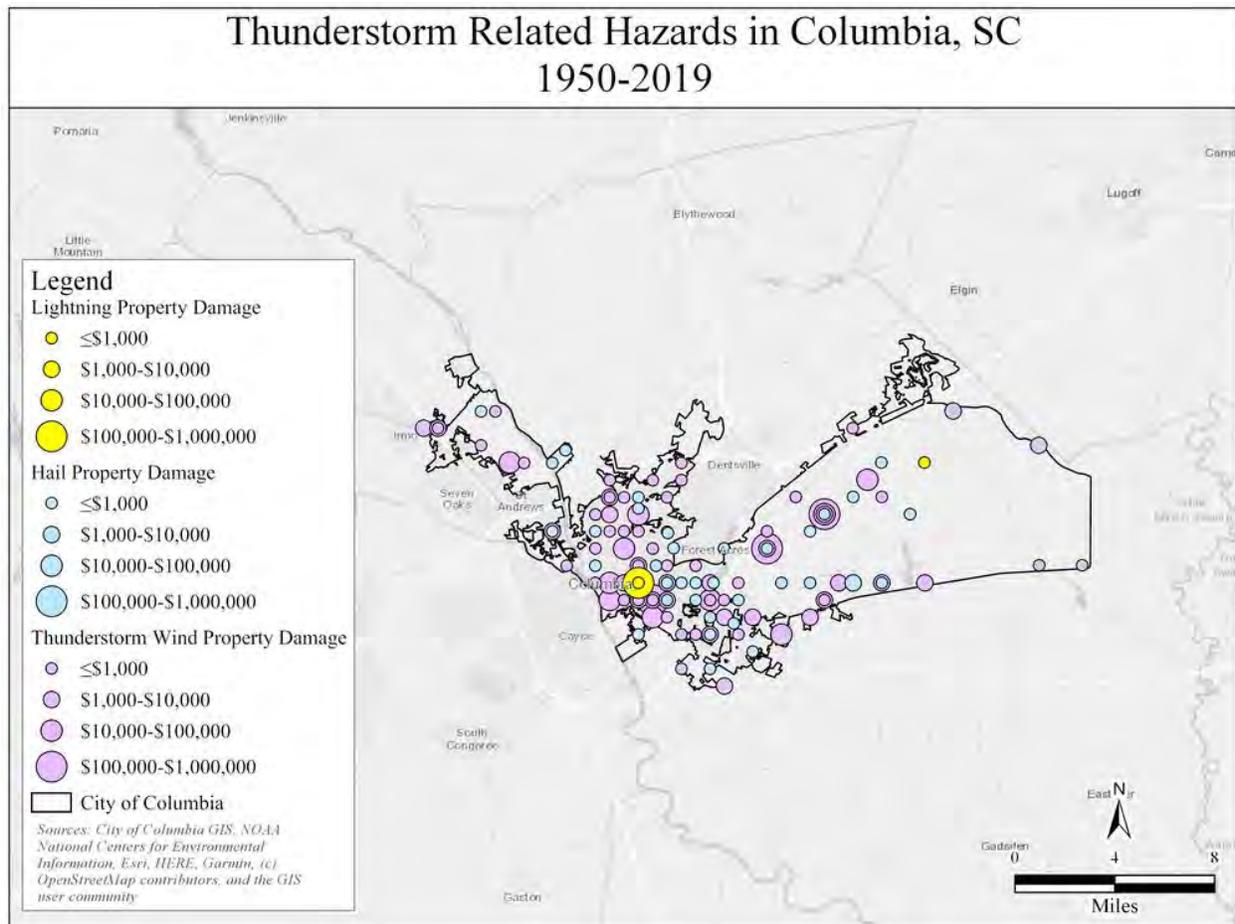
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<sup>20</sup> National Severe Storms Laboratory. Severe Weather 101 – Thunderstorms. Accessed on 2/19/2020 at <https://www.nssl.noaa.gov/education/svrwx101/thunderstorms>

<sup>21</sup> South Carolina State Hazard Mitigation Plan, 2018, p. 72. Accessed on 2/19/2020 at <https://www.scmd.org/media/1391/sc-hazard-mitigation-plan-2018-update.pdf>

<sup>22</sup> Central Midlands Hazard Mitigation Plan, 2016, p. 28. Accessed on 2/19/2020 at <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

Figure 16. Thunderstorm Wind Hazards, 1950–2019



Both property and people are at risk from lightning in the City of Columbia. Lightning occurs very frequently in Richland County, averaging several strikes per day.<sup>23</sup>

The frequency of lightning strikes in the City of Columbia often results in house fires and personal harm, increasing the demand on immediate fire response resources in the City. The historical impact of loss-causing lightning events in Columbia is captured in Table 8.

<sup>23</sup> Central Midlands Hazard Mitigation Plan, 2016, p. 362. Accessed on 2/19/2020 at <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

Table 8. Historical Loss-Causing Lightning Events in Columbia, SC, Since 1960

Start Date	End Date	Inj.	Fat.	Property Damage	Crop Damage	Location	Description
9/05/1961	9/05/1961	0	0	\$1,885	\$0	Eastern and Central South Carolina	High winds and excessive lightning
7/24/1964	7/24/1964	28	0	\$0	\$0	Fort Jackson	Electrical
4/12/1965	4/12/1965	0	0	\$37,577	\$0	Columbia	Lightning
5/28/1965	5/28/1965	3	0	\$0	\$0	Fort Jackson	Lightning
6/30/1965	6/30/1965	0	0	\$37,577	\$0	Columbia	Lightning
7/12/1965	7/12/1965	8	0	\$0	\$0	Fort Jackson	Lightning
8/10/1965	8/10/1965	0	0	\$18,788	\$0	Richland and Lee Counties	Lightning and wind
8/18/1965	8/18/1965	0	0	\$18,788	\$0	Columbia and Vicinity, Richland and Lexington Counties	Heavy thundershower and lightning
8/27/1965	8/27/1965	0	0	\$816	\$0	Statewide	Severe lightning
7/15/1966	7/15/1966	0	0	\$18,266	\$0	Columbia, Richland and Lexington Counties	Wind and electrical
7/09/1973	7/09/1973	0	0	\$26,659	\$0	Columbia	Wind and lightning
8/04/1973	8/04/1973	0	0	\$148	\$14	Midlands and Southern SC	Rain, wind, and electrical
8/29/1973	8/29/1973	0	0	\$133	\$13	Northwest and Midlands	Wind, rain, and electrical
3/21/1974	3/21/1974	0	0	\$5,219	\$521	Statewide	High winds and electrical
4/08/1974	4/08/1974	0	0	\$96	\$0	Central SC	Wind and electrical
4/08/1974	4/08/1974	0	0	\$6,669	\$6	Central, Western, and Northern SC	Wind and electrical
5/12/1974	5/12/1974	0	0	\$12,636	\$12,636	Central, Southern, and Eastern SC	Lightning, heavy rain, and high wind
6/07/1974	6/07/1974	0	0	\$2,400	\$0	Columbia	Heavy rain and lightning

Start Date	End Date	Inj.	Fat.	Property Damage	Crop Damage	Location	Description
8/13/1974	8/13/1974	0	0	\$1,091	\$109	Central	Wind and lightning
5/15/1975	5/15/1975	0	0	\$4,782	\$47	Statewide	Wind and lightning
7/24/1975	7/24/1975	0	0	\$628	\$0	Western, Central, and Northern SC	Lightning
8/27/1975	8/27/1975	0	0	\$5,789	\$57	North, Northeast, and Central	Lightning, high wind, and thunderstorms
10/09/1976	10/09/1976	0	0	\$5,778	\$57	Central and Eastern	Wind and lightning
7/14/1977	7/14/1977	0	0	\$4,246	\$42	Statewide	Wind and lightning
7/16/1981	7/16/1981	0	0	\$32,554	\$0	Greenwood, Newberry, Lexington, and Richland Counties	Lightning, wind, and rain
6/03/1982	6/03/1982	0	0	\$122,661	\$12,266	Columbia	Lightning, rain, and wind
7/03/1983	7/03/1983	2	0	\$1,188	\$0	Columbia	Lightning
7/25/1983	7/25/1983	0	0	\$2,583	\$25	Statewide	Wind and lightning
8/23/1983	8/23/1983	0	0	\$3,395	\$0	North and Central SC	Wind and lightning
7/12/1984	7/12/1984	2	0	\$1,139	\$0	Columbia	Lightning
7/13/1984	7/13/1984	0	0	\$5,696	\$0	Columbia, West Columbia, and Cayce	Lightning
8/21/1985	8/21/1985	0	0	\$11,000	\$0	Columbia	Lightning
5/28/1986	5/28/1986	0	0	\$5,400	\$0	Lexington and Richland Counties	Lightning
7/16/1986	7/16/1986	0	0	\$108,000	\$0	Columbia	Lightning
7/27/1986	7/27/1986	0	0	\$1,080	\$0	Eastern Columbia	Lightning
10/08/1986	10/08/1986	0	0	\$1,080	\$0	Columbia	Lightning
6/01/1987	6/01/1987	1	0	\$1,041	\$0	Countywide	Lightning
6/04/1987	6/04/1987	0	0	\$1,041	\$0	Countywide	Lightning
7/28/1987	7/28/1987	0	0	\$1,041	\$0	Columbia	Lightning
4/23/1988	4/23/1988	0	0	\$10,005	\$0	Countywide	Lightning
5/16/1988	5/16/1988	0	0	\$10,005	\$0	Eastover	Lightning

Start Date	End Date	Inj.	Fat.	Property Damage	Crop Damage	Location	Description
8/20/1989	8/20/1989	0	1	\$0	\$0	Columbia	Lightning
5/16/1991	5/16/1991	0	0	\$7,821	\$0	Columbia	Lightning
7/04/1991	7/04/1991	0	0	\$608,352	\$0	Columbia	Lightning
7/18/1994	7/18/1994	0	0	\$7,987	\$0	Columbia	Lightning
7/06/1995	7/06/1995	4	1	\$0	\$0	Fort Jackson	Lightning
4/27/1999	4/27/1999	3	0	\$0	\$0	Columbia	Three people were hit by lightning at River Banks Zoo. The victims were taken to nearby hospitals and released the next day.
2/22/2003	2/22/2003	0	0	\$90,062		Columbia	A home was struck by lightning that caused a fire.
6/11/2003	6/11/2003	0	0	\$70,763	\$0	Columbia	Lightning struck a home, starting a fire.
7/21/2003	7/21/2003	0	0	\$225,156		Columbia	Lightning struck a home in Spring Valley at 411 Bridgecrest Drive.
8/14/2005	8/14/2005	0	0	\$363,650	\$0	Columbia	Lightning caused a home fire at 204 Upland Trail.
6/12/2006	6/12/2006	0	0	\$2,348,571	\$0	Columbia	Lightning struck a tree and ran through the ground into the home, starting a fire in the home in the Woodcreek Farms subdivision.
6/11/2009	6/11/2009	0	0	\$242,764	\$0	Columbia	Lightning struck a home and ignited a fire that destroyed it. The home was located at 150 Rivendale Drive.
6/11/2009	6/11/2009	0	0	\$551,737	\$0	Columbia	Lightning struck a home at 38 Shoreline Drive and ignited a fire that destroyed it.

Start Date	End Date	Inj.	Fat.	Property Damage	Crop Damage	Location	Description
6/28/2011	6/28/2011	5	0	\$0	\$0	Columbia	A mid-afternoon thunderstorm produced lightning that struck an oak tree at Allen Benedict Court on Harden Street where five landscape and maintenance workers were sitting. One worker was taken to the hospital with non-life-threatening injuries.
<b>TOTAL</b>	<b>55</b>	<b>56</b>	<b>2</b>	<b>\$5,045,799</b>	<b>\$25,787</b>		

Data from Central Midlands Hazard Mitigation Plan, 2016, p. 363.

Due to the sporadic nature and unpredictability of lightning, responders in the City face difficulties when responding to thunderstorm events. Storm debris blocking critical roadways and access points create transportation issues, while power lines may also create fire hazards. This emphasizes the need for implementation of mitigation measures that ensure an adequate response to the impacts from lightning.

#### **Future Risk**

Climate models indicate a range of environmental changes that may contribute to increased thunderstorm activity, but the science in this area is still emergent and projections are difficult to make, particularly at the local scale.<sup>24</sup> Mitigation measures to reduce the risk of thunderstorms in Columbia will be similar to those undertaken to reduce exposure and increase resilience to hurricanes and extreme precipitation events.

## **Hurricanes and Tropical Storms**

### **Overview of Hazard**

Hurricanes and tropical storms are low-pressure systems that originate over warm ocean waters and bring damaging forces from high winds, storm surge, heavy precipitation, and tornadoes. These storms can cause immense destruction and loss

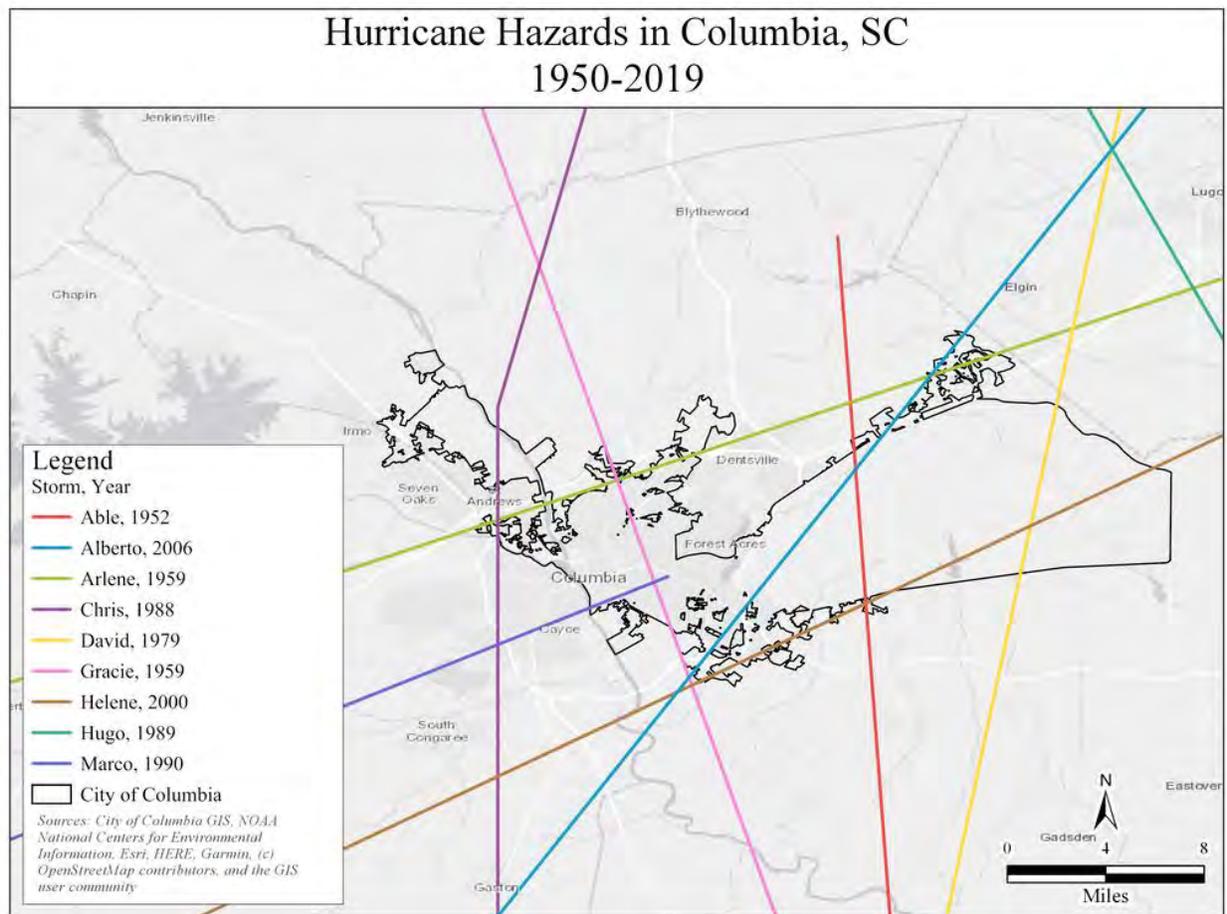
<sup>24</sup> Kossin, J.P., T. Hall, T. Knutson, K.E. Kunkel, R.J. Trapp, D.E. Waliser, and M.F. Wehner. 2017. Extreme storms. In *Climate Science Special Report: Fourth National Climate Assessment, Volume I* [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, pp. 257–276, doi: 10.7930/J07S7KXX.

of life and have historically done so across the United States. The primary damaging forces related to hurricanes and tropical storms in the City are high winds, heavy precipitation, and tornadoes.

### Historical Impact

Since 1851, more than 90 tropical cyclones have affected South Carolina, of which more than 30 have impacted the Central Midlands region where the City of Columbia is located.<sup>25</sup> Those that have impacted the City directly are shown in Figure 17.

Figure 17. Hurricane Hazards in Columbia, SC

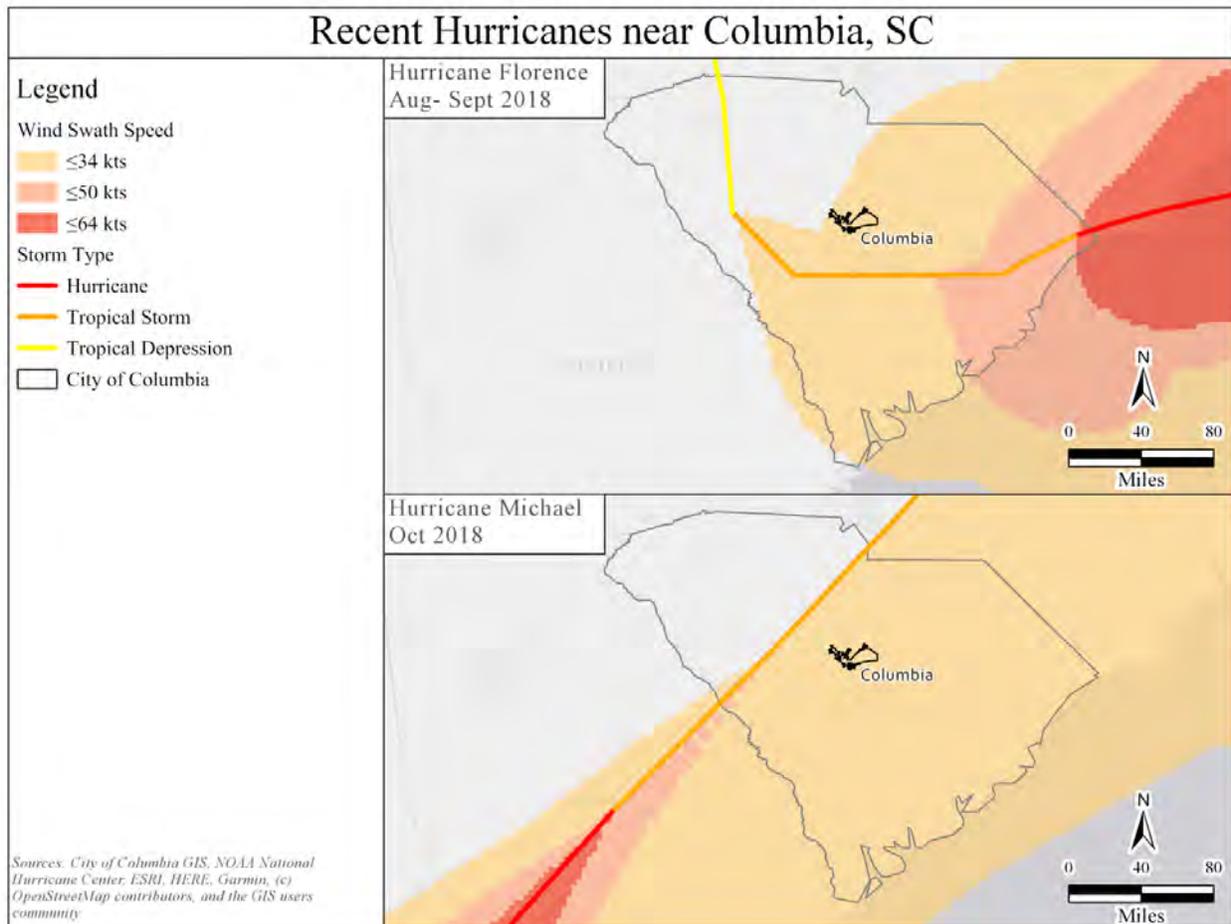


Due to its inland location, the City of Columbia does not experience coastal storm surge but has still historically been at risk from hurricane-force winds, heavy rainfall, flash flooding, and tornadoes that result from hurricanes and tropical storms. Many of the same impacts and risks noted in the Flooding section of this Mitigation Needs Assessment are present with the effects of hurricanes and tropical storms due to

<sup>25</sup> Central Midlands Hazard Mitigation Plan, 2016, p. 33. Accessed on 2/19/2020 at <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

heavy rainfall associated with the outer bands of hurricanes. Figure 18 highlights two recent examples – Hurricane Michael and Hurricane Florence – where the City felt impacts from these storms.

Figure 18. Hurricane Michael and Hurricane Florence Wind Speed for Columbia, SC



While the windspeeds highlighted above are not those that may typically impact the City, property and infrastructure damage due to falling trees, as well as power outages, are highly likely to occur from the strong winds of which the City is at risk in stronger storm scenarios.

#### Future Risk

The Fourth National Climate Assessment reports that climate models and theory point to an increase in the Atlantic region in the intensity of tropical cyclones (i.e., hurricanes) and an increase in the number of very intense cyclones. Increases are projected in precipitation rates (high confidence) and intensity (medium

confidence).<sup>26</sup> While the science is mixed regarding the number of hurricanes that will make landfall, recent experience has dramatically demonstrated that even off-shore hurricanes can have grave consequences for inland communities. The prospect of stronger severe events underscores the urgent need for mitigation.

## 2.5 Quantitative and Qualitative Assessment of Hazard Risks and Hazard Impacts on Community Lifelines



Community lifelines are defined by FEMA’s National Response Framework as services that enable a continuous operation of critical government and business functions and are essential to ensuring human health, safety, and economic security.<sup>27</sup> This is especially critical in the wake of disasters. Lifelines are the integrated network of infrastructure, services, assets, and capabilities<sup>28</sup> that support the recurring needs of the City of Columbia.

The seven community lifelines are as follows:

1. Safety and Security
2. Food, Water, and Shelter
3. Health and Medical
4. Energy (Power and Fuel)
5. Communications
6. Transportation
7. Hazardous Materials

For the City of Columbia, CDBG-MIT mitigation activities will ensure that these critical areas are more resilient and can reliably continue operations during future disasters, and will reduce the risk of loss of life, injury, and property damage and accelerate recovery following a disaster.<sup>29</sup>

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<sup>26</sup> Kossin, J.P., T. Hall, T. Knutson, K.E. Kunkel, R.J. Trapp, D.E. Waliser, and M.F. Wehner. 2017. Extreme storms. In *Climate Science Special Report: Fourth National Climate Assessment, Volume I* [Wuebbles, D.J., D.W. Fahey, K.A. Hibbard, D.J. Dokken, B.C. Stewart, and T.K. Maycock (eds.)]. U.S. Global Change Research Program, Washington, DC, pp. 257–276, doi: 10.7930/J07S7KXX.

<sup>27</sup> FEMA. National Response Framework, Fourth Edition, October 28, 2019, p. ii.

<sup>28</sup> FEMA Community Lifelines Implementation Toolkit, Version 2.0, November 2019. Retrieved from <https://www.fema.gov/media-library-data/1576770152678-87196e4c3d091f0319da967cf47ffd9c/CommunityLifelinesToolkit2.0v2.pdf>

<sup>29</sup> 45838 Federal Register, Vol. 84, No. 169, Friday, August 30, 2019, Notices.

### 2.5.1 Safety and Security

The 2015 floods that impacted the City of Columbia created an unforeseen demand for rescue missions and emergency response. Dumping more than a foot of rain on the first night of the storm, local officials responded to several hundred water rescues that included motorists and homeowners trapped by high water.<sup>30</sup> By the following mid-morning, the fire chief reported challenges in keeping a record of all requests.<sup>31</sup> On October 4, the Columbia-Richland County 911 processed 6,415 phone calls in the first 24 hours, a 114% increase from the average. The agency dispatches total per day reached more than 2,600, a 70% increase. More than 100 streets in the City were deemed closed, blocked, or impassable.<sup>32</sup>

The heavy rains and floods did not spare Columbia's public service stations, which are critical for securing safety across the City. Water infiltrated two police facilities, a police car, and submersed ammunition; roof leaks affected most fire stations; and one fire station and training facility were inundated and recorded as lost.<sup>33</sup>

Separately, as state environment officials recommended staff evacuate and shut down the City of Columbia Metro Wastewater Treatment Plant, due to the condition of a nearby dike, four employees stayed behind to keep the plant running. The volume of water the plant processed tripled its 60-million gallon per day limit, making it the most significant amount in the plant's history – these brave heroes mitigated raw sewage pouring into the Columbia River, surrounding neighborhoods and city streets.<sup>34</sup>

The resiliency of government functions – such as the capacity and security of police, fire responders, and city employees – is critical for ensuring that response times do not suffer and communities can remain the focus in times of need. Resilient building investment and construction ensure that facilities can withstand the impacts of hazards and reduce their susceptibility to future damages. Resilient, storm-resistant designs can also consider additional amenities that can serve the community through

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<sup>30</sup> U.S. Department of Commerce. The Historic South Carolina Floods of October 1–5, 2015 Service Assessment. Retrieved from

[https://www.weather.gov/media/publications/assessments/SCFlooding\\_072216\\_Signed\\_Final.pdf](https://www.weather.gov/media/publications/assessments/SCFlooding_072216_Signed_Final.pdf)

<sup>31</sup> Times Free Press. Historic South Carolina Floods: Heavy Rains, Hundreds Rescued. Retrieved from <https://www.timesfreepress.com/news/breakingnews/story/2015/oct/04/historic-south-carolina-floods-heavy-rain-hundreds-rescued/328719/>

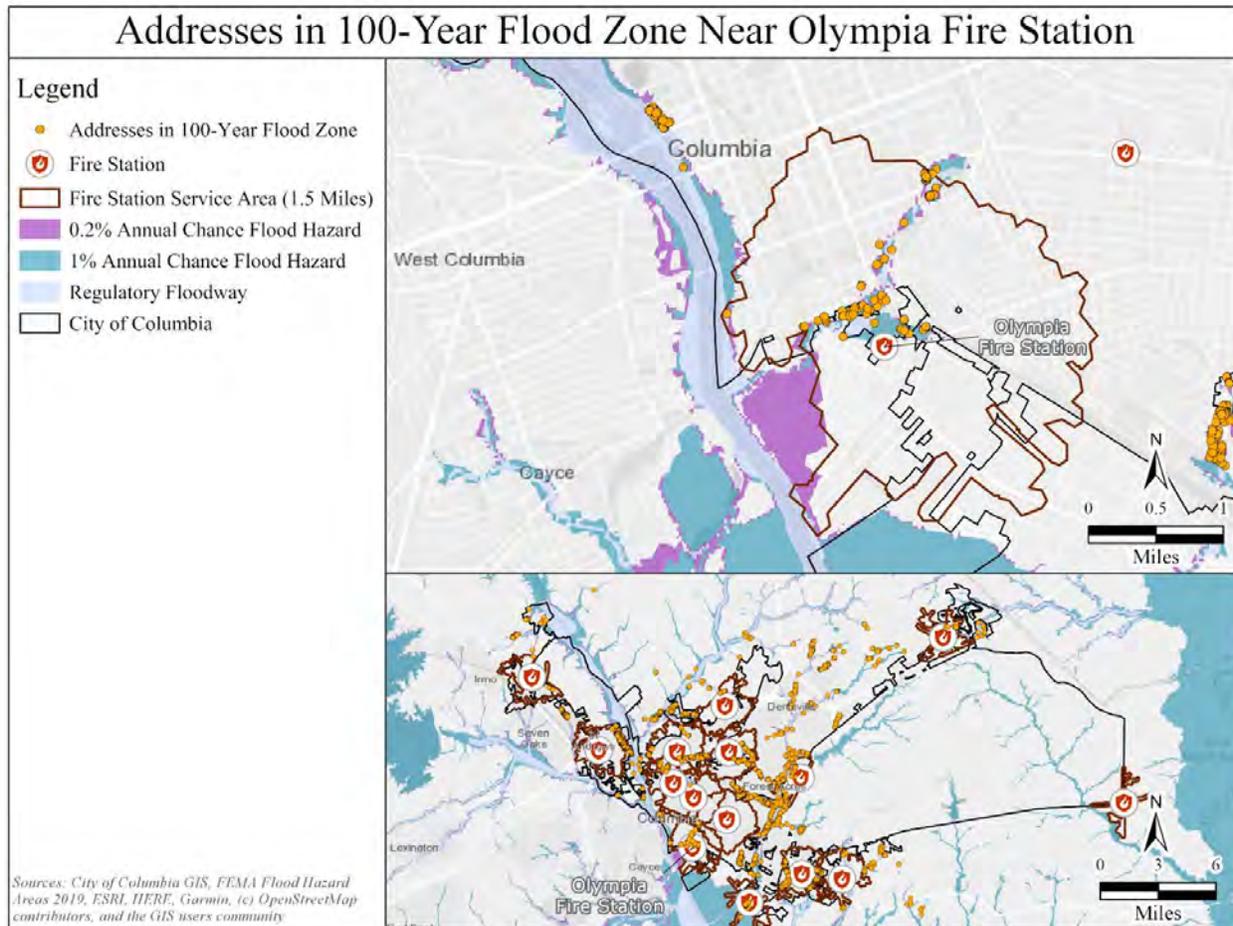
<sup>32</sup> Road to Recovery Annual Report: Status of Recovery One Year After the Historic Flood Event in October 2015, pp. 8–9. Retrieved from [https://columbiasc.gov/depts/flood/final-road\\_to\\_recovery\\_annual\\_report\\_print.pdf](https://columbiasc.gov/depts/flood/final-road_to_recovery_annual_report_print.pdf)

<sup>33</sup> Ibid, p. 13.

<sup>34</sup> Municipal Association of South Carolina. October 2016. One year later, cities take steps, lessons from flood. Retrieved from [https://www.masc.sc/Pages/newsroom/uptown/October%202016/One\\_year\\_later\\_lessons\\_from\\_flood.aspx](https://www.masc.sc/Pages/newsroom/uptown/October%202016/One_year_later_lessons_from_flood.aspx)

training spaces for volunteers to increase capacity or storm shelters to increase the availability of safe spaces. Mitigating the potential for losses of government services will be crucial for Columbia’s Safety and Security Lifeline. To highlight this future risk, Figure 19 shows addresses in 100-year flood zones with respect to the Olympia Fire Station’s service area.

Figure 19. Addresses in 100-Year Flood Zone Near Olympia Fire Station



### 2.5.2 Food, Water, and Shelter

The Food, Water, and Shelter Lifeline focuses on the fundamental operations for daily life. It considers the impact on supply chains, commercial facilities, residential areas, and citywide distribution systems. Disasters can quickly put a significant strain on the ability to maintain the supply chain of food, potable water, and shelter to residents. Without proper mitigation measures, this strain will increase as projected flood risk increases with the prospect of climate change.

In 2015, Columbia experienced a significant test to its Water Lifeline. Columbia Water operates and maintains the drinking water treatment, distribution, and storage system that serves City customers. Between the Columbia Canal and Lake Murray

Water Treatment Plants, they have a distribution system that has more than 2,400 miles of water lines, pump stations, storage tanks, and pressure-reducing valves that distribute water across nine major pressure zones.<sup>35</sup> Floods on October 4, 2015, ripped a 60-foot section of the Columbia Canal, destroying the head gates, impacting the water levels that affected water pressure, and ultimately threatening the potable water distribution system.<sup>36</sup> The canal breach, combined with numerous line breaks throughout the water system, resulted in a 10-day disruption of clean drinking water for more than 375,000 residents who received boil water notices.<sup>37</sup> Figure 20 shows the location of the canal breach and subsequent area of impacted water supply.

The Columbia Canal is not a flood control structure. It is a water delivery system. When the canal breached there was no structural or flooding threat to housing; however, the breach did severely impact the entire City's water supply and fire protection capacity. This caused a citywide boil water notice. Some areas had no potable water at all. The loss of pressure caused threats to the system and also endangered water service to the City's hospitals. The importance of the City's capacity to consistently provide a safe, potable source of drinking water to the community as a whole, and particularly to protected classes and minority communities, cannot be understated. The country has seen firsthand the impact of a failure to provide this most critical resource. It is for this reason that this project is receiving a high priority and CDBG-MIT funding.

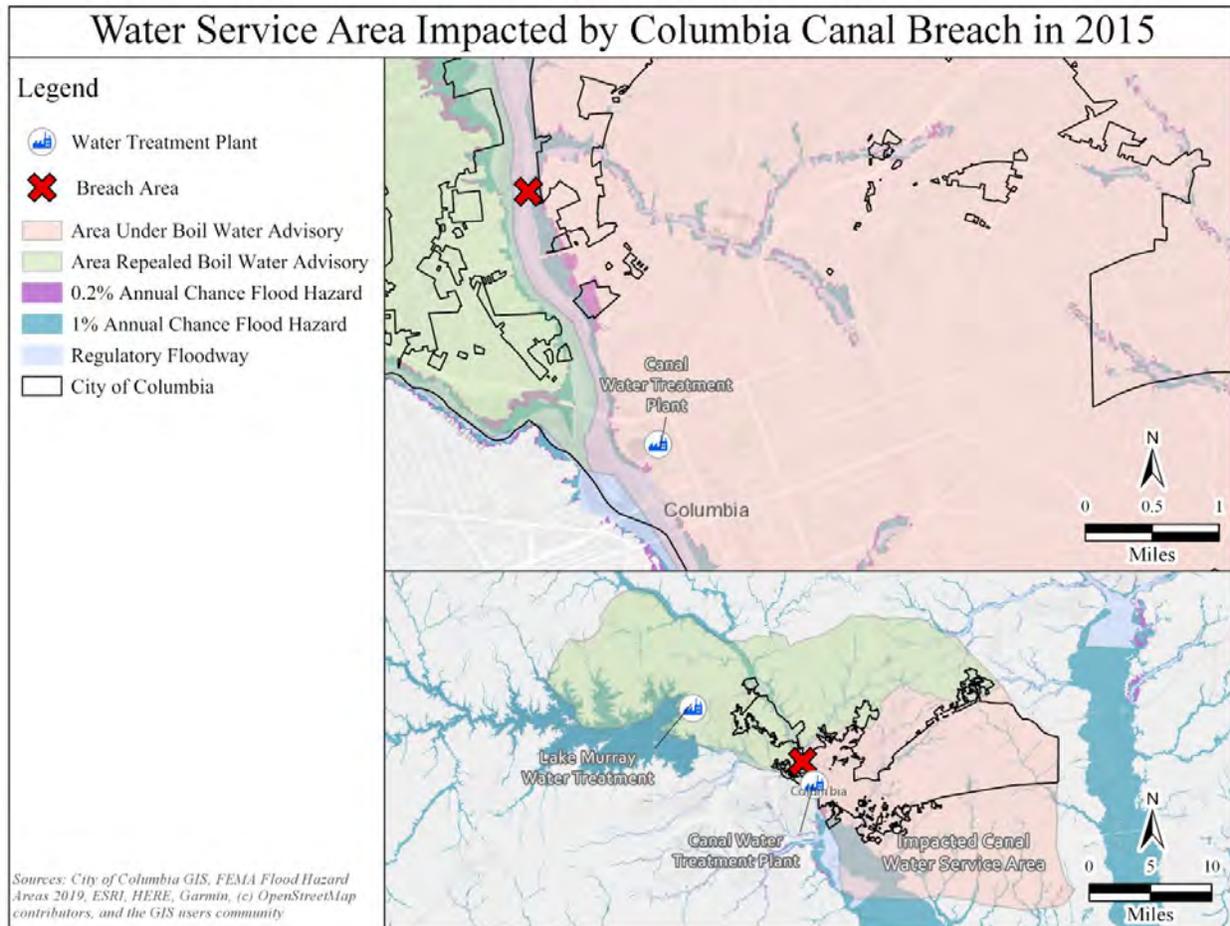
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<sup>35</sup> City of Columbia Drinking Water website. Accessed on 2/20/2020 at <https://www.columbiasc.net/drinking-water>

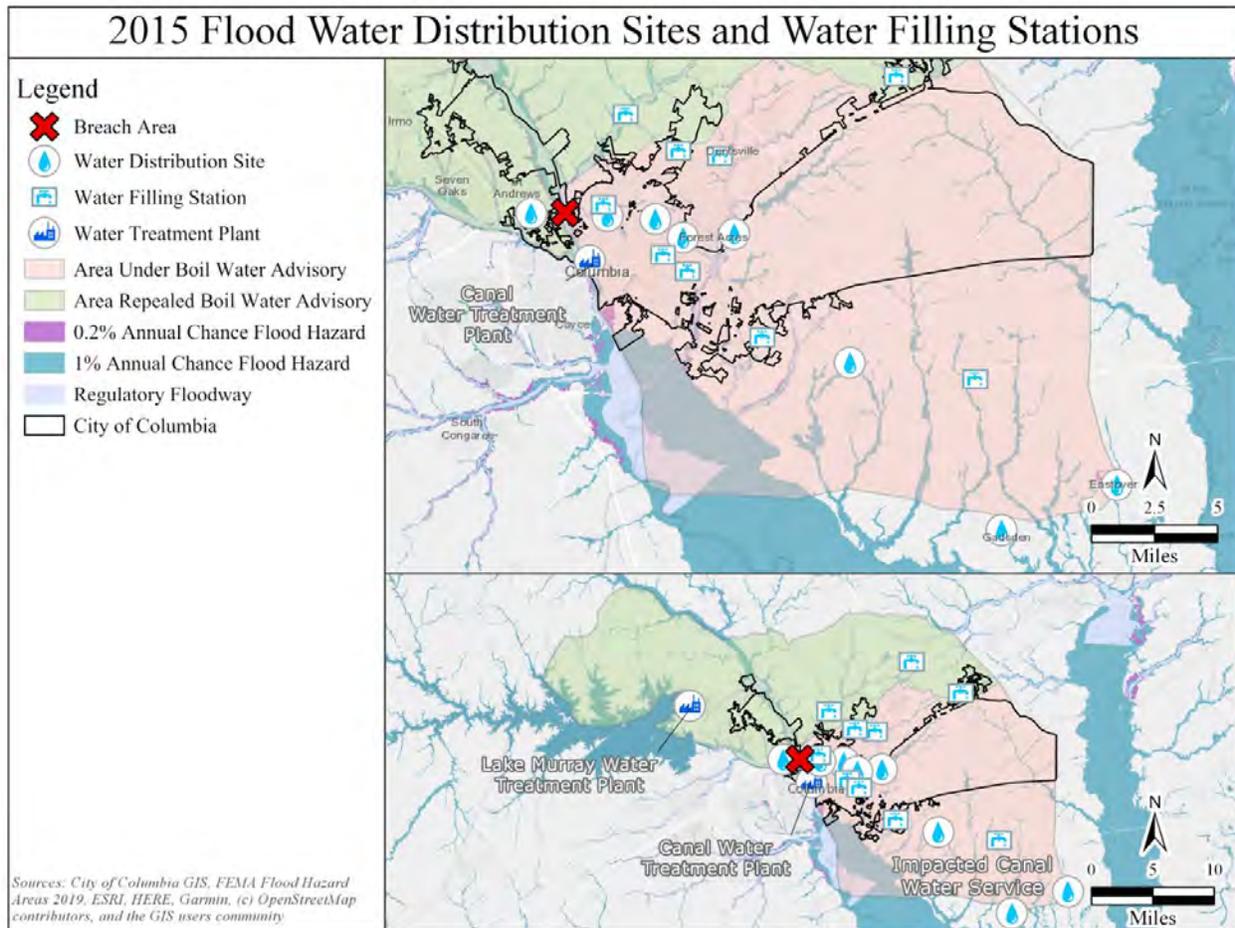
<sup>36</sup> Road to Recovery Annual Report: Status of Recovery One Year After the Historic Flood Event in October 2015, pp. 8–9. Retrieved from <https://columbiasc.gov/depts/flood/final-road-to-recovery-annual-report-print.pdf>

<sup>37</sup> City of Columbia. CDBG-DR Action Plan, December 21, 2016. Accessed on 2/23/2020 at <https://dr.columbiasc.gov/wp-content/uploads/2016/08/20161221-COC-Final-Action-Plan-Revisions.pdf>

Figure 20. Water Service Area Impacted by Columbia Canal Breach in 2015



Within just 2 hours of canal water rushing into the Congaree River, the water treatment plant lost the amount of water that would usually supply the City for 5 days. Subsequently, the City had to act swiftly to ensure that water levels reached a sufficient level to allow adequate water intake at the water treatment plant. At the same time, water main breaks and dam failures inundated streets and neighborhoods across the City, further impacting water supply and residential areas. In response, the City opened eight water distribution sites and 10 water filling stations across the City, which are shown in Figure 21.

Figure 21. 2015 Flood Water Distribution Sites and Water Filling Stations<sup>38</sup>

The flooding was unprecedented, affecting the City’s capacity to support hundreds of residents who sought refuge from the rains to come – and later, by the floods that became more detrimental as dams failed.<sup>39</sup> The City had to open an additional emergency facility that would not usually start operations until November to assist people with enduring cold temperatures. It also requested a local partner, on short notice, to open their winter shelter; by Saturday, it hosted more than 300 people. Supplemental, temporary shelters were added at local schools and community spaces across the City. Yet, as Columbia Water wrestled with water pressure, shelters faced no water for drinking, bathing, or toilets.<sup>40</sup> The connections in the Food, Water, and

<sup>38</sup> City of Columbia Incident Brief October 8 – November 6, 2015, pp. 19–20. Retrieved from [https://www.columbiasc.net/depts/pr/incident\\_response\\_brief\\_oct\\_8\\_-\\_nov\\_6\\_2015.pdf](https://www.columbiasc.net/depts/pr/incident_response_brief_oct_8_-_nov_6_2015.pdf)

<sup>39</sup> LA Times. 2015, October 7. South Carolina residents rush to higher ground as 14 dams fail. Retrieved from <https://www.latimes.com/nation/la-na-south-carolina-floods-dams-20151007-story.html>

<sup>40</sup> Al Jazeera. 2015, October 6. Homeless scramble for shelter in flood-ravaged South Carolina. Retrieved from <http://america.aljazeera.com/articles/2015/10/6/south-carolina-shelters-homeless.html>

Shelter Lifeline remain critical for ensuring the survival of residents as they endure a storm. The inclusion of shelter in emergency management, in conjunction with dam safety inspections and investment in mitigating future impacts on water systems, is critical for reducing vulnerability during future disasters.<sup>41</sup>

### Future Risks

Future risks to essential services are expected to increase due to a combination of factors. Urban growth itself – increasing population, more businesses, and denser communities – puts more stress on vital public services, requiring the City to plan for and manage expanding water and sanitation, local transport, and electricity services with Columbia Water and other utilities and regional partners. Climate changes, such as worsening heat waves,<sup>42</sup> will add further stress on these services. Infrastructure related to drinking water and wastewater treatment has the potential to be compromised more frequently by extreme weather events, and investments should ensure their safety.<sup>43</sup> Gaps in the availability of potable water, and the resulting health impacts that this generates, can have cascading impacts on health and medical services as demand for health care – particularly for vulnerable populations – increases.

#### 2.5.3 Health and Medical

The Health and Medical Lifeline includes medical care, patient movement, fatality management, public health, and the medical supply chain. In the City of Columbia, these critical systems have been affected by disasters in the past.

As a result of the canal breach and water supply impacts from DR-4241, there was no potable water source for several days for Palmetto Health Baptist, a 400-bed community hospital, or Palmetto Health Richland, a major 649-bed academic trauma hospital. Staff had to use bottled or sterile water for drinking and washing their hands, and non-potable water for operating chillers and boilers, and even for operating MRIs or CT scanners.<sup>44</sup> Figure 22 shows the two hospitals with respect to

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<sup>41</sup> LA Times. 2015, October 7. South Carolina residents rush to higher ground as 14 dams fail. Retrieved from <https://www.latimes.com/nation/la-na-south-carolina-floods-dams-20151007-story.html>

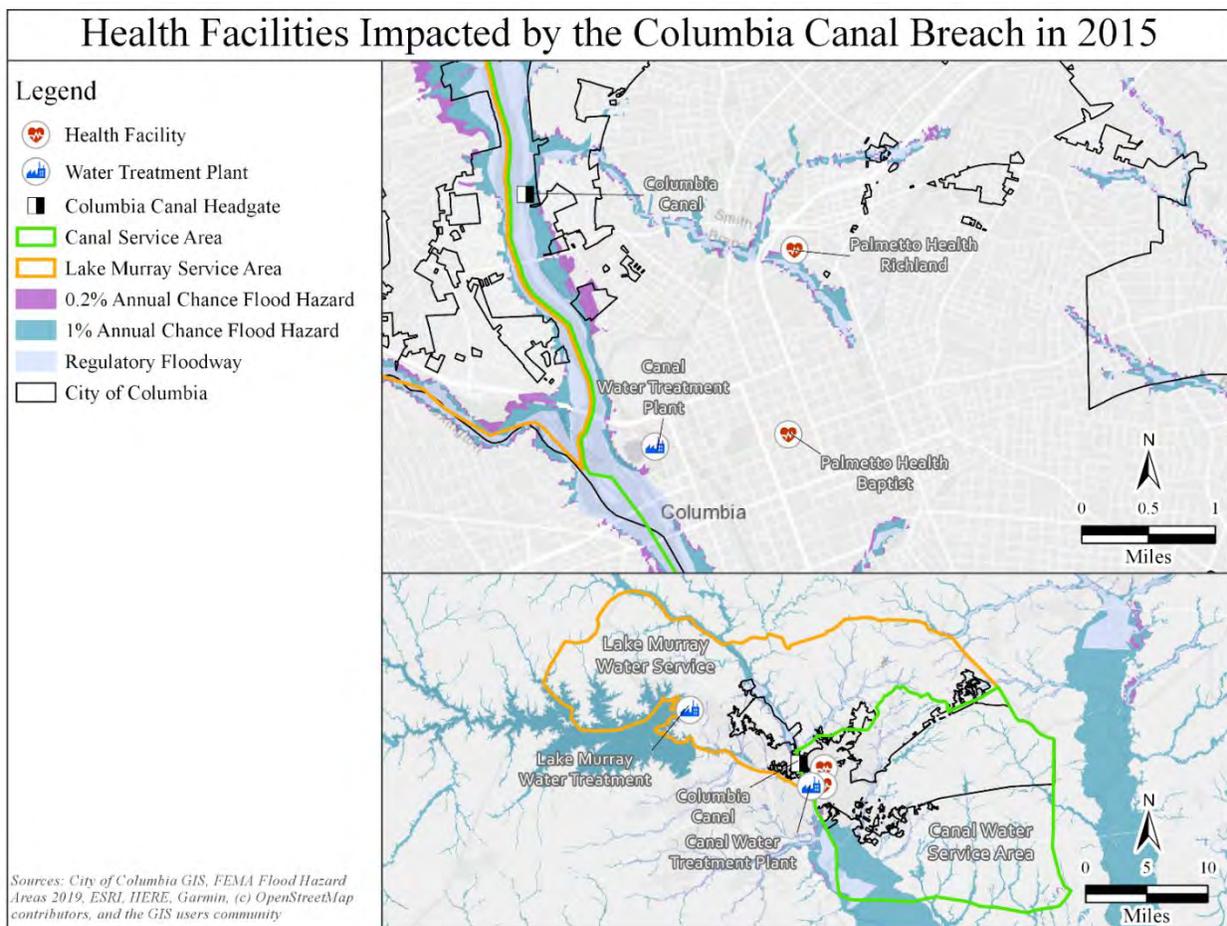
<sup>42</sup> Habeeb, D., J. Vargo, and B. Stone, 2015. Rising heat wave trends in large US cities. *Natural Hazards*, 76(3), 1651–1665. <http://dx.doi.org/10.1007/s11069-014-1563-z>

<sup>43</sup> Carter, L., A. Terando, K. Dow, K. Hiers, K.E. Kunkel, A. Lascurain, D. Marcy, M. Osland, and P. Schramm. 2018. Southeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, pp. 743–808. doi: 10.7930/NCA4.2018.CH19. Available at <https://nca2018.globalchange.gov/chapter/southeast>

<sup>44</sup> South Carolina Public Radio. A Story from the Columbia Canal: Hospitals and Water. Retrieved from <https://www.southcarolinapublicradio.org/post/story-columbia-canal-hospitals-and-water>

the water service area that was impacted due to the canal breach as a result of the flooding. To meet this need, the Fire Department committed 18 straight hours to ensure that water allowed for continual hospital operations, requiring more than 500,000 gallons of water to be transported to both hospitals. However, fire trucks can only transport 1,500 gallons of water at a time, making this solution only temporary. Once the City was able to restore water pressure, the challenge was transitioned to operationalizing the hospitals under a boil water advisory. The National Guard arrived to assist the City for the days that followed, until the City was able to assist the hospitals.<sup>45</sup>

Figure 22. Health and Medical Facilities with Water Supply Impacted

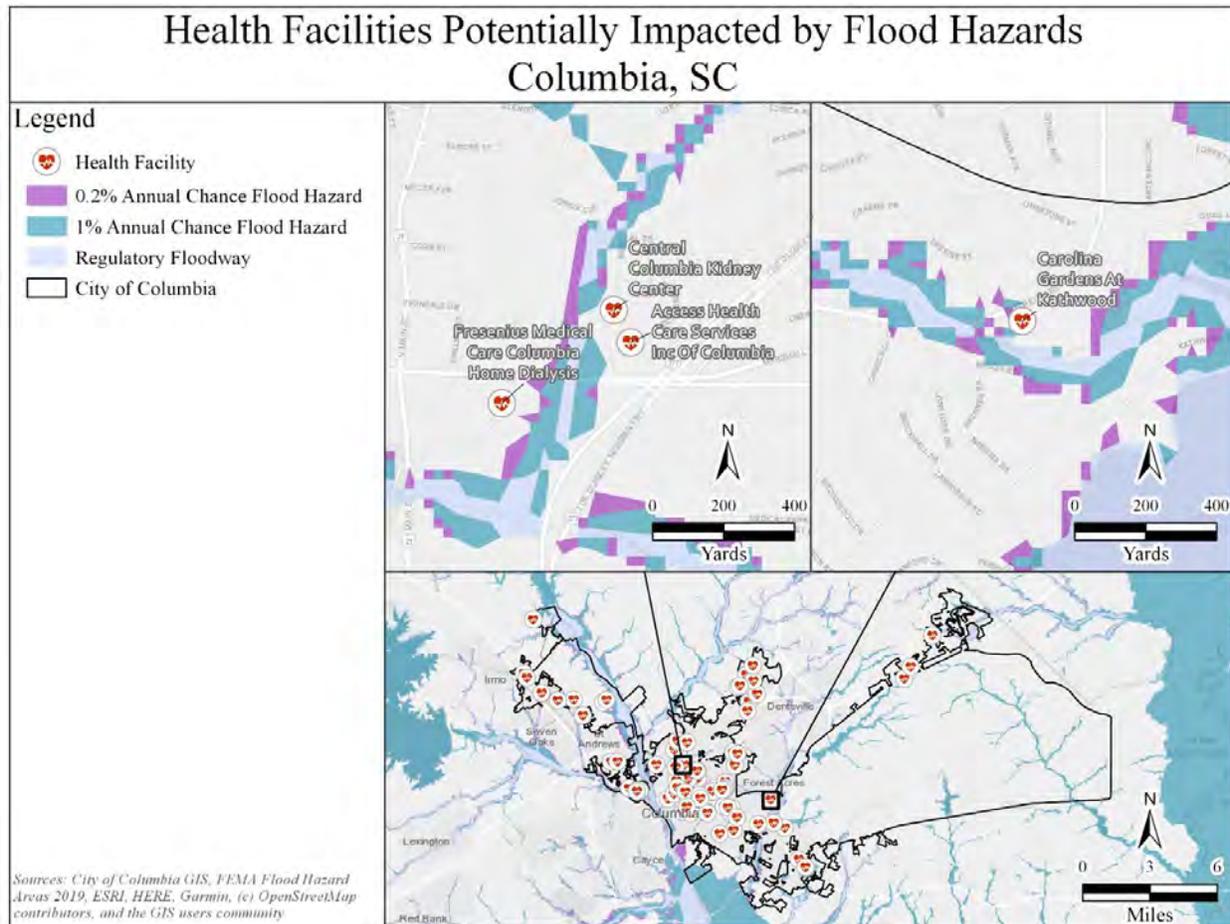


In addition to the impacts on continuity of operations as a result of compromised water supply, several hospitals in the City of Columbia are located within 100 yards of FEMA’s 1% or 0.2% annual chance flood hazard areas, as shown in Figure 23. This has the potential to impact staff and patient accessibility in the event of a storm and may require an increase in emergency response ability to ensure alternative patient

<sup>45</sup> Ibid.

transportation. When the water supply was compromised at the hospitals noted above, the Fire Department worked around the clock to deliver water for continued operations.

Figure 23. Hospitals Within 100 Yards of Flood Hazard Areas



## Future Risks

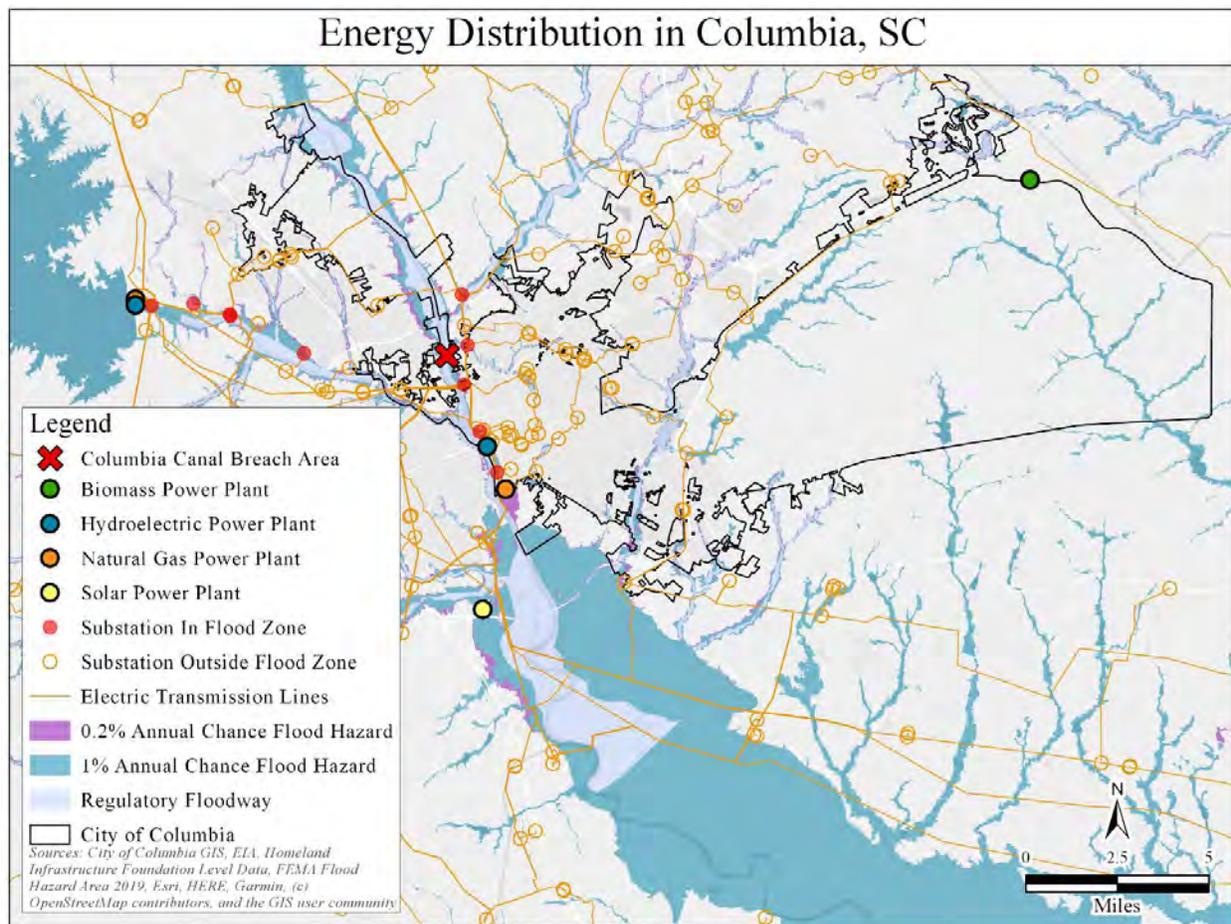
Increased frequency in extreme precipitation events, severe storms, and extreme heat as a result of climate change may exacerbate the risk of hazard impacts, such as these, to the Health and Medical Lifeline of the City. Mitigation measures, such as those that reduce future potential for disruption to clean water supply and increase flood emergency response measures, will ensure a reduced threat to loss of life.

### 2.5.4 Energy (Power and Fuel)

The Energy Lifeline includes the power grid and its critical facilities, including fuel supply lines that ensure continuous power supply to the City (Figure 24). The Energy Lifeline in the City of Columbia is one of the most critical, given that the City contains many of the critical facilities that support both the City and the surrounding areas. It

is, however, one of the areas that is most often impacted during storms due to downed power lines resulting in power outages. The restoration process often includes assessing and repairing damage to large transmission towers, power lines, and substations, clearing obstructions and repairing primary distribution poles and power lines.<sup>46</sup> Figure 24 shows the transmission system in the City and highlights substations that may be impacted during flood events. In addition, as a result of the flooding in 2015, the Columbia Canal breach resulted in a shutdown of water supply to the hydroelectric plant downstream. This hydroelectric plant was originally able to generate 10 megawatts of power and was operational up until the 2015 flood but has yet to resume functionality due to the impacts on the canal.<sup>47</sup>

Figure 24. Energy Distribution in Columbia, SC



Maintaining continuity of energy and power supply during disaster is critical to ensuring that the City's other community lifelines that provide safety and security, or health and medical care are able to maintain operations to ensure an emergency response that limits loss of life and property. In a long-term power

<sup>46</sup> <https://columbiabusinessreport.com/news/government/75148/>

<sup>47</sup> <https://www.southcarolinapublicradio.org/post/columbia-canal-rebuild-could-be-years-away>

outage as a result of storms, FEMA emphasizes that emergency power generation assets (e.g., generators and fuel) to maintain mission-essential functions and provide lifesaving and life-sustaining support are critical.<sup>48</sup>

For example, if the City’s Police Headquarters loses power, critical functions housed in the building must be relocated to an alternate facility until power can be restored. This results in an interruption of important functions during times of disaster, where every second can make a difference.

### Future Risks to Energy

Increasing temperatures and increased incidence of extreme events – including heavy precipitation, as well as hurricanes – will increase the risks to energy systems in Columbia. These risks include both direct damage to generation and transmission infrastructure, as well as pressure on energy utilities due to increasing demand.<sup>49</sup>

The risk of direct damage to energy infrastructure due to flooding and extreme storm events will increase as the frequency, duration, and intensity of precipitation and hurricane events increase. These growing risks point to the need for further mitigation actions to reduce flooding, and to site, design, and construct new or replacement infrastructure to reduce exposure and increase resilience to future impacts.

As discussed in Section 2.1, the number of days of extreme heat is projected to increase due to climate change. A hotter city – the result of hotter days and less cool nights, as well as the urban heat island effect created by an increase in buildings and pavement – increases demand for air conditioning and puts more strain on power systems. Increasing temperatures increase energy demand, and the Southeast is projected to experience the highest regional costs due to increased demand.<sup>50,51</sup>

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<sup>48</sup> FEMA. June 2017. Power Outage Incident Annex to the Response and Recovery Federal Interagency Operational Plans: Managing the Cascading Impacts from a Long-Term Power Outage. Retrieved from [https://www.fema.gov/media-library-data/1512398599047-7565406438d0820111177a9a2d4ee3c6/POIA\\_Final\\_7-2017v2\\_\(Compliant\\_pda\)\\_508.pdf](https://www.fema.gov/media-library-data/1512398599047-7565406438d0820111177a9a2d4ee3c6/POIA_Final_7-2017v2_(Compliant_pda)_508.pdf)

<sup>49</sup> U.S. Department of Energy. October 2015. Climate Change and the U.S. Energy Sector: Regional Vulnerabilities and Resilience Solutions. Retrieved from [https://www.energy.gov/sites/prod/files/2015/10/f27/Regional\\_Climate\\_Vulnerabilities\\_and\\_Resilience\\_Solutions\\_0.pdf](https://www.energy.gov/sites/prod/files/2015/10/f27/Regional_Climate_Vulnerabilities_and_Resilience_Solutions_0.pdf)

<sup>50</sup> U.S. EPA. 2017. Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment, EPA 430-R-17-001. Retrieved from [https://indecon.com/wp-content/uploads/CIRA2.0\\_TechnicalReportforNCA4.pdf](https://indecon.com/wp-content/uploads/CIRA2.0_TechnicalReportforNCA4.pdf)

<sup>51</sup> Carter, L., A. Terando, K. Dow, K. Hiers, K.E. Kunkel, A. Lascurain, D. Marcy, M. Osland, and P. Schramm. 2018. Southeast. In *Impacts, Risks, and Adaptation in the United States: Fourth National Climate Assessment, Volume II* [Reidmiller, D.R., C.W. Avery, D.R. Easterling, K.E. Kunkel, K.L.M. Lewis, T.K. Maycock, and B.C. Stewart (eds.)]. U.S. Global Change Research Program, Washington, DC, pp. 743–808. doi: 10.7930/NCA4.2018.CH19. Retrieved from <https://nca2018.globalchange.gov/chapter/southeast>

Increases in the cost of energy have impacts across the economy, affecting both local businesses and households, and can increase the level of “energy poverty” among vulnerable populations.<sup>52</sup> Surges in demand can increase the risk of disruption to electricity supply; loss of power can disrupt the full range of essential public services, including medical support, water and sanitation services, communications, and emergency response. Ensuring that energy and power availability is resilient is vital to ensuring the continuity of critical operations, such as emergency response and communications during disaster. This may include the development of back-up generation and transmission systems to ensure uninterrupted electricity service, especially to the City’s critical facilities.

### 2.5.5 Communications

The Communications Lifeline includes the necessary information channels critical during disaster tracking, response, and recovery. The channels include responder communications, local alerts, warnings and messages, 911 and dispatch, infrastructure streams (i.e., internet, broadcast, and satellite), and finance (i.e., banking services and electronic payments). These channels of information keep residents, businesses, and local services aware of disaster developments, including storm updates, safety information, possible hazards, and city coordination for response and recovery needs.

The 2015 floods impacted most of the State of South Carolina, making federal, state, and local coordination necessary for alerting the public about storm updates and safety messages.<sup>53</sup> Social media proved to be a significant vehicle for effectively sharing information during the flood event with government agencies, community members, media outlets, and nonprofit partners. Storm alerts, updates, and messages were able to reach a diverse audience of stakeholders and ensured that the public was connected and engaged. These communication channels provided weather conditions, safety tips, information on where to access resources such as water, volunteer opportunities, and appreciation for fellow community members.<sup>54</sup>

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<sup>52</sup> U.S. Department of Energy. October 2015. Climate Change and the U.S. Energy Sector: Regional Vulnerabilities and Resilience Solutions. Retrieved from [https://www.energy.gov/sites/prod/files/2015/10/f27/Regional\\_Climate\\_Vulnerabilities\\_and\\_Resilience\\_Solutions\\_0.pdf](https://www.energy.gov/sites/prod/files/2015/10/f27/Regional_Climate_Vulnerabilities_and_Resilience_Solutions_0.pdf)

<sup>53</sup> U.S. Department of Commerce. The Historic South Carolina Floods of October 1–5, 2015 Service Assessment. Retrieved from [https://www.weather.gov/media/publications/assessments/SCFlooding\\_072216\\_Signed\\_Final.pdf](https://www.weather.gov/media/publications/assessments/SCFlooding_072216_Signed_Final.pdf)

<sup>54</sup> University of South Carolina Office of Research. SC Floods Project Summaries: Examining the Role of Twitter as a Response and Recovery Strategy During the #SCFlood in October 2015, p. 8. Retrieved from [https://www.sc.edu/about/offices\\_and\\_divisions/research/docs/sc\\_floods\\_project\\_summary\\_booklet.pdf](https://www.sc.edu/about/offices_and_divisions/research/docs/sc_floods_project_summary_booklet.pdf)

As for the Columbia-Richland County (CRC) 911, they processed 6,415 phone calls on October 4, 2015, alone, a 114% increase from the average. For the days that followed, CRC 911 saw an average of 2,500–3,000 calls per day, a considerable steady flow as dam failures continued throughout the City. The agency dispatches total for October 4 reached more than 2,600, a 70% increase, with the rest of the week dropping to an average of 1,400–1,600 dispatches.<sup>55</sup> Aligned with the urgency, the Columbia Water Customer Care Center also saw a hike of more than 6,500 calls, as the City coped with a boil water advisory.<sup>56</sup> Communication throughout the City was overloaded, causing a backlog on rescue missions, threatening response times in what could have been life-threatening situations. At the peak of October 4, the Police Department noted 200 pending calls for rescues.<sup>57</sup> In addition, due to the depth of the water, roads were blocked, and emergency call boxes were lost. Winds and saturated soils also led to downed trees and power line poles across Columbia, leading to communication and power disconnections.<sup>58</sup>

The City was also able to leverage the Columbia Richland Alerts – launched in 2013 – for time-sensitive critical information alerts and advisories via email, phone, and text message. City messaging to the public included an overnight curfew requesting that people stay off the roads as the rain persisted, and a boil water advisory was shared due to water main breaks and capacity concerns about the water treatment plant. Local broadcasters, education partners, and nonprofits were also able to provide supplemental support by providing Spanish-language messaging when government agencies only alerted residents in English.<sup>59</sup>

Coordination across government agencies and local partners, such as local broadcasters and nonprofits, indeed showcase the importance of a robust Communications Lifeline during disaster events. Power outages, equipment damage, and overloaded communication systems are examples of disruptions to communication channels. Resilient infrastructure, connections, and alternative

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<sup>55</sup> Road to Recovery Annual Report: Status of Recovery One Year After the Historic Flood Event in October 2015, pp. 8–9. Retrieved from <https://columbiasc.gov/depts/flood/final-road-to-recovery-annual-report-print.pdf>

<sup>56</sup> City of Columbia Incident Brief October 8 – November 6, 2015, p. 7. Retrieved from [https://www.columbiasc.net/depts/pr/incident\\_response\\_brief\\_oct\\_8\\_-\\_nov\\_6\\_2015.pdf](https://www.columbiasc.net/depts/pr/incident_response_brief_oct_8_-_nov_6_2015.pdf)

<sup>57</sup> Flooding Cripples South Carolina Where Some Areas See Over a Foot of Rain. Retrieved from <https://www.nytimes.com/2015/10/05/us/south-carolina-residents-told-to-stay-home-as-rain-continues-to-pound-region.html>

<sup>58</sup> U.S. Department of Commerce. The Historic South Carolina Floods of October 1–5, 2015 Service Assessment. Retrieved from [https://www.weather.gov/media/publications/assessments/SCFlooding\\_072216\\_Signed\\_Final.pdf](https://www.weather.gov/media/publications/assessments/SCFlooding_072216_Signed_Final.pdf)

<sup>59</sup> University of South Carolina Office of Research. SC Floods Project Summaries: Experiences of Latinos Affected by the Floods in Columbia, SC, p. 15. Retrieved from [https://www.sc.edu/about/offices\\_and\\_divisions/research/docs/sc\\_floods\\_project\\_summary\\_booklet.pdf](https://www.sc.edu/about/offices_and_divisions/research/docs/sc_floods_project_summary_booklet.pdf)

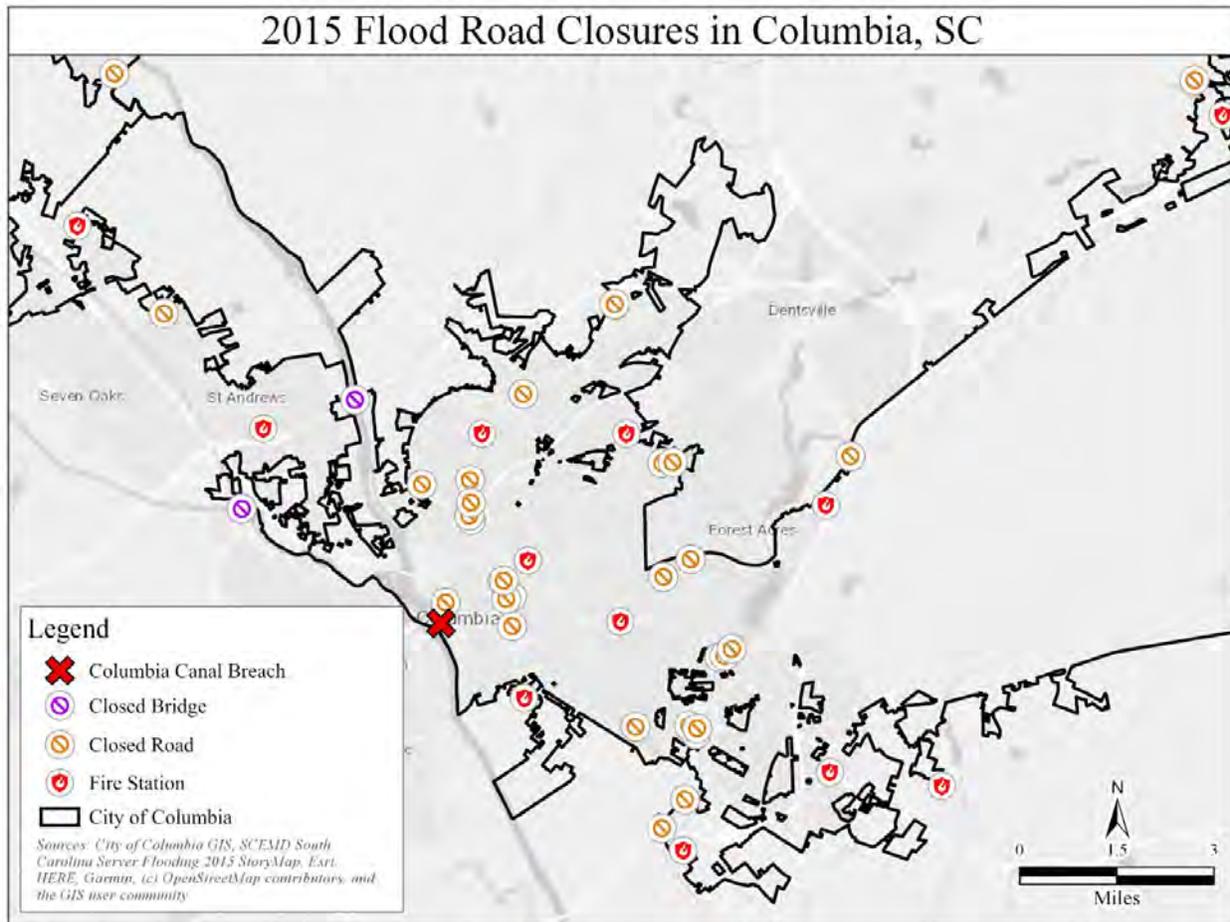
methods must ensure a variety of distribution channels, languages, and partners to reach the City’s diverse population and landscape in times of shock.

#### 2.5.6 Transportation

The City of Columbia’s Transportation Lifeline includes the highways, roads, bridges, and other transportation infrastructure that are utilized for the transit of people and goods. This includes mass transit, railway, aviation, and maritime. Transportation systems in the City are essential for regular operations but also are critical during times of disaster. Many of the other community lifelines are inherently dependent upon transportation. Response and recovery operations rely on accessible transportation routes in order to ensure the provision of food or medical supplies to those in need. Damaged or flooded transportation networks such as roads and bridges can impede access to essential services such as hospitals, and stifle support from fire departments and police.

The critical importance of a reliable transportation infrastructure was demonstrated during the 2015 floods, when multiple intersections were affected, disrupting efficient emergency response and services. The City’s Emergency Management Division actively published roadway intersections that were closed due to flooding during DR-4241. Figure 25 depicts these locations in relation to critical service areas, highlighting the role of reliable transportation networks at the local, street-by-street level during flood events.

Figure 25. Road Closures Due to DR-4241 Flooding and Critical Facilities in Columbia



During the floods of 2015, major portions of I-95 and three other interstates (I-20, I-26, and I-77), including a 70-mile section of I-95 from I-26 to I-20 in the Columbia/Lexington area at the Saluda River, were also closed in South Carolina. Floods rendered many roadways impassable and, in some instances, officials were concerned about bridges that may have been rendered unsafe as well.<sup>60</sup>

### Future Risks to Transportation

As the population of Columbia continues to grow and economic activity increases, reliable transportation will be an essential component in building a sustainable and vital city. The most recently adopted Unified Work Program for transportation (2015–2017) highlights a future multi-modal transportation network that meets expanding passenger and freight needs, addresses congestion, and meets both environmental

<sup>60</sup> [https://www.umcsc.org/PDF/disasterresponse/DISASTER\\_RESOURCES\\_SC\\_10%205%2015.pdf](https://www.umcsc.org/PDF/disasterresponse/DISASTER_RESOURCES_SC_10%205%2015.pdf)

and social goals.<sup>61</sup> To ensure the reliability and robustness of its transportation infrastructure and services, Columbia needs to take action to reduce future risks to the system.

The primary future risk to transportation networks and subsequent emergency response efforts in Columbia will continue to be flooding. Given the increasing frequency of severe rainfall events, as discussed in Section 2.1, the potential flood risk to Columbia’s roads and bridges can be expected to increase over time. This can become an important consideration when determining strategic locations for critical facilities such as fire stations and police departments. According to an EPA technical study for the Fourth National Climate Assessment, the Southeast region has already experienced the most damage to roads and bridges of any U.S. region, and these losses to transportation infrastructure are expected to grow unless mitigation measures are implemented. The EPA report states: “Under both RCPs, the Southeast is projected to have the highest number of vulnerable bridges in 2050 and the second highest in 2090 of all the regions, making up roughly one third of the national total of vulnerable bridges. Cumulative costs to rail by the end of the century are also highest in the Southeast region under both RCPs. Adaptation costs for urban drainage are second highest (behind Southern Plains) under RCP 8.5 (based on 50-year storm estimates).”<sup>62</sup>

The increased disruption of roads and bridges due to flooding has cascading impacts across all lifelines, as transportation is a critical element of each essential service component. Furthermore, it is worth noting that future climate change stressors also have longer range impacts on transportation infrastructure that increase the costs of operations and maintenance. These impacts include more rapid deterioration of pavements as a result of high heat and inundation, damage to lighting and signage during severe storms, and increased erosion rates. These more gradual impacts on infrastructure resilience should be considered as the City budgets for repairs and reconstruction.

### 2.5.7 Hazardous Materials

The Hazardous Materials Lifeline refers to HAZMAT facilities, hazardous materials, pollutants, or contaminants. Often hazardous materials are utilized or transported as part of daily operations but become a danger when exposed to the public as a result of an accidental release.

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<sup>61</sup> Unified Planning Work Program FY 2015–2017, Columbia Area Transportation Study (COATS), Central Midland Council of Governments, adopted June 25, 2015. Retrieved from <https://centralmidlands.org/wp-content/uploads/UPWP%202015-2017%20FINAL%20DOCUMENT%20APPROVED%206-25-15.pdf>

<sup>62</sup> U.S. EPA. 2017. Multi-Model Framework for Quantitative Sectoral Impacts Analysis: A Technical Report for the Fourth National Climate Assessment, EPA 430-R-17-001.

The state’s industrial capacity and network of interstate highways and railways that run throughout the City of Columbia result in vulnerabilities to hazardous material releases from both stationary sites and transportation sources. Facilities that use or store hazardous materials are located throughout the state in both rural and densely populated areas. Damage to either the extensive network of interstate highways and railways or a singular transportation source that supplies industries with chemical and petroleum products could also result in a moderate to large accidental release of hazardous materials.<sup>63</sup>

To ensure that these hazards are sufficiently mitigated, South Carolina’s Department of Health and Environmental Control (DHEC) publishes radiation and nuclear safety information on its website at <https://www.scdhec.gov/disaster-preparedness>. In addition, DHEC publishes guidance and requirements for Risk Management Plans and preventing accidental releases to ensure compliance with the Risk Management Program Rule under Section 112(r) of the Clean Air Act Amendment of 1990.

## 2.6 Unmet Mitigation Needs Problem Statements

### Unmet Mitigation Need 1. Operational Resilience

Facilities that ensure the health and safety of the public, especially fire stations, are essential for emergency response officials to efficiently coordinate and execute response and recovery efforts across the City of Columbia. As the City expands in size and function, these facilities need the capacity and strategic location to be able to respond to the impacts of flooding and other disasters. Input and feedback from stakeholders across the City highlight that the current capacity and location of fire stations may be inadequate to respond to the growing demands of public safety. It is essential to ensure that emergency response facilities are well equipped to be able to respond with enough capacity to mitigate the loss of life and property that result from the hazards discussed in this Mitigation Needs Assessment.

Both the State of South Carolina Hazard Mitigation Plan and the Central Midlands Hazard Mitigation Plan highlighted the need for backup generation for facilities that are critical to the City’s capacity to maintain a high level of readiness and to continue operations uninterrupted in the event of an emergency. The facilities slated to have permanent generation built into their infrastructure are critical to response, communications, and the fueling of the City’s fleet of emergency vehicles.

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<sup>63</sup> South Carolina Emergency Management Division (SCEMD). Hazardous Materials. Retrieved from <https://www.scemd.org/prepare/types-of-disasters/hazardous-materials/>

## Unmet Mitigation Need 2. Flood-Resilient Infrastructure

The impacts that DR-4241 had on the City’s infrastructure highlight the need for implementation of infrastructure mitigation projects that will restore resiliency to future hazard impacts. Along the Broad River and Columbia Canal, mitigation projects have gone unimplemented due to a lack of funding necessary to complete them. Infrastructure associated with the Columbia Head Gates was impacted due to flooding and caused widespread failures and impacts citywide. While this critical situation could have evolved into a larger crisis, the City’s strong response minimized both shorter- and longer-term impacts on residents. However, the infrastructure of the Head Gates is still compromised and is not resilient to future flooding. As the widespread impacts of this failure have been well documented, it is crucial that funding is used to ensure that a repeat scenario does not occur.

## 3.0 Approach to Addressing Mitigation Needs

### 3.1 Introduction – Connection Between Mitigation Needs and the Distribution of Funds

In the Federal Register Notice (FR-6109-N-01), HUD defines mitigation as “those activities that increase resilience to disasters and reduce or eliminate the long-term risk of loss of life, injury, damage to or loss of property, and suffering and hardship, by lessening the impact of future disasters.”

The Mitigation Needs Assessment demonstrated that the greatest risks to the City would persist in the form of flooding, tornadoes, thunderstorms, lightning, hurricanes, and tropical storms.

### 3.2 Actions Taken by the City to Address Mitigation Needs

#### 3.2.1 Housing

With the most recent Substantial Amendment (#5) to the City’s CDBG-DR Action Plan, 74% of the funding is dedicated to housing: homeowner assistance, small rental repair, elevation reimbursement, minor home repair, and multifamily housing. Of that 74%, 99% is set aside for low- and moderate-income households.

#### 3.2.2 Buyouts

On November 9, 2017, the date the CDBG-DR Action Plan Amendment #1 was submitted to HUD, the City received a notice of award for the two HMGP applications. In the interest of leveraging all potential funding sources, the City moved the \$2 million in CDBG-DR funding allocated to the Buyout Program to the newly proposed FEMA HMGP Match program, and the CDBG Columbia Buyout Program was subsequently closed to applicants. Property owners were notified of the change in program. The eligibility and acquisition process are essentially the same for both programs, making for a seamless transfer. The City is utilizing its HMGP funding, along with a 25% match provided by CDBG-DR to buy out properties of homeowners that have experienced repetitive losses. To date, 21 have been purchased, and 20 have been demolished. That is, all the homeowners that indicated an interest in the program were served.

#### 3.2.3 Economic Development

The City initially created a forgivable loan program with CDBG-DR funds to address the needs of small businesses following the flooding. The program was undersubscribed and the funding eventually reallocated. As a result, the City decided

to allocate its CDBG-MIT funding to projects that would address multiple community lifelines and a spectrum of disasters.

The City has now chosen to fund economic development programs that will create a more resilient Columbia through the use of self-generated fees. Beginning in response to COVID-19, and to create a more sustainable environment, the City's Office of Business Opportunity created an economic sustainability plan. Its purpose was to address potential and known impacts of COVID-19 on the City's small businesses and nonprofits, to mitigate impacts to the City's budget, and to provide seamless delivery of public services in response to this and future emergencies. The result of this effort is "A Resilient Columbia: Economic Sustainability Plan."

The following recommendations have already been approved by City Council:

- Establish a Small Business and Nonprofit Stabilization Package – \$2,000,000
- Reduce the Hospitality Tax transfer to the General Fund by \$925,000, which reflects the last three months portion of the transfer. This will help to ensure continuation of existing allocations and build a reserve.
- Provide funding for the Columbia Police Department recruitment and retention plan needed to position the department to be competitive as they strengthen the City's ability to respond to emergencies – \$2,000,000
- Provide funding for additional public safety initiatives to strengthen the City's ability to respond in emergencies (Fire 911, Emergency Management), and information technology enhancements for online service delivery to the public – \$1,000,000
- Waive penalties for Hospitality Tax and Tourism Development Fee collections through June 2020. The City will continue to monitor customer's needs and the action of Richland County to provide consistent action.
- Waive fees for online credit card payments
- Allocation to Senior Resources in the amount of \$250,000 for the Senior Nutrition Program.

The City is also providing continuing support for persons and families experiencing homelessness through the United Way of the Midlands, Richland County Library resource listing, and the South Carolina Department of Health and Environmental Control.

The total "Resilient Columbia" effort is funded locally with a \$6,000,000 allocation from Water and Sewer Non-Operating Revenues to the General Fund. As part of the Small Business and Nonprofit Stabilization Program, the City created a Small Business Forgivable Loan Program. The program targets neighborhood-serving retail and service businesses, hospitality businesses, cleaning services, small event venues, health care (not COVID related), and manufacturing. The City has also created a

grant program for nonprofits that provide services to the City’s most vulnerable populations, senior citizens at high risk for developing COVID-19 and underserved communities.

### 3.2.4 Infrastructure

Since the 2015 storms, the City adopted a more aggressive approach to provide the necessary funding to implement its Stormwater Management Capital Improvement Program (CIP) in order to address citywide stormwater and flooding issues. To aid in the delivery of the Stormwater Management CIP and manage the cost to rate payers, the City used a financial plan, utilizing the issuance of stormwater revenue bonds. This approach would allow the City to invest in the system at a higher level than can currently be sustained via cash financing that spreads the financing costs across both current and future rate payers.

## 3.3 Distribution of Funds

Category	Project Name	Allocation Level	Estimated LMI Benefit
Infrastructure	Columbia Canal Head Gates and Lock Gate Repair	\$ 8,000,000.00	100%
	Olympia Fire Station Replacement	\$ 7,000,000.00	100%
	Critical Facility Generators	\$ 950,000.00	100%
Planning, Oversight and Monitoring	Planning Activities	\$ 1,705,750.00	
	Administration	\$ 929,250.00	
<b>Total</b>		<b>\$ 18,585,000.00</b>	

The City now intends to utilize CDBG-MIT funding to take additional action to make Columbia more resilient.

The City acknowledges the high probability that these extreme weather conditions will continue to affect Columbia’s residents and city services and may become more severe or more frequent in occurrence. The City commits to ensuring that any project to be funded with CDBG-MIT funds will address high winds, sea level rise, floodplain and wetland management, and the frequency and intensity of precipitation events in all architectural and design elements, as appropriate.

The impact of these types of events was taken into consideration as the City made critical decisions around project selection and how each project will impact community lifelines. The Method of Distribution and the project descriptions that follow demonstrate the City’s commitment to addressing:

- The continuing impact on residents of damage to critical infrastructure that occurred during the 2015 flooding and has yet to be addressed.
- The City’s ability to respond to future disaster events in a manner that improves its ability to protect lives and property.

- The City’s interest in addressing some of the unfunded projects specific to Columbia identified in the Central Midlands Hazard Mitigation Plan (2016)<sup>64</sup> and the State of South Carolina’s Hazard Mitigation Plan (2018).<sup>65</sup>
- The City’s awareness of the need to supplement currently limited planning resources in a manner that will allow continual improvement in overall resilience through land use, building code, and emergency management and hazard mitigation planning.
- The importance of engaging in more collaborative planning with the Central Midlands Council of Governments, and Lexington and Richland counties.

The City’s Office of Community Development, administrator of all other CDBG programs, will administer the CDBG-MIT program.

### 3.4 Columbia Head Gates and Lock Gate Repair

**Project Description:** This project consists of the design, engineering, and replacement of 12 water control gates and one lock control gate. These gates are used to regulate the raw water supply diverted from the Broad River to the Columbia Canal, which supplies raw water to the Columbia Canal Water Treatment Plant and the Columbia Hydroelectric Facility. These facilities serve more than half of the City’s water customers, including most of the city limits and much of Richland County, with portions being located within Lexington County as well. The area within the city limits served by the proposed project (shaded in blue in Figure 26) is 52% low and moderate income. Combining this with the additional service area outside the city limits, the total Canal Water Service Area is 51% low and moderate income<sup>66</sup> (see Section 8.3, Project Service Area Census Tracts). MIT funding will be used to ensure continuous operation of these critical facilities during and after extreme weather events.

The Columbia Canal is not a flood control structure. It is a water delivery system. When the canal breached, there was no structural or flooding threat to housing; however, the breach did severely impact the entire City’s water supply and fire protection capacity. This caused a citywide boil water notice. Some areas had no potable water at all. The loss of pressure caused threats to the system and also endangered water service to the City’s hospitals. The importance of the City’s capacity to consistently provide a safe, potable source of drinking water to the

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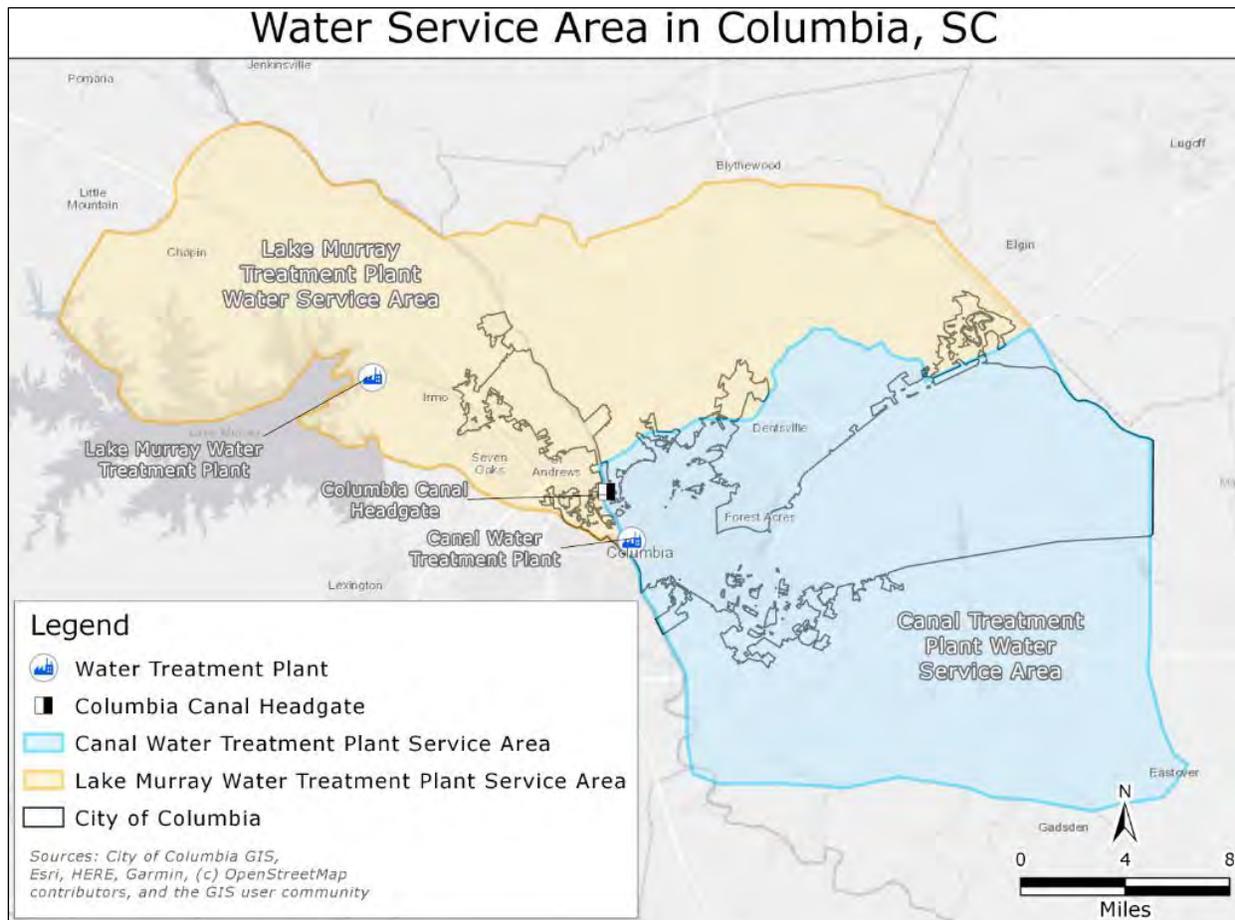
<sup>64</sup> <http://www.centralmidlands.org/pdf/CMHMP%202016%20-%20Final.pdf>

<sup>65</sup> <https://www.scemd.org/media/1391/sc-hazard-mitigation-plan-2018-update.pdf>

<sup>66</sup> FY 2020 ACS 5-year ACS Low- & Moderate-Income Summary Data, 4/10/2020. Retrieved from <https://www.hudexchange.info/programs/acs-low-mod-summary-data>

community as a whole, and particularly to protected classes and minority communities, cannot be understated. The country has seen firsthand the impact of a failure to provide this most critical resource. It is for this reason that this project is considered a high priority and is receiving CDBG-MIT funding.

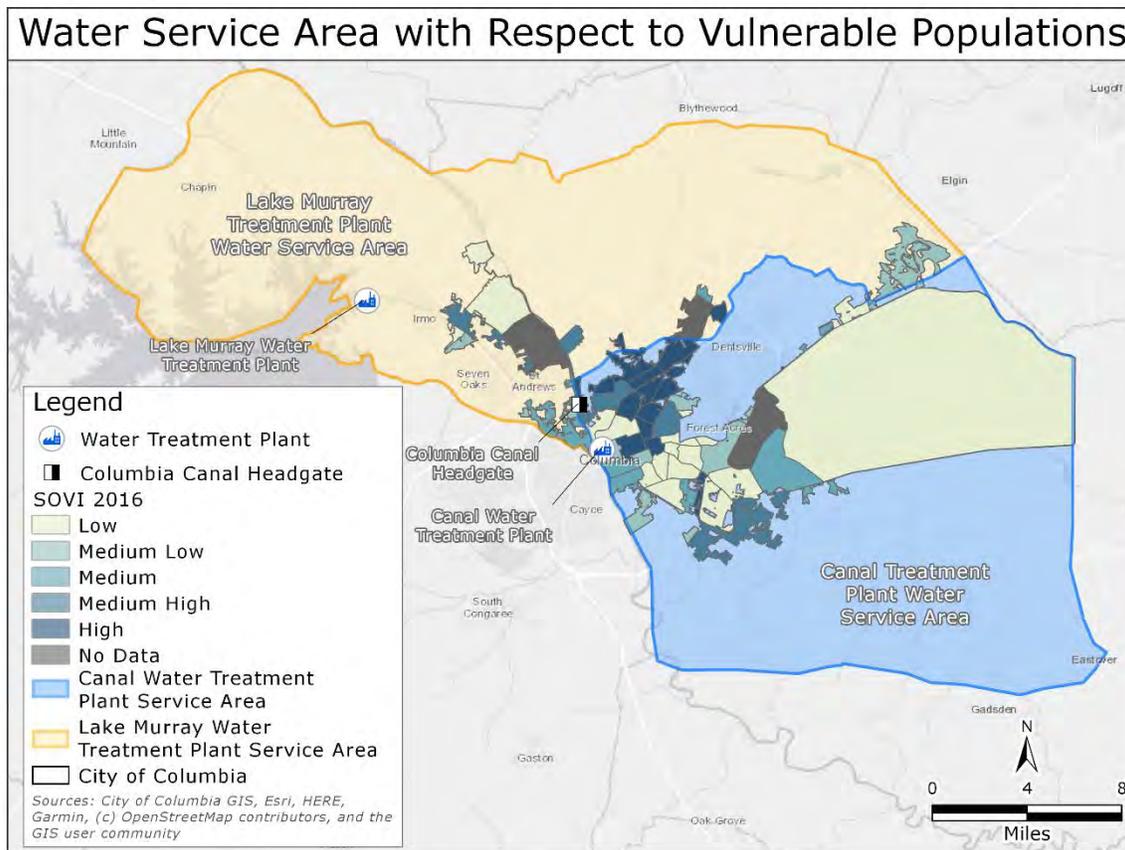
Figure 26. Water Service Areas in Columbia



Currently, the City is controlling water flow into the Columbia Canal through a fixed dimension opening in a bulkhead that was placed in front of the #1 gate during emergency operations, arising from the flood event of 2015. Under this emergency stopgap measure, the City has almost no control over the amount of water entering the canal. This continues to jeopardize the potable water supply for approximately 50% of the City's customers.

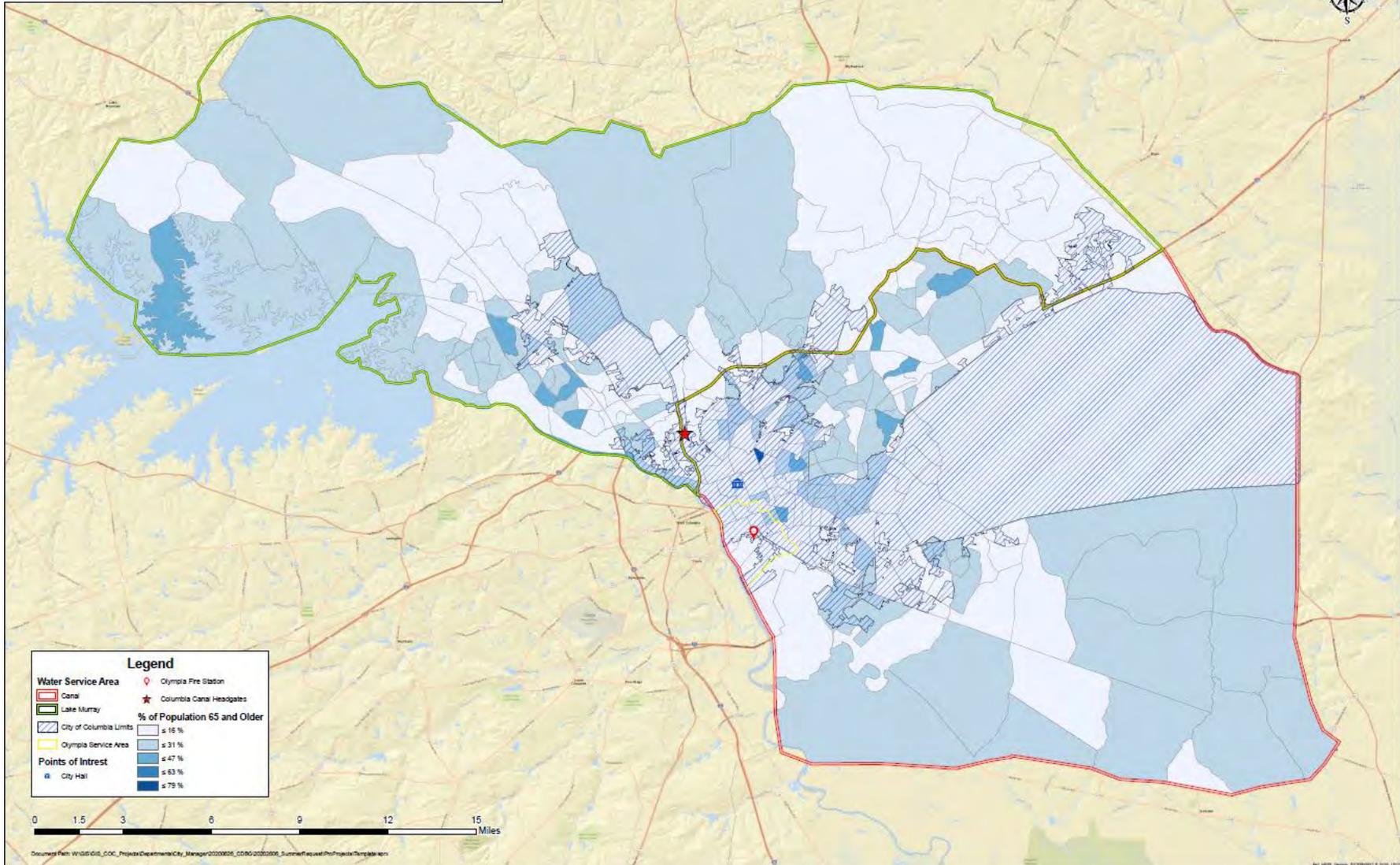
Figure 27 shows the current water treatment plant service areas with respect to the Social Vulnerability index in the City of Columbia. Large areas of the Canal Treatment Water Plant's service area are communities identified as having high vulnerability based on this index. This figure emphasizes the importance of mitigation projects that ensure continuity of water service, especially to those highly vulnerable or those that need additional support in preparing for hazards or recovering from disaster.

Figure 27. Water Service Area with Respect to Vulnerable Populations

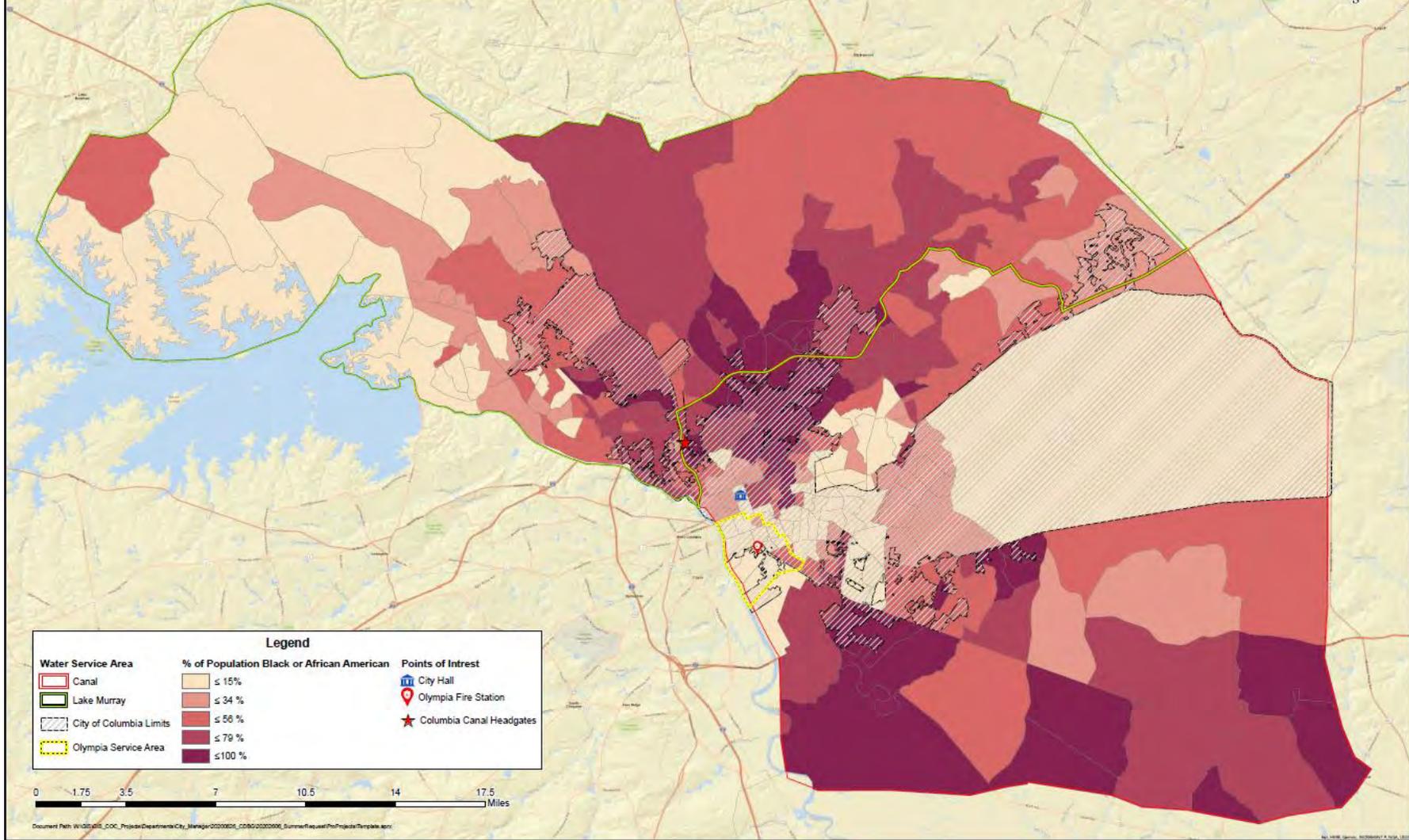


The Head Gates project will provide water service to the area shown in blue in Figure 26 and Figure 27. The maps on the following pages illustrate how this project will provide a consistent supply of safe drinking water, as well as an uninterrupted supply of water for fire protection to protected classes.

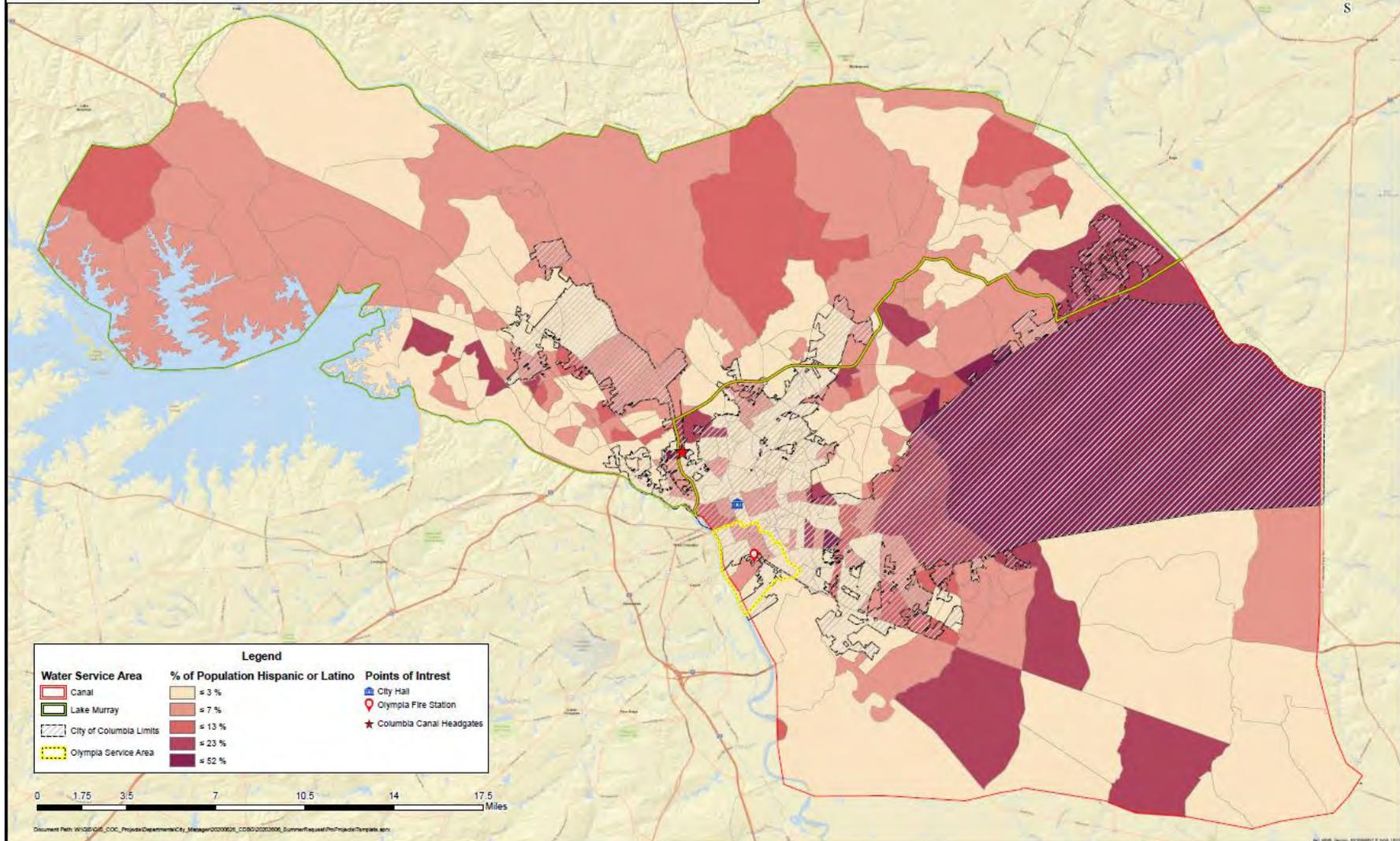
Estimated Percent of Population Ages 65 and Up Within the Water Service Area - City of Columbia  
2018 United States Census



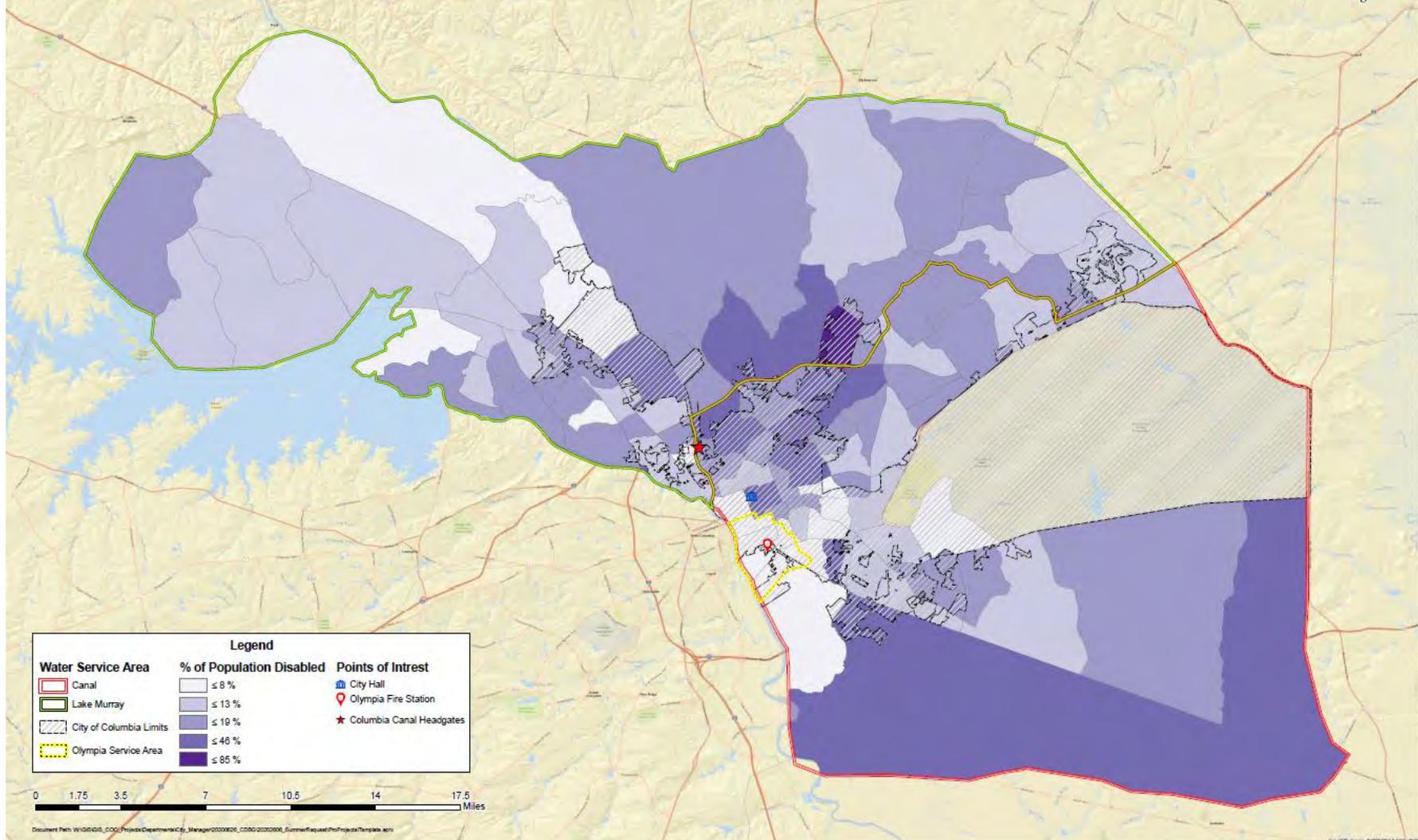
**Estimated Percent of People Identifying as Black or African American Within the Water Service Area - City of Columbia**  
**2014-2018 American Community Survey 5-Year Estimates:**



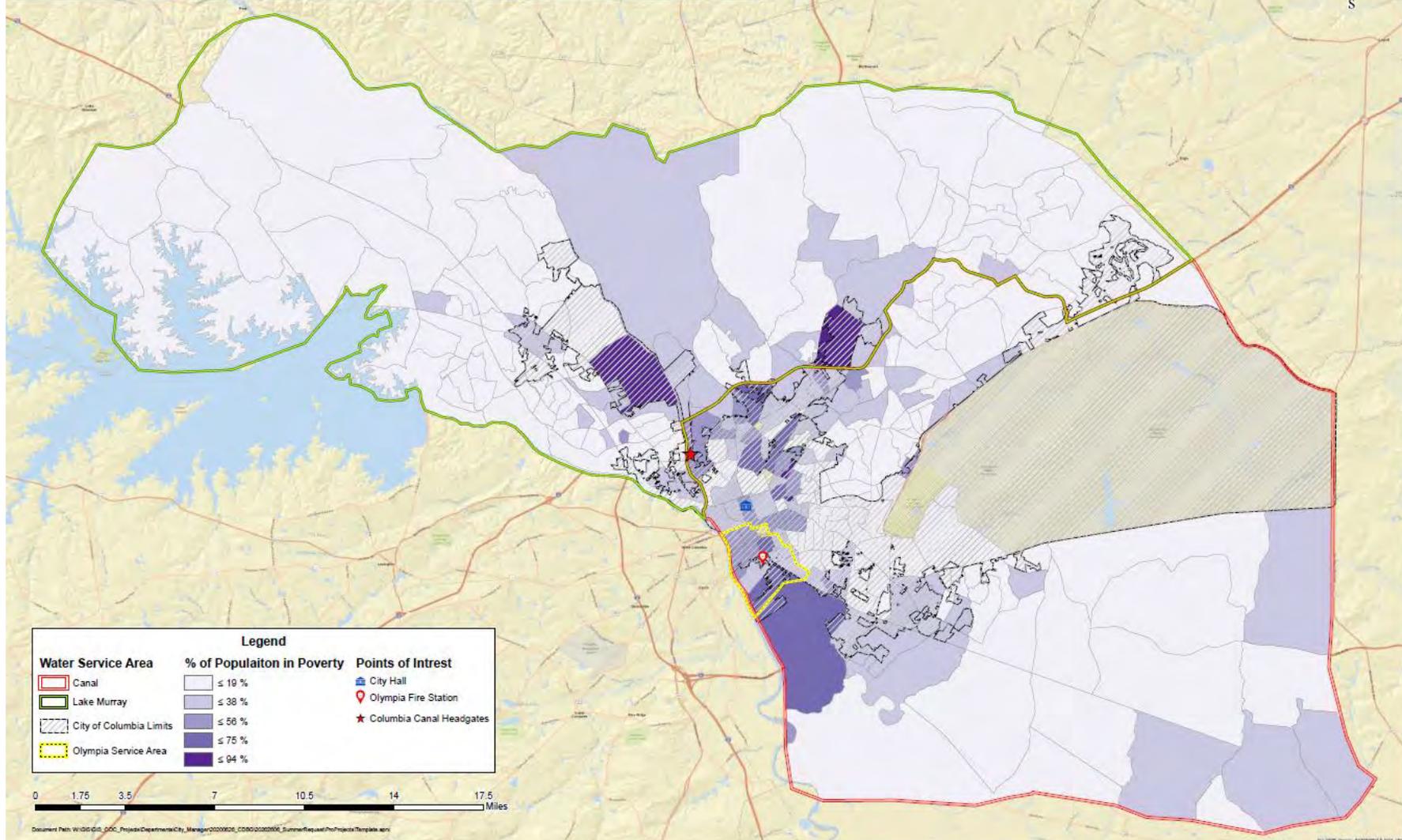
**Estimated Percent of People Identifying as Hispanic or Latino Within the Water Service Area - City of Columbia  
2014-2018 American Community Survey 5-Year Estimates:**



**Estimated Percent of Population with at Least One Disability Within the Water Service Area - City of Columbia**  
**2014-2018 American Community Survey 5-Year Estimates:**



**Estimated Percent of Population in Poverty  
Within the Water Service Area - City of Columbia  
2014-2018 American Community Survey 5-Year Estimates:**



**Estimated Percent of Unmarried Same-Sex Couples among Unmarried All Couples Within the Water Service Area - City of Columbia**  
**2014-2018 American Community Survey 5-Year Estimates:**

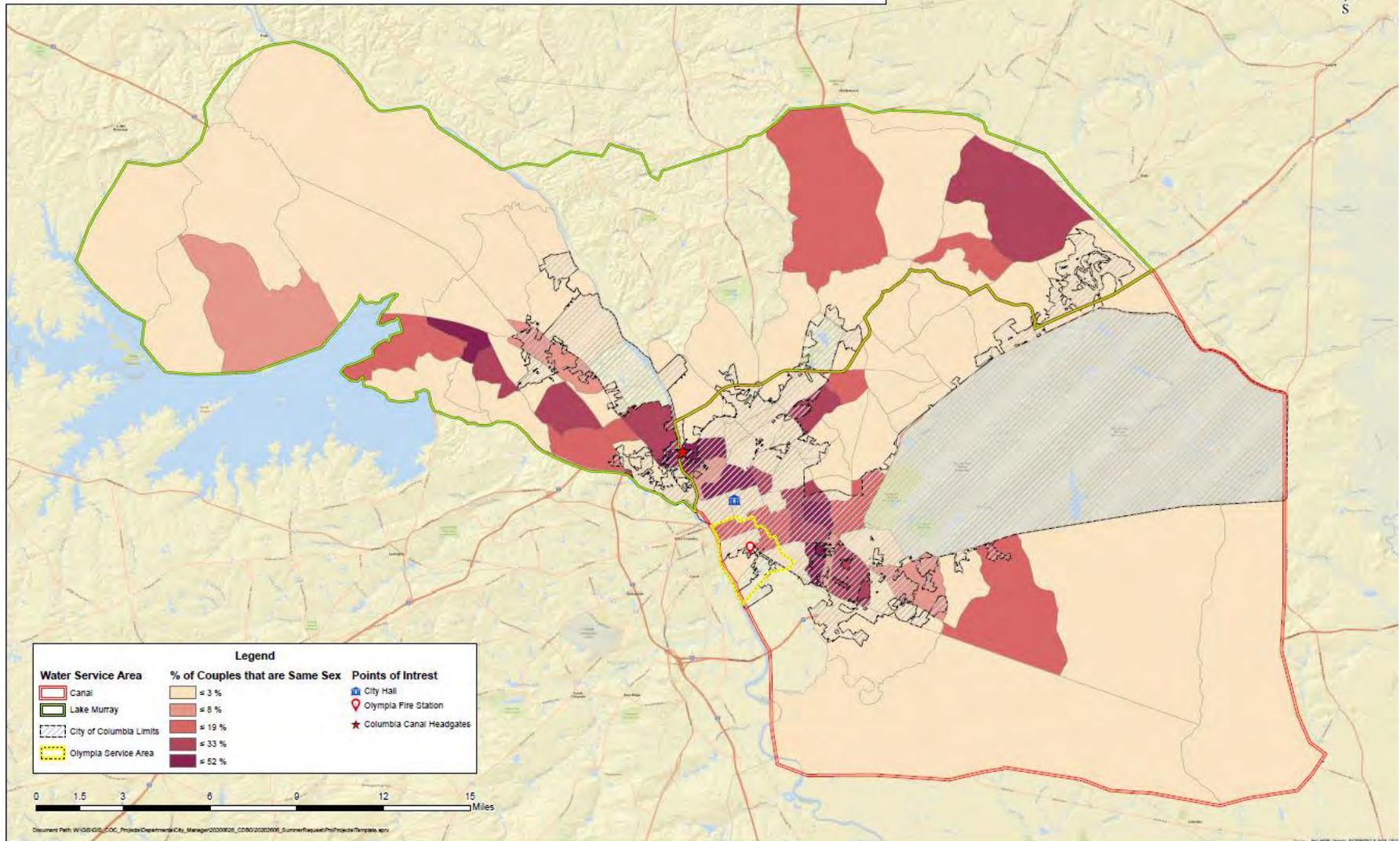


Figure 28. Two Views of Head Gates



The Head Gates and Lock Gate repair project will be complemented by a separate project that involves repairs to the Columbia Canal. FEMA is funding the canal repair, along with additional funding from the City and state. FEMA denied the City's request to fund the Head Gates and Lock Gate repairs (see FEMA Project Worksheet, Section 8.5). Design and engineering for the Head Gates and Lock Gate repair project are funded by the City's CDBG-DR grant.

FEMA has excluded the Head Gates project from their environmental review because they are not funding that portion of the project.

FEMA has also eliminated the Alternate Water Supply project because it is being potentially funded under the FEMA PDA program. PDA program staff contacted FEMA PA staff and advised that the project's environmental review could not be funded with PA, as the funding sources differ.

The extent to which the City may be able to use the Unified Federal Review process given FEMA's funding decisions is in question. The City staff responsible for the project have been and will continue to be in consultation with FEMA regional office staff. The City has been advised that they may be able to use data resulting from the FEMA EA in the separate environmental review that the City will conduct for the Head Gates Project. The Head Gates and Lock Gate repair project will be the first project to begin once environmental clearance and authorization to use grant funds are received.

The Head Gates' function is to control and regulate the amount of raw water introduced into the Columbia Canal. The current Head Gates were unable to perform their intended function during the flood event in October 2015. The proposed project will allow the existing gates to be replaced with gates that will be more resilient and able to function under flood and other adverse conditions. This reduces the risk to the City's potable water and energy supply during future events.

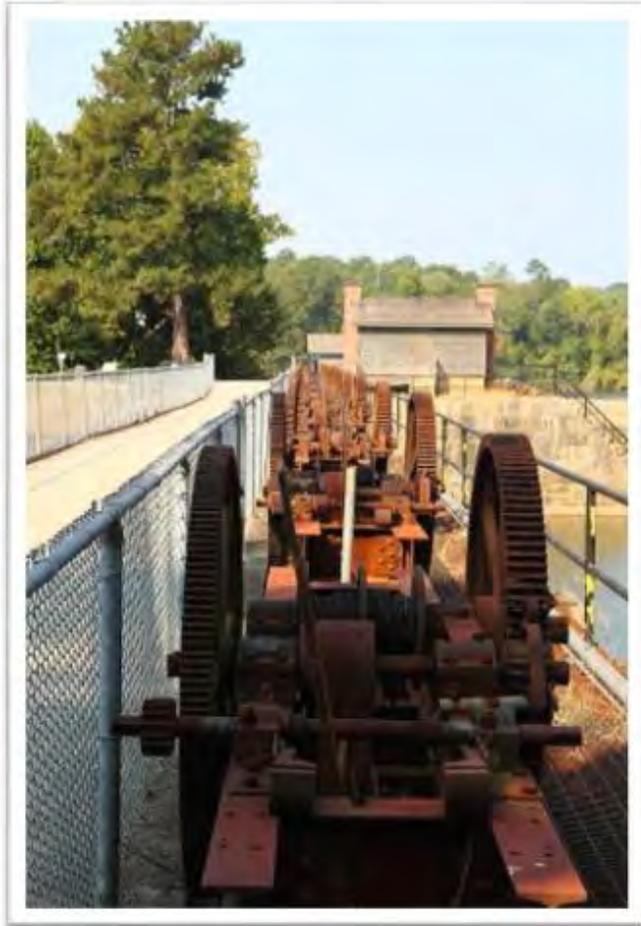
As the Head Gates project is on the floodway, design and construction standards will take this into account. All new motors to be used will have the highest energy efficiency rating available and will have a manual override in the event of motor failure or water inundation. There is no additional land acquisition involved in this project.

A maintenance and operating agreement by the City to operate the project for its useful life can be found in Section 8.4.

**Project Impact on Community Lifelines:**

- **Safety and security:** This project is critical for the City, ensuring a continuing, adequate supply of water used for fire protection.
- **Food, water, and shelter:** This project is critical for the City's ability to ensure a continuing supply of safe drinking water.
- **Health and medical:** This project is critical for ensuring an adequate supply of safe drinking water to five hospitals, including the region's only Level 1 Trauma Center, six major universities and colleges, Fort Jackson (the U.S. Army's largest basic training site), McEntire Joint National Guard Base, the State Capitol, and other federal facilities. It also ensures an adequate supply of water used for fire protection for those same institutions.

Figure 29. Head Gates Mechanism



**Allocation for the Activity:** \$8,000,000

**Eligibility for CDBG-MIT:** Housing and Community Development Act Section 105(a)(2)

**National Objective:** Low- and Moderate-Income Area Benefit (LMA)

**Administering Agency:** Columbia Water, Columbia Office of Community Development

### 3.5 Olympia Fire Station Replacement

Figure 30. Olympia Fire Station Service Area with Respect to Vulnerable Populations

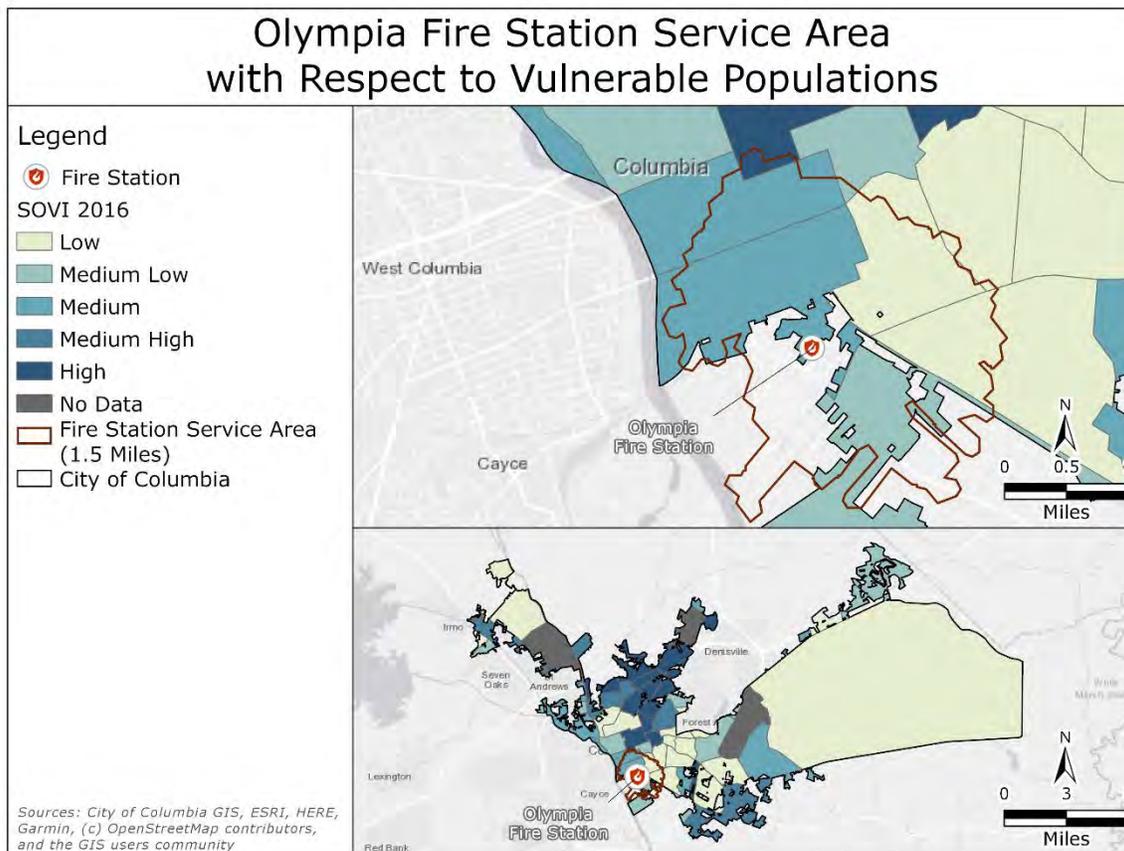
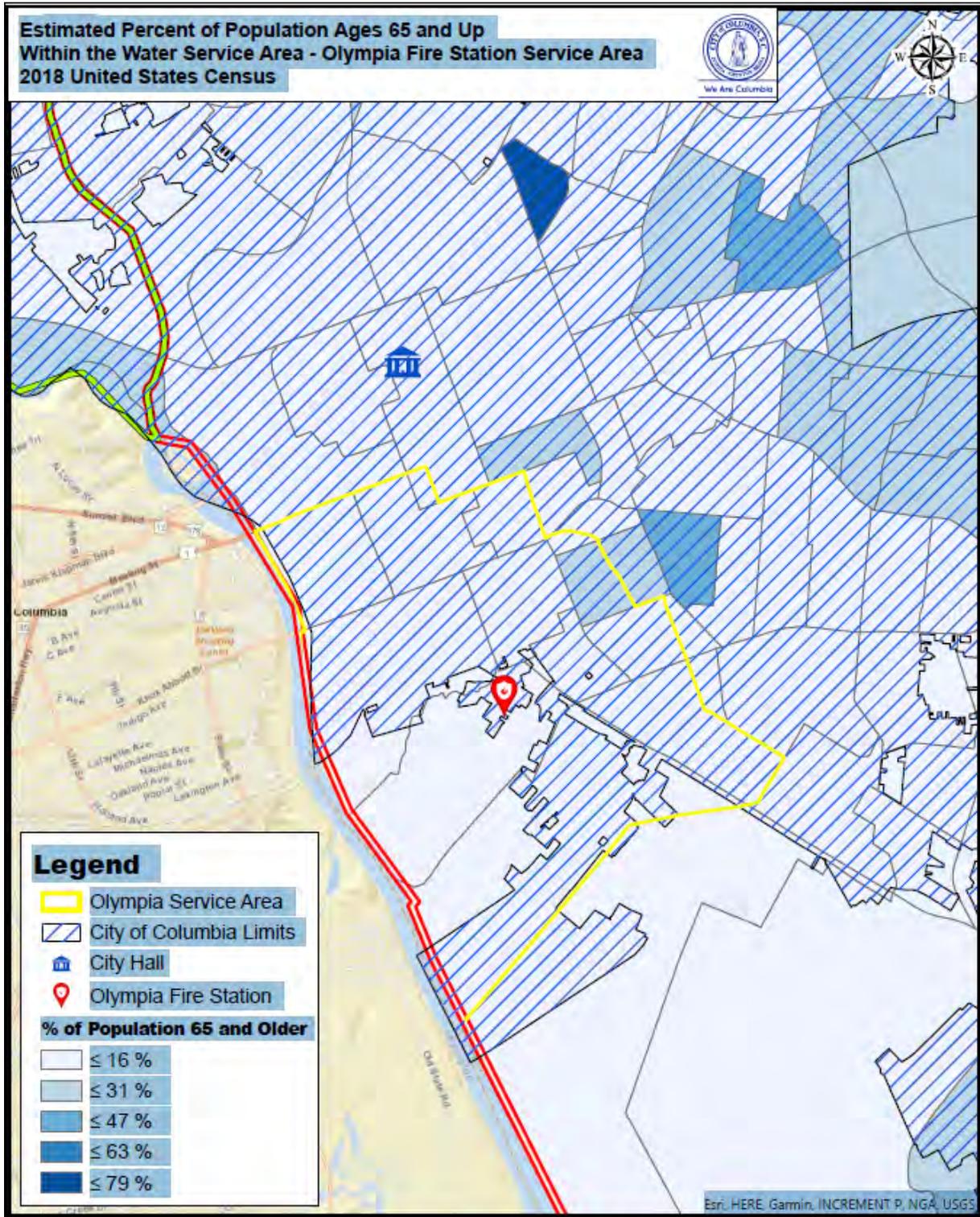
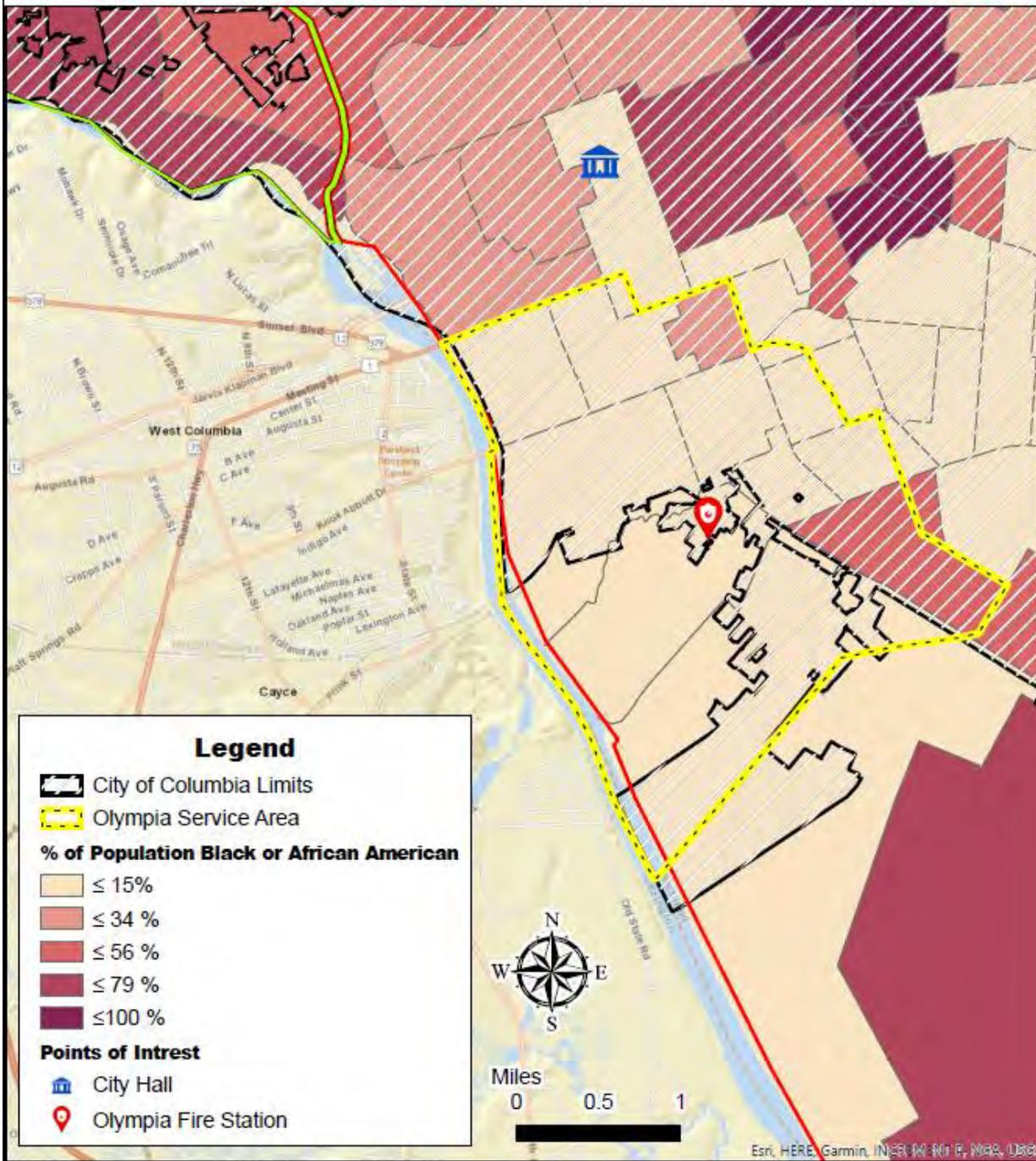


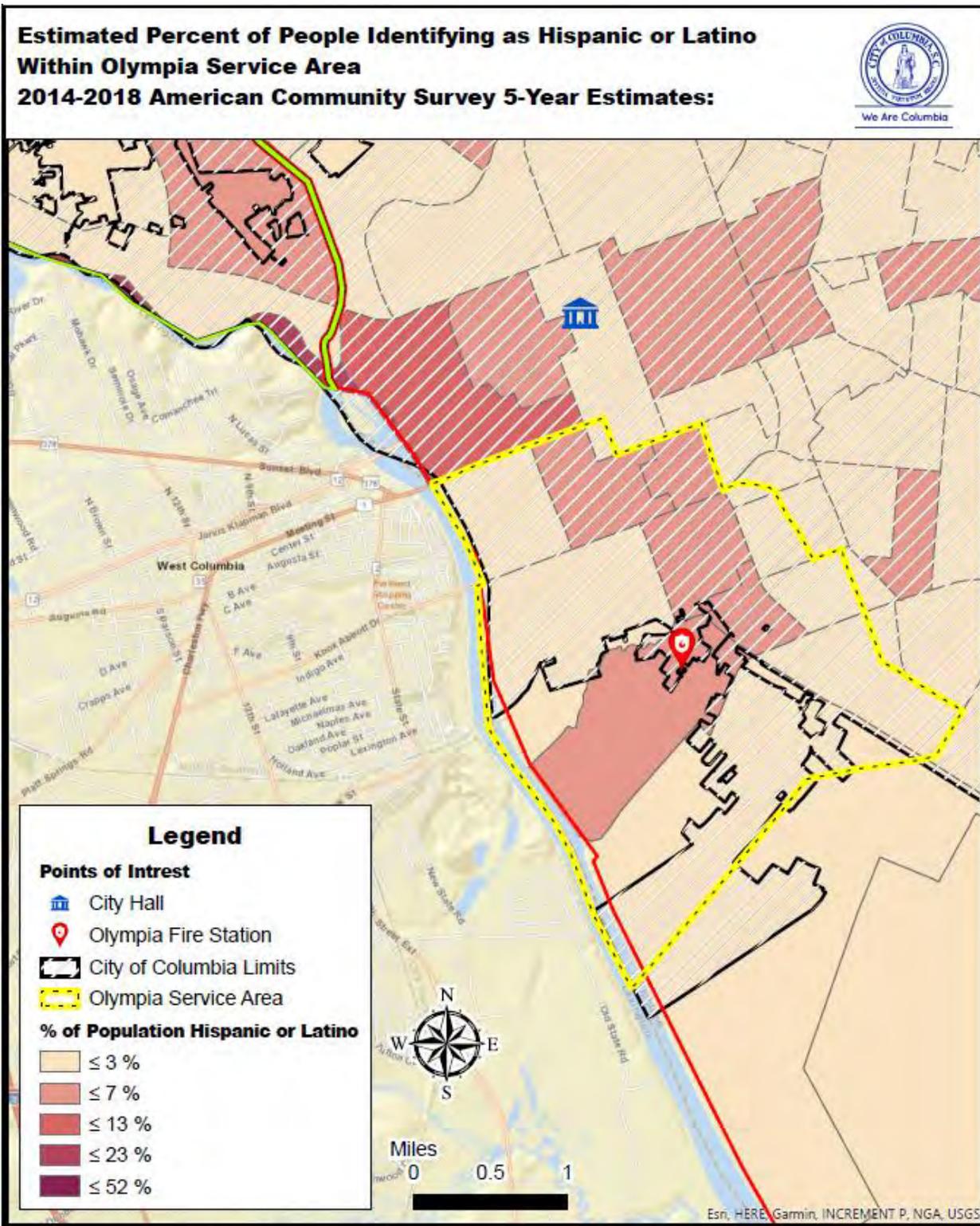
Figure 30 shows the current 1.5-mile service area of the Olympia Fire Station with respect to the Social Vulnerability Index both in the City at large and within the 1.5-mile service area. This figure emphasizes the importance of the fire station in serving local communities that may need support in preparing for hazards or recovering from disaster. The mitigation project to storm harden the fire station will not result in a significant alteration or expansion of the current service area.

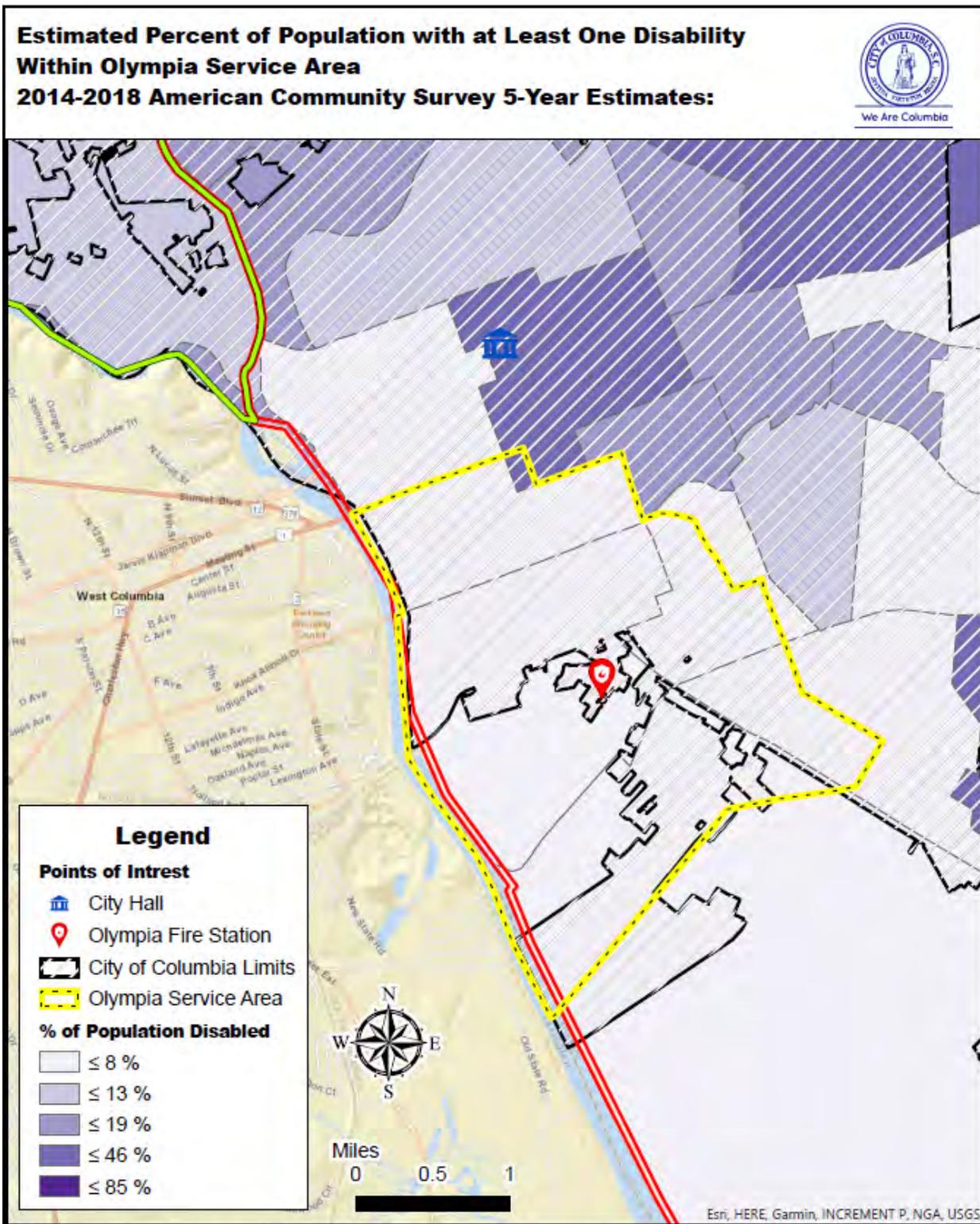
The Olympia Fire Station will serve the area outlined in brown on the map shown above. The maps on the following pages illustrate how the services provided by this station will provide protection to protected classes, allowing for reliable and uninterrupted emergency services in the event of a natural disaster or other hazard event.

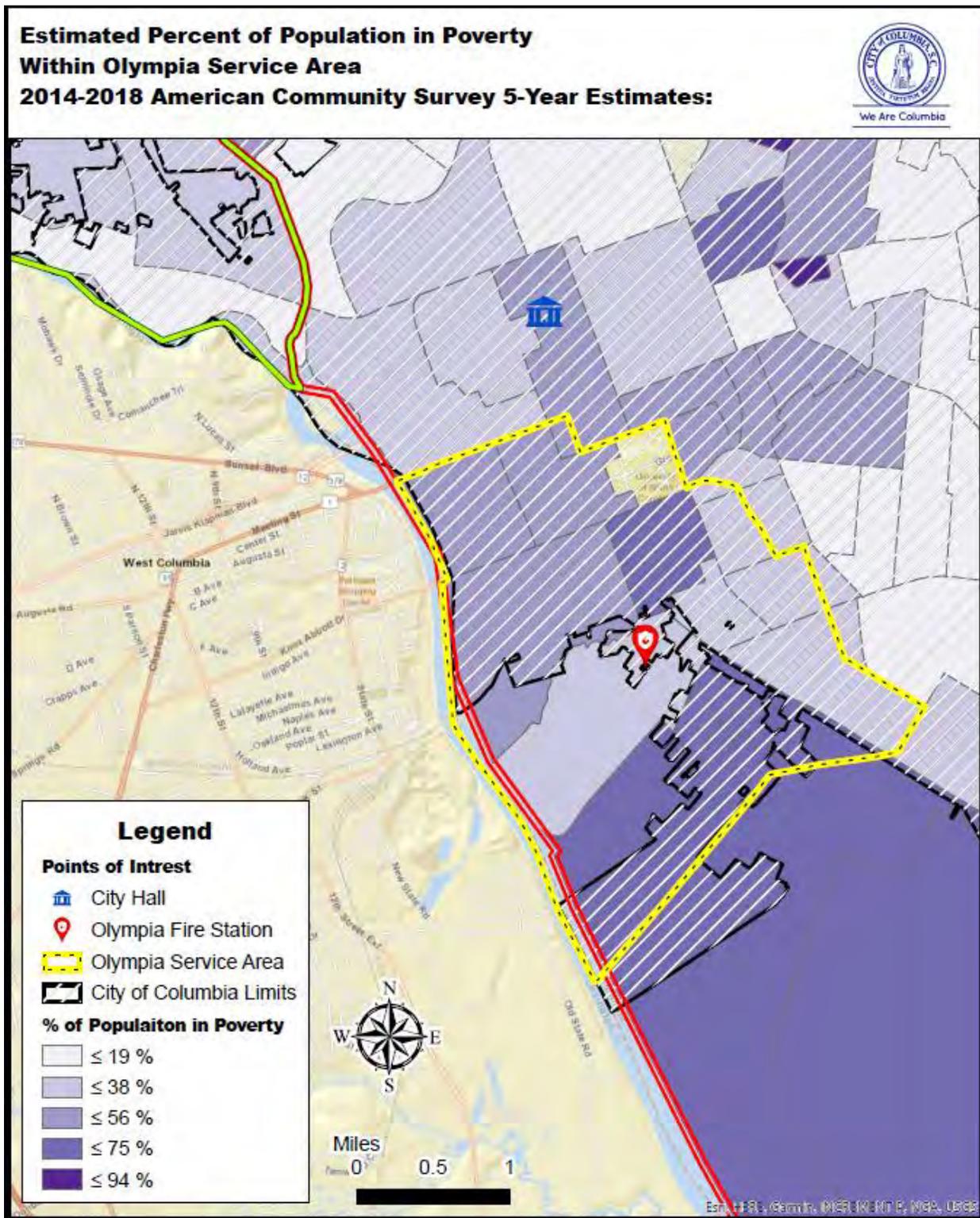


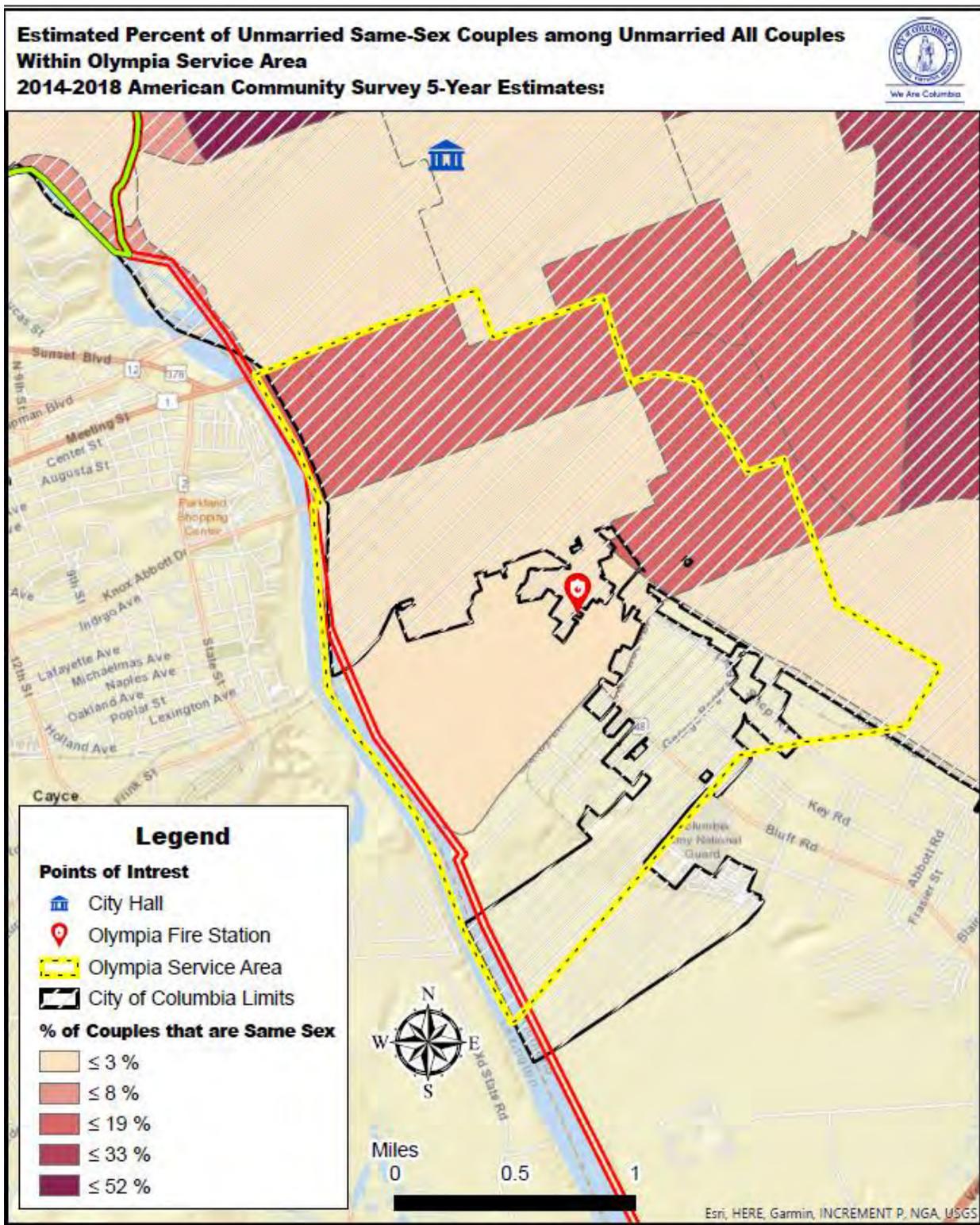
**Estimated Percent of People Identifying as Black or African American Within Olympia Service Area**  
**2014-2018 American Community Survey 5-Year Estimates:**











**Project Description:** The existing Olympia Fire Station, which serves an area that is 65.35% low and moderate income,<sup>67</sup> is a repurposed greenhouse. The facility is both inadequate to support modern fire response demands and poses a health hazard to fire safety personnel, due to its poor ventilation system and lack of suitable support quarters for firefighters (see Section 8.3, Project Service Area Census Tracts). The new fire station will reduce the risk of loss of life and injury, and damage to and loss of property.

This station is in one of the fastest growing areas of the City, and near the University of South Carolina campus. With an influx of people and new construction, the City of Columbia must provide additional fire and emergency resources to the station's service area to maintain the level of response capacity necessary to protect lives and property.

Figure 31. Current Olympia Fire Station



The station's current location does not leave room for expansion, and during weather events, the critical access roads needed for engines to reach residential areas are often flooded or blocked with storm debris, slowing response times. In addition, with the rapid expansion in the area, new multi-story residential buildings are being constructed. The station needs to add an aerial or ladder truck to meet the challenges presented by these newer multi-story structures. As can be seen from the picture of the current Olympia Station #2 above, it cannot accommodate a fire truck with multi-story response capacity.

The current station and new facility will provide backup emergency response to the University of South Carolina campus. The new station house will be designed with enough space to ensure that additional equipment and resources can be staged at the station when large-scale events occur on the nearby campus, or in the event of potential severe weather. In addition, the new station will add a bay that will accommodate a ladder truck and an additional bay for future use. A training room will provide space for CPR and emergency response training for first responders and for the surrounding community. The station will also have a full-building natural gas-

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<sup>67</sup> FY 2020 ACS 5-year ACS Low- & Moderate-Income Summary Data, 4/10/2020. Retrieved from <https://www.hudexchange.info/programs/acs-low-mod-summary-data>

powered generator. The City will decide during the design phase of the Fire Station project whether or not it is feasible to add a “safe room” to the structure.

The station will be elevated or flood-proofed as required, pursuant to 24 CFR 55.2 (b) (3) or any successor standard, up to at least 3 feet above the 100-year floodplain, and may include using structural or nonstructural methods to reduce or prevent damage. It will be designed to adapt to, withstand, and rapidly recover in the event of a flood. The City intends to include requirements for green infrastructure, reduction of impervious surfaces, and other mitigation measures in the design requirements for the Fire Station project.

The City also wishes to secure enough land to expand and accommodate Columbia Police Department operations and support services at this site in the future. As the City expands, both through growth and development and through annexations, there will be a need to locate a new police facility in this area of the City. The City intends to co-locate that facility with the Columbia Fire Department, as has been done successfully in other parts of the City. Having enough space for this expansion of service is critical for ensuring the welfare of the growing community. The new fire station will be located outside any dam failure inundation area. That said, dam failure inundation areas will be considered to help information planning, locations, design, construction, and if needed, elevation of critical components.

A maintenance and operating agreement by the City to operate the fire station for its useful life can be found in Section 8.4.

#### **Project Impact on Community Lifelines:**

- **Safety and security:** This project will provide a modern resilient facility that will be able to resist extreme weather events and ensure that critical response services will not be delayed or interrupted. The station will also house a redundant emergency communications system.
- **Food, water, and shelter:** The proposed station will have the capacity to house additional emergency response units during natural disasters and is positioned to assist with mass evacuations. It will also be able to house federal emergency management personnel.
- **Health and medical:** All personnel are Emergency Medical Responder (EMR) certified and some are emergency medical technicians.
- **Energy (power and fuel):** The new station will be equipped with a diesel/gas generator that is able to provide the station with power for an extended period.
- **Transportation:** The new fire station, located in the Olympia area, is critical for ensuring the long-term viability of several major transportation routes in Columbia, including the Assembly Street, Bluff Road, Huger Street, and Blossom Street corridors. The area is also home to several major railway intersections. Quick resolution of accidents and disaster incidents in this area is critical for the

City’s ability to serve existing residents and businesses and will have a positive impact on mitigating factors that inhibit long-term growth.

**Allocation for the Activity:** \$7,000,000

**Eligibility for CDBG-MIT:** Housing and Community Development Act Section 105(a)(2)

**National Objective:** Low- and Moderate-Income Area Benefit (LMA)

**Administering Agency:** Columbia Water (Engineering, Construction Management, and Real Estate), Columbia Fire Department, Columbia Office of Community Development

### 3.6 Critical Facility Generators

#### **Project Description:**

The City of Columbia is proposing to add backup generation capacity to the power grid for two of the City’s critical buildings – Police Headquarters and the Fleet Services facility. Both the Central Midlands Hazard Mitigation Plan<sup>68</sup> and South Carolina Hazard Mitigation Plan<sup>69</sup> gave “high priority” ranking to the installation of critical facility backup generation projects. The State Plan noted the importance of this goal in ensuring adequate emergency response for the campus of the University of South Carolina. The campus is in the City of Columbia and served by its police and fire departments. At the time the hazard mitigation plans were published, no funding could be identified for either of these projects. The City is 53.45% low and moderate income.<sup>70</sup>

The City intends to consider renewables with solar or battery back-up storage for critical facilities generators and plans to include this requirement as part of the design of all three generator projects (Fire Station, Police Headquarters, and Fleet Services Facility). The City will incorporate FEMA guidance on Emergency Power Systems for Critical Facilities into all generator and critical facility projects as feasible.

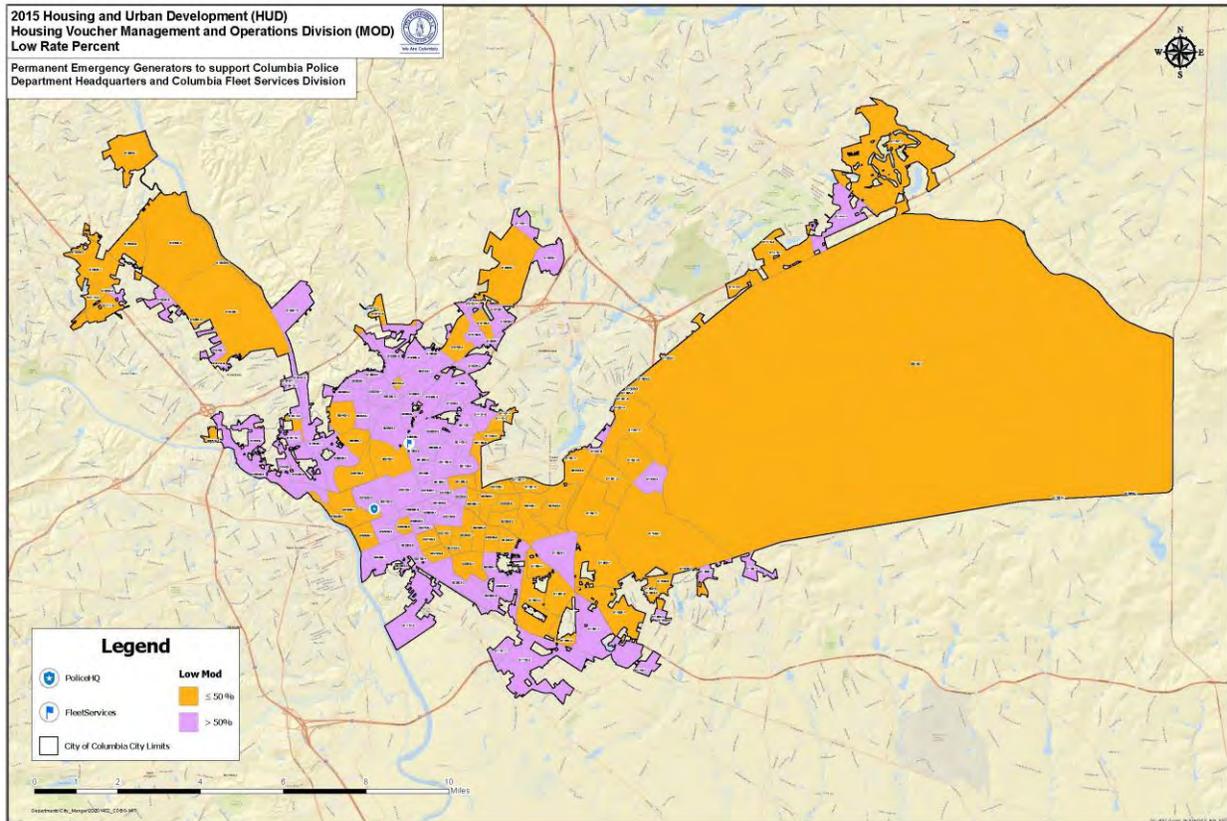
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<sup>68</sup> “An All Hazards Risk Assessment and Mitigation Plan for the Central Midlands Region of South Carolina – 2016 Update,” Table 130 p. 437.

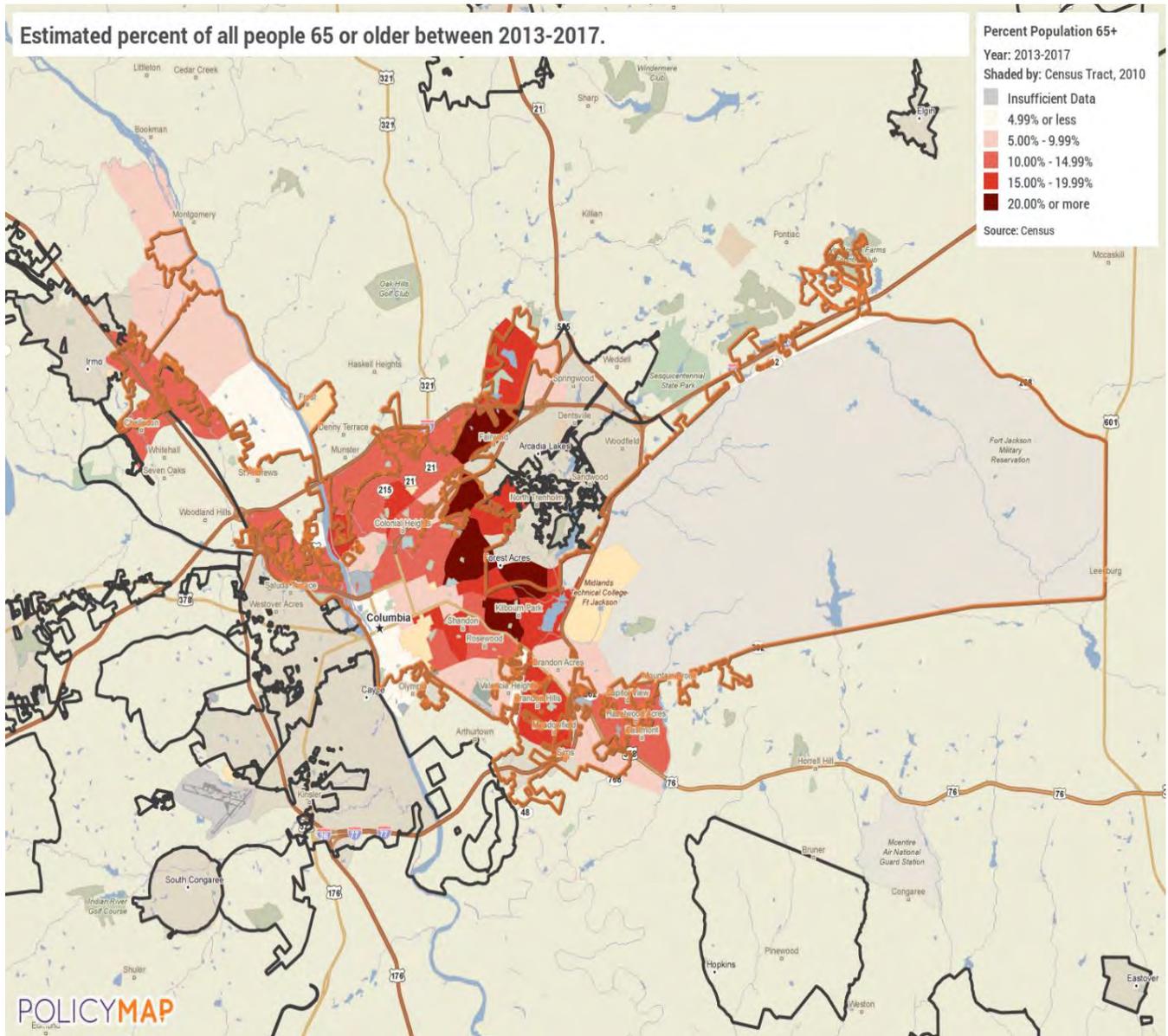
<sup>69</sup> “South Carolina Hazard Mitigation Plan, 2018 Update,” Goal 1.

<sup>70</sup> FY 2020 ACS 5-year ACS Low- & Moderate-Income Summary Data, 4/10/2020. Retrieved from <https://www.hudexchange.info/programs/acs-low-mod-summary-data>

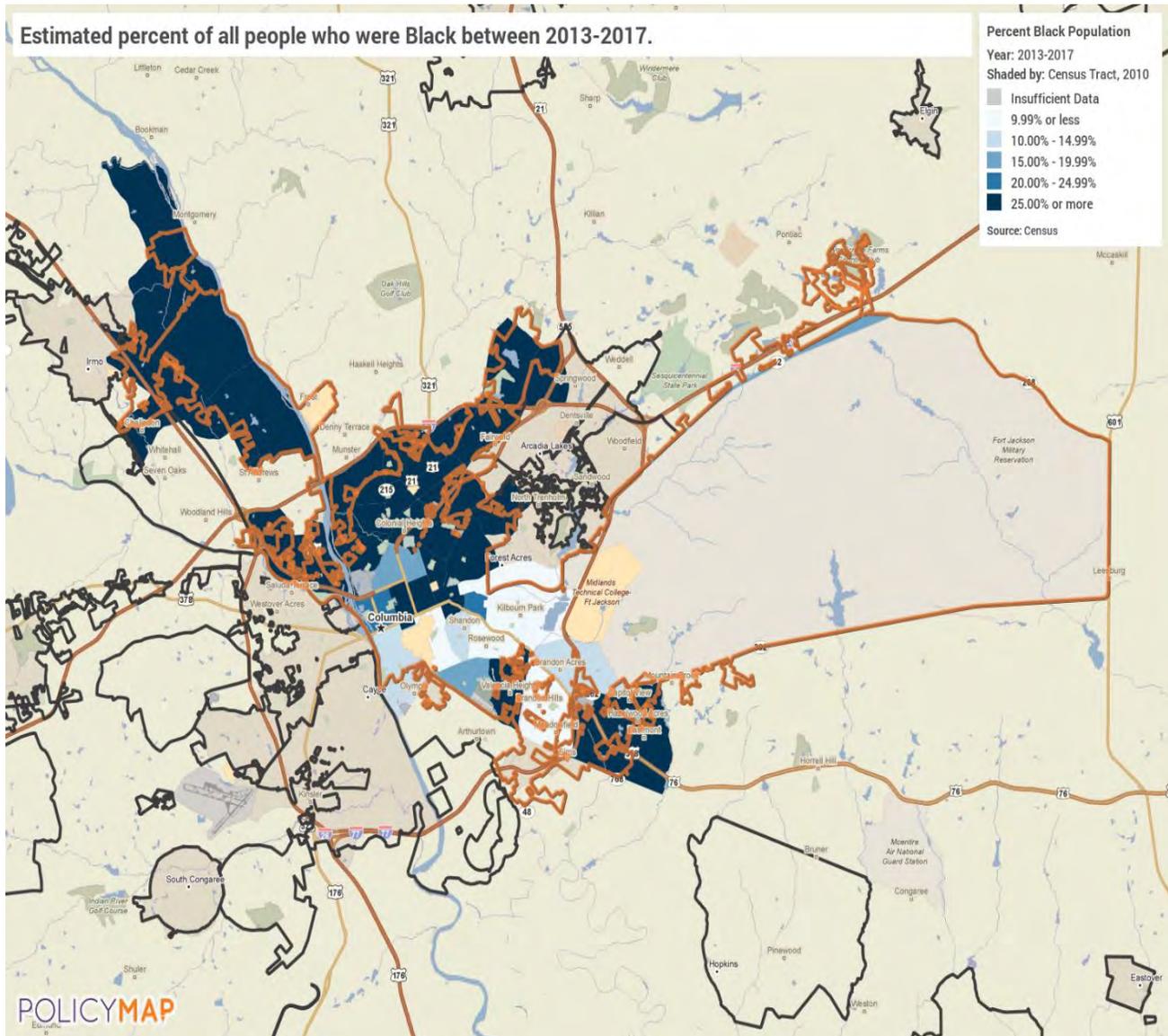
Figure 32. Service Area and Locations of Critical Facility Generators



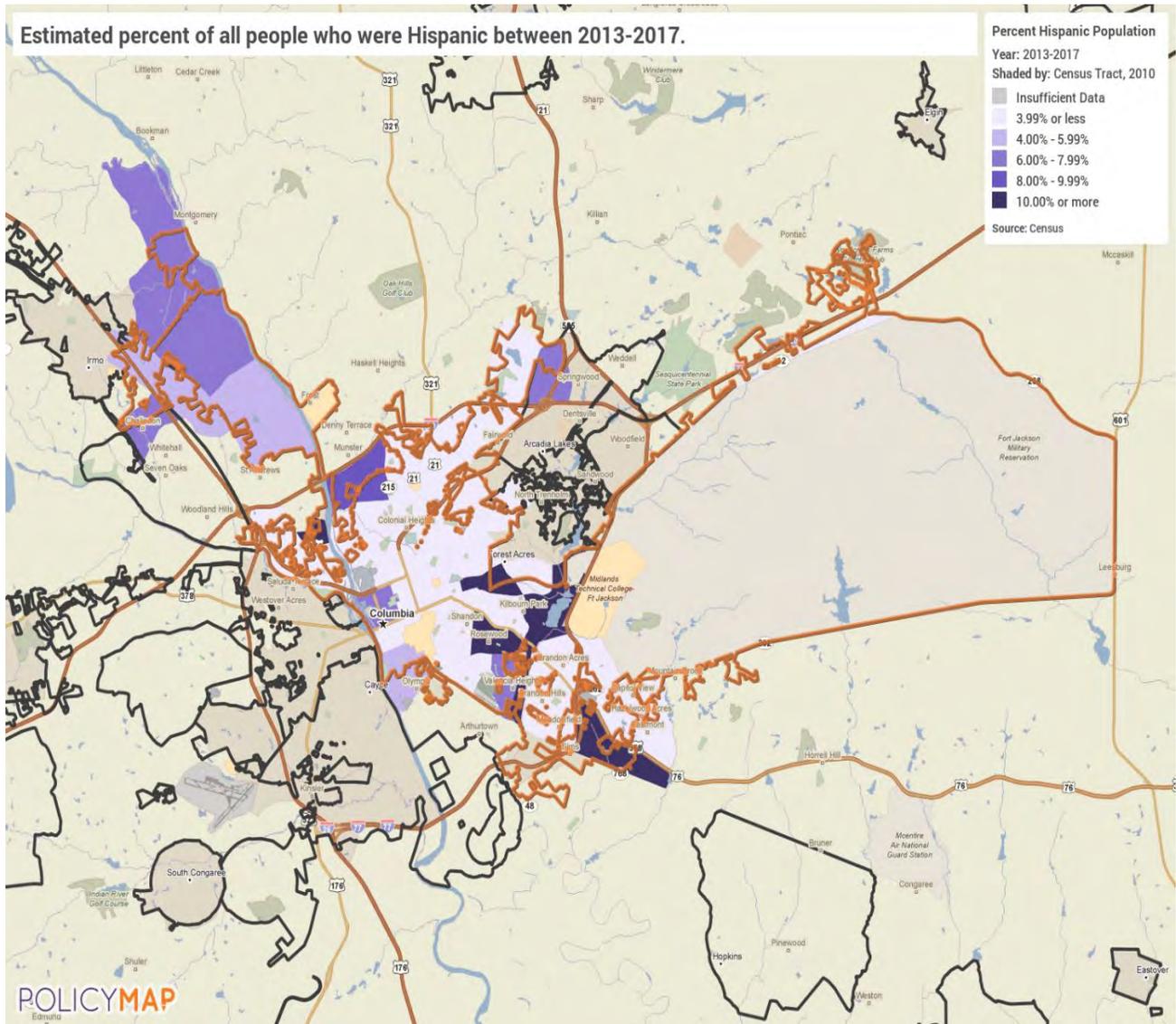
The two critical facility generators will serve the entire City of Columbia. The maps on the following pages illustrate how these services will safeguard protected classes, allowing for reliable and uninterrupted emergency services in the event of a natural disaster or other hazard event.



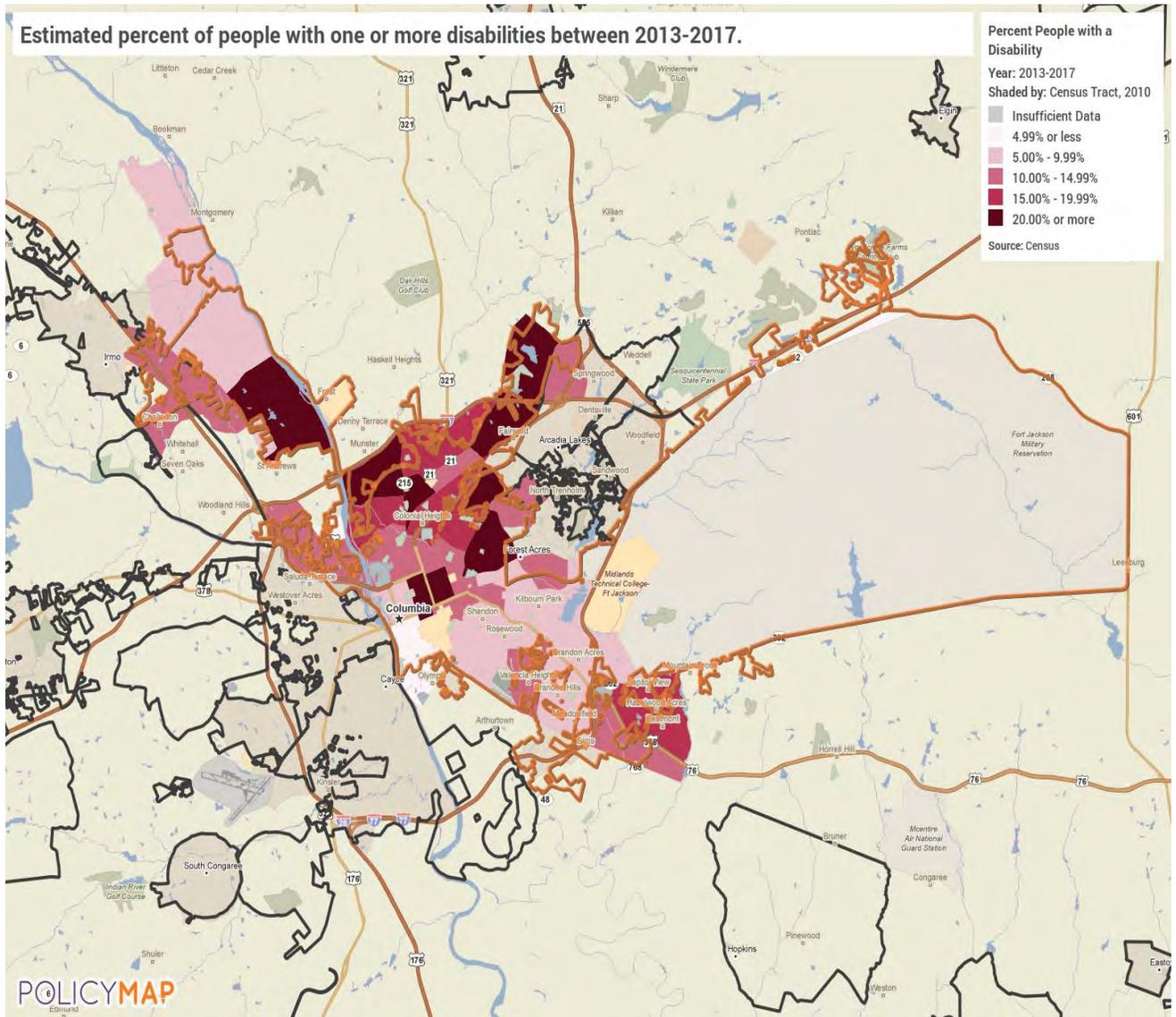
Source: 2013-2017 ACS via PolicyMap



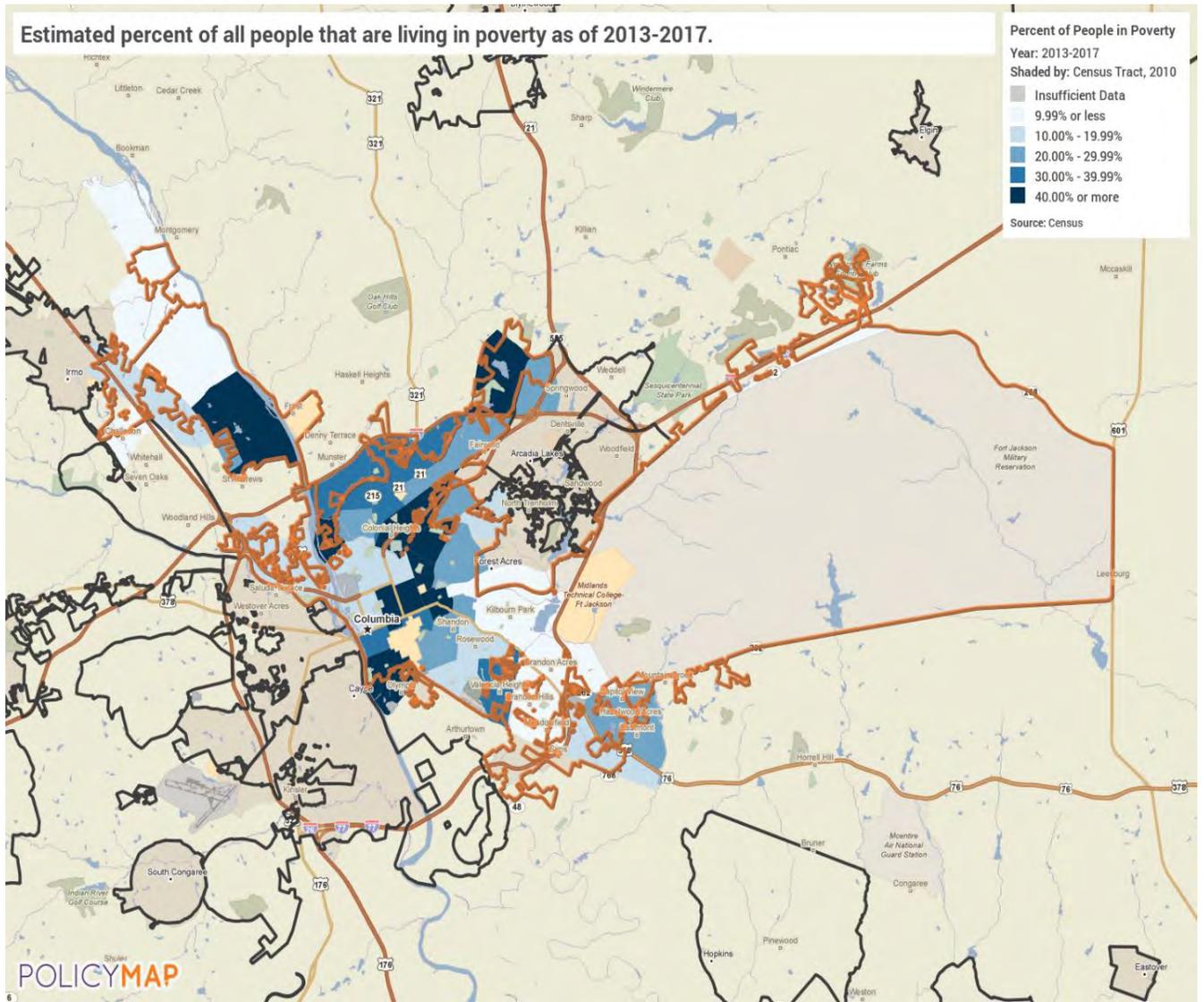
Source: 2013-2017 ACS via PolicyMap



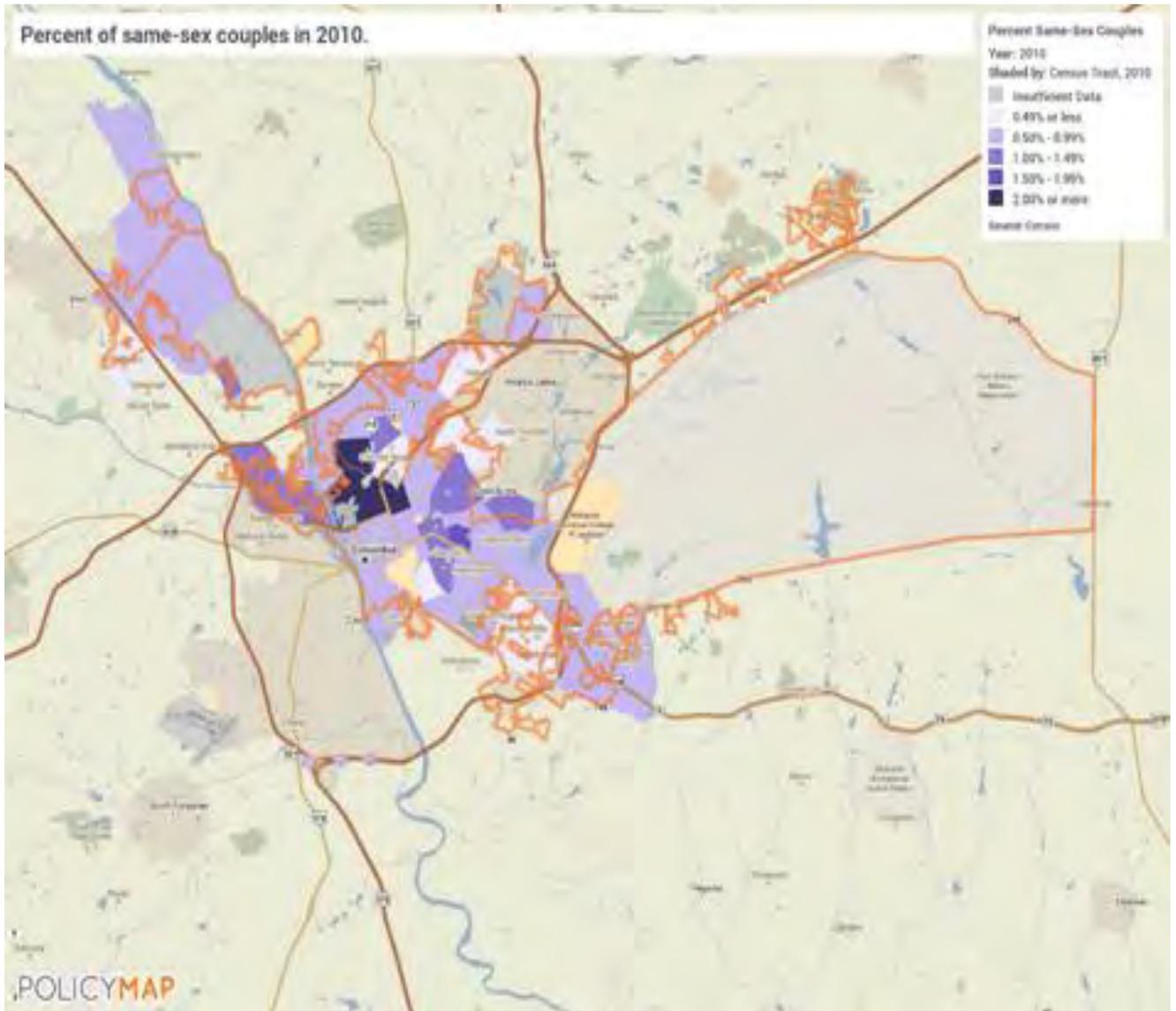
Source: 2013-2017 ACS via PolicyMap



Source: 2013-2017 ACS via PolicyMap



Source: 2013-2017 ACS via PolicyMap



Source: 2010 Decennial Census via PolicyMap

### Police Headquarters Emergency Generator

The City of Columbia will design and install a new 1200-amp diesel generator and transfer switch to act as a secondary source of power to Police Headquarters. The generator is a permanent fixture integrated into the facility's existing power grid, and its installation will ensure that all services housed in that facility can sustain operations during and after a disaster.

Police Headquarters, located at 1 Justice Square in Columbia, serves as the central command center for the Police Department and its employees. If the Police Headquarters loses power, there are currently life safety measures in place to assist citizens and staff to evacuate the building; however, the critical functions housed in the building must be relocated to an alternate facility until power can be restored. This results in an interruption of important functions. The installation of a permanent backup generator will enable the Police Department to ensure continuity of services should a loss of power occur.

### Fleet Services Emergency Generator

The City of Columbia will design and install a new 1600-amp diesel generator and transfer switch to act as a secondary source of power for the Fleet Services Facility. This generator is a permanent fixture integrated into the facility's existing power grid. This will ensure that the services housed in that facility can sustain operations during and after a disaster.

Fleet Services are responsible for maintaining the entire City fleet. The fleet is composed of 3,161 vehicles (and equipment): 329 Fire Department vehicles, 653 Police Department vehicles, and vehicles that service the city departments that provide public services, public works, water and sewer, roads and traffic, and other critical infrastructure. In the event of a power outage at Fleet Services, the City loses the capability to maintain critical assets used to provide crisis response. The loss of the use of these assets results in diminished capacity to maintain order and to respond to emergencies.

Of critical importance, the primary fueling station for the City is located within the footprint of the Public Works facility that houses Fleet Services. The City intends to include the fueling station as a component of the Fleet Services generator to ensure the City can continue fueling the fleet during times of loss of primary power to the facility.

While there are life safety measures in place to evacuate staff and citizens safely from the building in the event of a power loss, there is no viable alternative to relocating the services provided in the building.

A maintenance and operating agreement by the City to operate the generators for their useful life can be found in Section 8.4.

#### **Project Impact on Community Lifelines:**

- **Safety and security:** These projects will enable the City to sustain vital police and fire department operations in the event of disaster resulting in a power outage.
- **Health and medical:** These projects will ensure that emergency vehicles and the City’s first responders will have uninterrupted communications, and access to vehicles, equipment, and the wherewithal to fuel them in the event of a disaster.
- **Energy (power and fuel):** The projects will provide a permanent, redundant source of power to two facilities, critical to the provision of critical services in the event of a disaster. It will also provide the ability to fuel emergency response vehicles during a power outage.
- **Transportation:** The projects will enable the Police Department and other critical city services to continue in the event of a disaster, providing evacuation oversight and traffic control, keeping streets and highways safe and operational.

The City intends to create a list of critical facilities and will be prioritizing these for back-up generation as funding is available.

**Allocation for the Activity:** \$950,000

**Eligibility for CDBG-MIT:** Housing and Community Development Act Section 105(a) (1), Section 105(a) (2)

**National Objective:** Low- and Moderate-Income Area Benefit (LMA)

**Administering Agency:** Columbia, Engineering Department, Construction Management Division, Columbia Office of Community Development

### **3.7 Planning Activities**

**Project Description:** Rising flood insurance costs threaten city residents as they are “priced out” of their homes where flood insurance coverage is required as a condition of their mortgage. On a broader scale, rising National Flood Insurance Program (NFIP) premiums pose a threat to the local economy and real estate markets, as properties gradually lose their resale value as flood risks become more pronounced. Participation in the Community Rating System (CRS), including the implementation of higher regulatory floodplain standards, is an effective tool to mitigate the impact of rising

flood insurance costs. As of August 2019, Columbia ranked 23rd in the state for the number of policies written (1,130).<sup>71</sup>

To lessen this financial burden on residents or buy down the cost of flood risk, the City will leverage land-use planning and/or hazard mitigation planning activities, informed by the Mitigation Needs Assessment, to support the adoption and implementation of international building codes and policies as they are put forward. These activities will help to mitigate the cost of current and future flood risk by accumulating discounts on existing flood insurance policies for its residents, while also lessening the impacts of future disasters on new construction built in accordance with higher standards.

The City may also collaborate with Richland and Lexington counties, as well as the Central Midlands Council of Governments, to participate in planning for regional approaches in addition to specific local solutions to promote sound hazard mitigation practices. This may include providing additional financial support for updating the Central Midlands Hazard Mitigation Plan currently underway. Studies could include, but are not limited to, flood control, drainage improvement, resilient housing solutions, surge protection, economic development, infrastructure improvement, or other efforts to mitigate risks and future damages and establish plans for comprehensive recovery efforts. Planning funds and projects will be administered by the City's Department of Community Development. The City will make all final determinations regarding planning studies and coordinate with local universities, other local governments, the Central Midlands Council of Governments, state agencies, federal agencies, and/or vendors to identify the scopes, the parameters of the planning efforts, and the type of data that they will gather.

The City continues to work to gather, understand, and utilize data in ways that will enhance the city's emergency response and preparedness activities. Data of interest includes, but is not limited to, natural hazard risks, including anticipated effects of future extreme weather events and other natural hazards. This will enable the city to improve its disaster information analytics capabilities, and foster communication, collaboration, and information gathering among relevant city agencies, nonprofits, and community organizations that have a role in disaster response and recovery. Data gathered will inform possible solutions that plan for and create a more resilient landscape in the City. Updated mapping and modeling techniques will be used to inform land-use plans, master plans, historic preservation plans, comprehensive plans, community recovery plans, resilience plans, updating of building codes, zoning ordinances, and neighborhood plans.

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<sup>71</sup> [https://crsresources.org/files/100/maps/states/south\\_carolina\\_crs\\_map\\_october\\_2019.pdf](https://crsresources.org/files/100/maps/states/south_carolina_crs_map_october_2019.pdf)

The City will use planning funds to support additional collaborative hazard mitigation planning to understand evolving disaster risks and support additional mitigation activities as they may be identified.

The City is reserving specific decisions regarding the planning activities to be funded at the present time, with the exception of providing support to the Central Midlands Hazard Mitigation Plan Update. When program policies and procedures are developed for the Planning Program, the City will include prioritized efforts that more directly support activities that actively engage residents and businesses in planning and implementing mitigation and resilience activities and programs.

**Allocation for the Activity:** \$2,655,750

**Eligibility for CDBG-MIT:** FR-6109-N-02

**National Objective:** Low- and Moderate-Income Area Benefit (LMA), Urgent Need – MIT (UNM)

**Administering Agency:** Columbia Office of Community Development

### 3.8 Administrative Costs

The City has certified and has in place proficient financial controls and procurement processes, adequate procedures to prevent any duplication of benefits as defined by Section 312 of the Stafford Act, and processes for ensuring timely expenditure of funds. The City also maintains a comprehensive website for all mitigation activities assisted with these funds, as well as processes to detect and prevent waste, fraud, and abuse of funds; perform environmental reviews on every project; and ensure that all projects are compliant with the Uniform Relocation Assistance Act; Davis-Bacon Act and other labor standards; Fair Housing, Section 3, Part 85; and other federal laws. HUD provides monies to the City for the operating costs associated with day-to-day management of programs. Proper oversight and administration ensure a reduction in concerns or findings from HUD.

The Department of Community Development will oversee all activities and expenditures of the CDBG-MIT funds. Existing city employees will be utilized, and additional personnel and contractors may be hired to aid in the administration and carrying out of mitigation programs. Not only will these personnel remain involved in ensuring that there are layers of financial control, they also will provide technical assistance to the City, and will undertake administrative and monitoring activities to better ensure compliance with applicable requirements, including, but not limited to, meeting the mitigation threshold, eligibility, national objective compliance, fair housing, nondiscrimination, labor standards, environmental regulations, and procurement regulations at 2 CFR Part 200.317 – 200.326. Each activity funded will

meet the mitigation definition and one of HUD’s three national objectives, with an emphasis on achieving the primary national objective of benefiting low- and moderate-income persons, and will be an eligible activity. Department of Community Development staff will perform monitoring in accordance with the City’s CDBG-MIT monitoring plan.

The Department of Community Development will maintain a high level of transparency and accountability by using a combination of risk analysis of programs and activities, desk reviews, site visits, and checklists modeled after HUD’s Disaster Recovery Monitoring Checklists (until more specific Mitigation Monitoring Checklists are available) and existing monitoring checklists used in monitoring regular program activities.

The Department of Community Development will determine appropriate monitoring of subgrantees and subrecipients, considering prior CDBG and CDBG-DR grant administration performance and audit findings, as well as factors such as the complexity of the project. The primary purpose of the Department’s monitoring strategy is to ensure that all projects comply with applicable federal regulations and are effectively meeting their stated goals. The frequency and areas monitored will be determined by a risk analysis. All projects will be monitored at least once on-site during the life of the activity. The results of monitoring and audit activities will be reported to the Director of the Department of Community Development. The Department will determine the areas to be monitored, the number of monitoring visits, and their frequency. City departments administering program funds will be provided training and technical assistance if requested, or if the Department determines that in-house or on-site monitoring is needed.

The Department of Community Development will continue to follow all guidelines that it uses to monitor projects funded under the regular CDBG program. The monitoring will address program compliance with contract provisions, including, but not limited to, environmental reviews, fair housing, Section 3 compliance, compliance with the Davis-Bacon Act and other labor standard provisions, procurement regulations, fair housing and equal opportunity requirements, compliance with 2 CFR Part 200, program income, and other CDBG financial requirements. These policies and procedures are consistent with those used by HUD to monitor entitlement programs. All necessary environmental reviews will be performed on each project prior to funding.

As part of the implementation of its Fair Housing and EEO compliance, the City works to overcome racial and ethnic segregation and housing problems through fair housing seminars and advocacy efforts. The City encourages partners and subrecipients to add/maintain affordable housing throughout the entire City of Columbia. The City of Columbia will continue to monitor the administrative processes and procedures that might inhibit fair housing. The City will review city ordinances and regulations that

might pose additional burdens. The City will continue to meet with representatives from other local governmental jurisdictions, Columbia Housing Authority, and United Way of Midlands to discuss housing development issues. Community Development staff will continue to participate with the Greater Columbia Community Relations Council to identify and address fair housing issues.

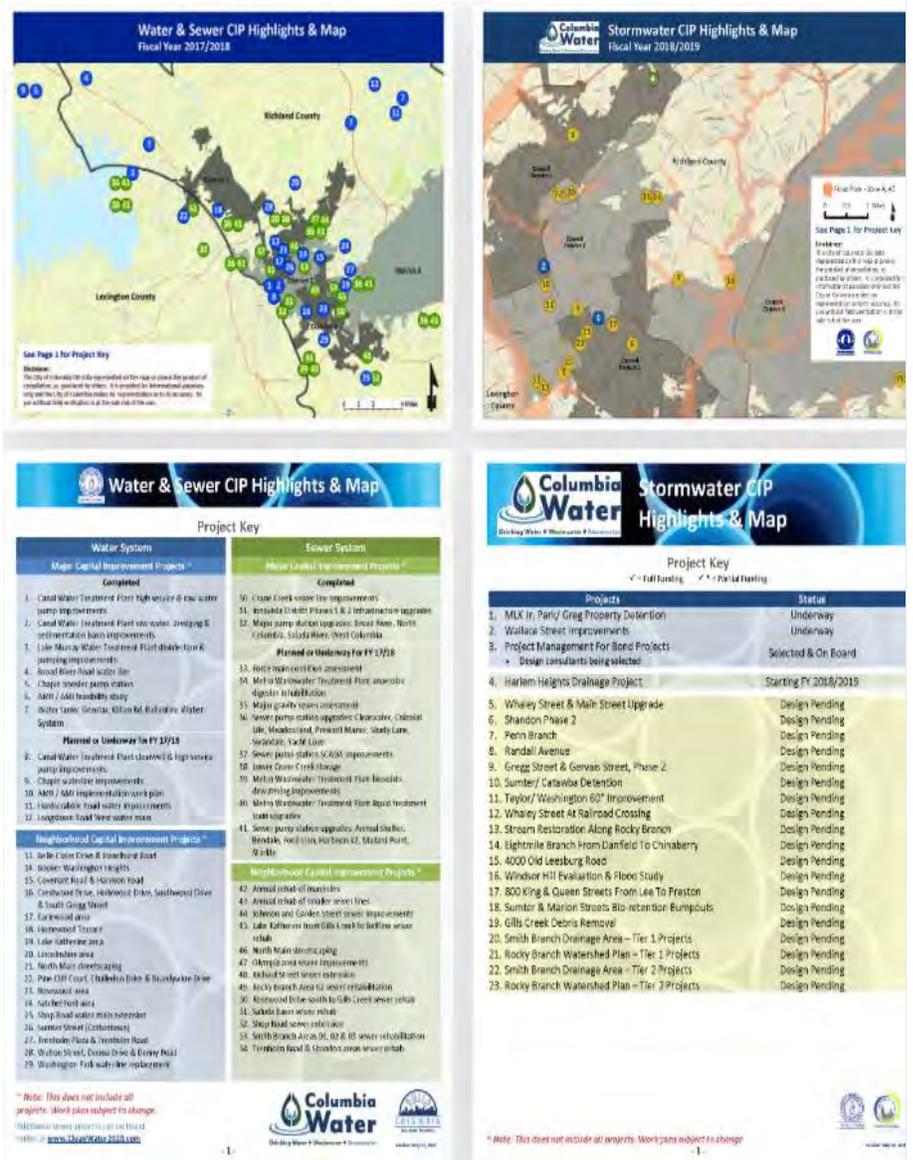
More specifically, for the CDBG-MIT projects, the City will ensure that goals for environmental justice are met and that Section 3 requirements are included in all construction contracts, that contractors are trained on compliance, and that best efforts are made to address Section 3 and MBE/DBE/SBE and VBE goals.

### 3.9 Additional City Actions and Collaborations to Address Mitigation Needs

#### Water and Sewer Projects

Since the flooding in 2015, Columbia Water, the City’s water, sewer, and storm water management department, has moved to develop and fund critical stormwater control projects. The City has had a Stormwater Management Capital Improvement Program (CIP) for decades. Prior to 2001, it was funded via General Funds. On or around 2001, the City implemented a stormwater utility fee that is based on impervious area and is assessed to every parcel within the city limits. While stormwater fees have increased through the years, the projects were funded with a “pay as you go approach” until recently. In 2017, the City increased fees and issued bonds using the Stormwater Utility Fund to advance the delivery of projects to be more proactive in addressing stormwater hazards and flooding problems in Columbia. The City was the first to issue Green Bonds.

Figure 33. Capital Improvement Plan Maps & Projects



The City’s Capital Improvement program is designed to identify and fund construction projects for upgrading, rehabilitating, or expanding the City’s infrastructure. This program includes projects for the drinking water treatment and distribution system, the wastewater collection and treatment system, the stormwater drainage system, street-scaping, and other projects as identified by the City. The City typically develops a 5-year CIP list with projects allotted to different years based on priority.

The stormwater management projects in particular are focused on neighborhoods with high and moderate populations of socially vulnerable populations. (See Figure 34 for additional detail.) Two projects are currently underway. Nineteen additional projects, including a debris removal project for Gills Creek and two watershed plans, are currently in the design phase.

Figure 34. Stormwater Capital Improvement Project with Respect to Vulnerable Populations

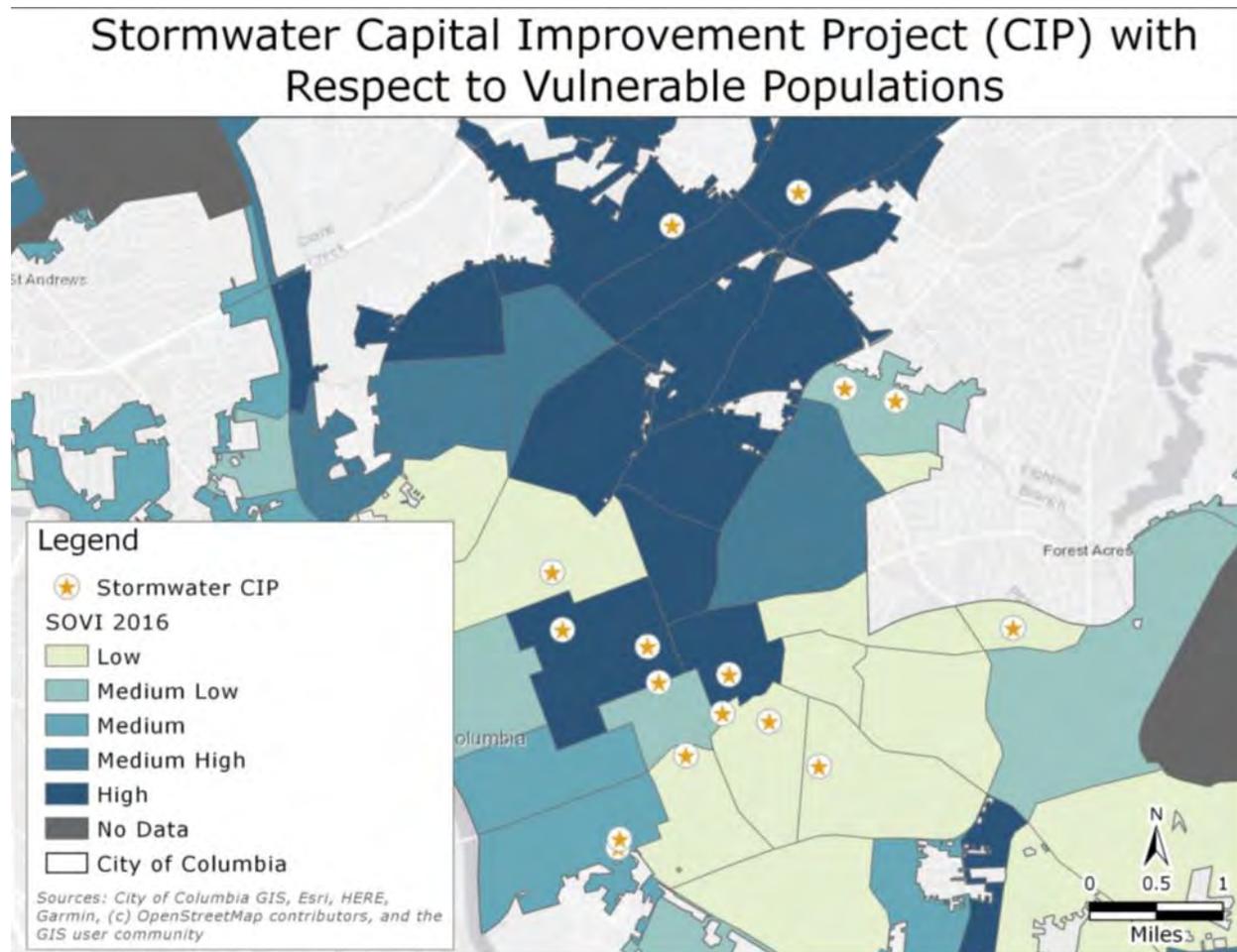


Figure 34 shows locations of stormwater improvement projects that are part of the City's Capital Improvement Plan. These have been overlaid on 2016 SOVI data and illustrate the City's focus on addressing flooding and stormwater management in the City's most vulnerable neighborhoods.

The City also has a robust Water and Sanitary Sewer CIP. The City budgets \$120 million per year to support improvements to the water and sanitary sewer system. Many of those projects involve enhancing the resiliency of the sanitary sewer and water systems. The improvements made to the sewer system prior to the 2015 flood event proved to be a vital part of mitigating the impact of the flood on the City. Many critical sanitary sewer facilities were elevated above the 100-year flood elevation levels, which allowed those facilities to continue to operate during the flood event,

aiding in a quicker recovery throughout the City than otherwise would have been possible.

Through the various CIPs, the City is identifying and funding construction projects to upgrade, increase the capacity, and make more resilient the City's infrastructure for the drinking water treatment and distribution system, the wastewater collection and treatment system, and the stormwater drainage system. Taking an aggressive and proactive approach to mitigation, the City's program is funded through bond sales, with the goal of making the water, wastewater, and stormwater systems more resilient and able to function effectively during severe weather events. These improvements provide benefits within the City, as well as in Richland and Lexington counties.

The City has evaluated the option of developing a Revolving Loan Fund in the past and has determined it is not currently in a position to devote the administrative and technical resources needed to successfully carry out this type of program.

#### [National Flood Insurance Program Participation](#)

As a part of NFIP, the Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum NFIP requirements. Under CRS, flood insurance premium rates are discounted to reward community actions that meet the three goals of CRS, which are (1) reduce flood damage to insurable property, (2) strengthen and support the insurance aspects of NFIP, and (3) encourage a comprehensive approach to floodplain management.

As a participant in NFIP, the City of Columbia decided to participate in NFIP's CRS Program. As a result of the City's efforts, effective May 1, 2019, the City entered the CRS Program as a Class 9 community. This provides flood insurance policyholders within the City's jurisdiction a **5%** premium discount on their NFIP policies.

Columbia Water has launched an effort to educate residents on the importance of participating in FEMA's NFIP. Columbia Water manages construction and significant improvements in its floodplains as part of its participation in NFIP. Recognizing that the City has a relatively low participation rate (23rd among South Carolina cities), Columbia Water is deploying educational resources to help property owners learn more about their flood risk and how to manage their flood insurance rates, with the goal of increasing NFIP participation.

#### [Intergovernmental Agreements for Emergency Services](#)

The Columbia Fire Department serves Columbia, the capital of South Carolina, as well as a 772-square mile area of Richland County. The Department is the sole provider of fire services for local, state, and federal government buildings in both the City and

county. The City of Columbia and Richland County entered a contract to provide fire protection to the entire county, and Richland County EMS serves the entire county, including the City of Columbia. The Columbia Fire Department provides fire protection to five local municipalities in addition to unincorporated Richland County. The City has mutual-aid agreements to provide fire protection to McEntire Air National Guard Base and Fort Jackson, in addition to five surrounding counties.

The City of Columbia's Fire Department strives to improve emergency response services to city and county residents. It now utilizes social media to alert residents ahead of severe storms. Not only does it provide real-time weather updates, but it also includes pre-storm preparation and safety tips. The Department enhanced its Swiftwater Rescue component with additional boats and pieces of specialty equipment. This equipment, along with advanced training, is credited with saving lives during Columbia's recent flood events.

### 3.10 Building Sciences

The City has adopted Green Building and energy efficiency codes for use with all HUD-funded projects as feasible. Effective January 1, 2020, the International Energy Conservation Code has been adopted for all City construction projects. The City reviews and revises (as necessary) its code every two years. The building code within which Columbia needs to operate is mandated by the State of South Carolina. Any deviations or modifications must be approved by the State. The City intends to include high-quality, durable, sustainable, mold-resistant, and energy-efficient construction methods in specs for all CDBG-MIT projects.

The division below outlines the Energy Conservation Code under which the City currently operates:

#### **DIVISION 8. - ENERGY CONSERVATION CODE**

##### **Sec. 5-171. - Adoption; conflicting provisions.**

(a) There is hereby adopted by and for the city the International Energy Conservation Code 2009 edition as adopted by the South Carolina Building Code Council, Inc., which code is published separately in book form and is adopted by reference as though copied fully in this section. Any provision concerning the qualification, removal, dismissal and duties of the building official or any other city employee are deemed excluded from this section. A file of record of this code is in the offices of the city clerk and building official.

(b) In the event of any conflict between the provisions of the code adopted by this section and state law or city ordinances, rules or regulations, then the code adopted by this section shall prevail and be controlling unless

the code is specifically amended by state law which shall prevail and be controlling.

(Code 1979, § 6-2081; Ord. No. 2005-078, 8-10-05; Ord. No. 2009-069, 11-18-09; [Ord. No. 2016-074, 10-18-16](#).)

The following additional measure was added to the last Code revision:

- Designers, contractors, and inspectors will place more emphasis on proper soffit installation to limit wind-driven rain.

#### **4.0 Coordination and Alignment**

The City of Columbia has a long history of collaboration and coordination with its fellow CDBG-MIT grantee neighbors, Richland and Lexington counties. The City provides fire protection and emergency response services to Richland County, and has mutual-aid pacts with five other Richland communities, as well as with Lexington County. Columbia also provides water and sanitary sewer services to Richland County and a portion of Lexington County. In return, Richland County handles EMS for the City and is responsible for shelters and emergency evacuation services. The City of Columbia also owns and operates the Columbia Animal Shelter, which services the city limits and Richland County regarding lost and/or unwanted animals. Disasters such as the 2015 flood result in many stray and homeless animals that need to be reunited with their families or connected with new families. The partnership between the City and county regarding this activity has existed for decades and is beneficial to the entire region.

The Central Midlands Council of Governments (COG) is responsible for the development of the Hazard Mitigation Plan for the four-county Central Midlands area, composed of Richland, Lexington, Newberry, and Fairfield counties. While COG is in the process of updating the 2016 Hazard Mitigation Plan, representatives have been involved in a discussion with city officials around project selection and have provided support for the Mitigation Needs Assessment. Efforts were made to ensure that, to the maximum extent possible, recommendations and goals from the 2016 Hazard Mitigation Plan were incorporated into the projects recommended for funding. For example, the proposed Olympia Fire Station replacement will include both an auxiliary power supply built into the building's electrical system and surge protectors.

The City identified several projects that were included in the State of South Carolina's Hazard Mitigation Plan, last updated in 2018. These projects focused on the development of a comprehensive, interagency flood assessment and mitigation plan to manage floodwater in the Rocky Branch Creek, which originates in the City of

Columbia and runs through the University of South Carolina – Columbia campus. Both projects have components that are addressed in the City’s Stormwater Management CIP.

The three grantees (City of Columbia, Richland County, and Lexington County), along with representatives of the Central Midlands COG, met on February 27, 2020, to share information on the MIT projects that each jurisdiction is proposing and to explore opportunities for additional collaborations to support a regional approach to hazard mitigation and increased community resilience. Both Richland and Lexington counties intend to continue their buyout programs, and both will have at least one infrastructure project as well. Richland County’s timetable is similar to that of the City of Columbia. Lexington County will be submitting their MIT Action Plan in June 2020.

The representatives of the Central Midlands COG provided an update on the planning underway for updating the region’s Hazard Mitigation Plan. A grant application was submitted to FEMA for funding to support development of the plan. Columbia indicated a willingness to allocate some MIT funding as well, should that become necessary.

Staff from the Central Midlands COG discussed an innovative modeling project, developed as a joint venture between the University of South Carolina and the University of North Carolina. The project uses climate data to predict both drought and flood events. COG hopes to be able to introduce the drought modeling to local municipalities and utility providers by early fall.

The Central Midlands Hazard Mitigation Plan is currently under revision and the City of Columbia is supporting that effort with funding through their CDBG-MIT allocation. The City commits to consideration of any planning recommendations, including those for land use that come out of that plan, as well as identifying other planning opportunities that can be undertaken to improve long-term resilience and mitigate hazards facing the City.

Joint meetings between the three MIT grantees and COG will continue on a monthly basis going forward.

## **5.0 Citizen Engagement and Participation**

### **5.1 Citizen Participation Plan**

To comply with HUD requirements and community expectations, the City of Columbia has developed a Citizen Participation Plan specifically for its CDBG-MIT programs.

The goal of the Citizen Participation Plan is to provide meaningful and inclusive opportunities for citizen involvement.

During the development of this action plan, citizens, residents, and other stakeholders had an opportunity for reasonable and timely access to information and a minimum of 45 days to submit comments related to the allocation of CDBG-MIT funding, program design, and eligible activities. In addition to receiving citizens' comments on the initial CDBG-MIT Action Plan, the City held one outreach event during the development of the action plan and one additional outreach during the public comment period. These outreach events were held to inform the public of the funding process and solicit input regarding the mitigation and resilience needs of the community. Significant efforts were made to notify the public and generate participation as described in Section 5.3, Public Engagement and Stakeholder Consultation, below. These types of outreach efforts will be continued as mitigation projects evolve, additional mitigation needs are identified, and program activities are modified to respond to these changes.

The City's initial action plan and subsequent amendments will be posted to the City of Columbia CDBG-MIT website in both English and Spanish in accessible formats. Public notices regarding the action plan and subsequent notices will be posted in *The State* newspaper and will also be placed in a prominent location on the City's main website along with a hyperlink for the City's CDBG-MIT website. The CDBG-MIT website will display an announcement on its home page with a hyperlink to the action plan (or amendment). In addition to accepting public comments via more traditional methods (email, mail, and fax), the City's CDBG-MIT website is also enabled to receive public comments. All comments and city responses will be incorporated into the action plan or action plan amendment for HUD review.

Residents with disabilities or those who need technical assistance or reasonable accommodations are encouraged to contact the City of Columbia Human Resources Employee Relations Officer/ADA Coordinator, Gardner Johnson, for assistance at:

- Phone: 803-545-4625
- Email: [gardner.johnson@columbiasc.gov](mailto:gardner.johnson@columbiasc.gov)
- Mail: 1401 Main Street, 4th Floor, Human Resources, Columbia, SC 29201

Supplemental to the posting of the action plan and subsequent amendments on the City's CDBG-MIT website, the following items will be posted and updated to promote transparency and provide the latest available information on the City's mitigation and resilience efforts:

- Program Policies and Documents
- DRGR Quarterly Progress Reports

- Program Performance Reports
- Procurement Policies and Opportunities
- CDBG-MIT Contracts and Status Report

## 5.2 Public Hearings

The City scheduled two public hearings: one while the plan was being developed and the projects were identified to solicit community input, and one after the draft action plan was posted to gather additional citizen comments on the projects being proposed. The first notice publicizing the public hearings was posted in *The State* (newspaper of general circulation) on February 19, 2020.

The first public hearing, introducing the community to the Mitigation Grant program and HUD’s goal in providing the funding to Columbia, was held on March 2, 2020 at 6:00 p.m. It took place at the Edisto Discovery Park facility. This site was chosen for its proximity to the low- and moderate-income community that is currently served by the Olympia Fire Station, and the ease of access for the most heavily impacted community.

Note: Due to public health directives and with HUD approval, City of Columbia leadership changed the second “in person” public hearing on the CDBG-MIT Action Plan to a “virtual” public hearing, conducted on the Zoom platform, which offered participation by computer or telephone. The date and time of the meeting remained the same. After the slide presentation, citizens were able to make live comments and the presenters responded in real time. The hearing was also transcribed to capture all verbal comments. Listeners were also able to provide typed comments through the platform’s chat box.

The information to participate in the virtual public hearing was widely disseminated through the steps below. The information for the public to participate was:

<https://zoom.us/j/846466498>

Join Online: <https://zoom.us/j/846466498> or click [here](#)

Join by phone: 253-215-8782

Meeting ID: 846 466 498

In an effort to advise the public of this change, and to promote as much citizen engagement as possible, the City took the following steps:

- The informational presentation for the public hearing was posted to the City’s CDBG-MIT website in both Spanish and English in advance of the hearing.

- Both the Public Engagement and Action Plan links on the CDBG-MIT website promoted the public hearing, posting both the URL and the telephone number. Instructions were provided to those who wished to participate in the public hearing regarding how to download and use the Zoom application.
- Those needing special accommodations to participate were given a phone number and email to submit a request. This information was provided in the press release, flyer, and on the CDBG-MIT website.
- A press release announcing the public hearing with details on how to participate was distributed.
- The City distributed an electronic flyer with details on the public hearing and methods of participation.
- The City used its social media platforms to publicize the virtual public hearing.
- The City recorded and re-broadcast the virtual public hearing on its television station, along with information on how to submit comments.
- The City Council hearing was posted to YouTube with instructions regarding how to submit comments. At the time of the meeting, listeners were able to post comments to a portal. These comments were recorded for distribution to the Office of Community Development.

In addition to the CDBG-MIT specific public hearings, two presentations were made to the City Council: one before final determination of project selection (February 25, 2020) and one following the second public hearing (April 21, 2020 – virtual meeting). Opportunities for public comment were provided at both City Council meetings. Comments received at both City Council meetings have been included in this document (Section 7.0, Public Comments).

### 5.3 Public Engagement and Stakeholder Consultation

As part of the process to develop the City of Columbia CDBG-MIT Action Plan, the City placed a high priority on public engagement. Recognizing the synergies from working in concert with its peers in Lexington and Richland counties, the City has sought to combine efforts where appropriate. This has led to a robust engagement process with multiple opportunities to present to, hear from, and otherwise engage the concerned and impacted residents of the City of Columbia, keeping the two other CDBG-MIT grantees in the area advised of the City's progress.

The Columbia City Council meets regularly, and its meetings are open to the public and are broadcast on the internet. In addition to the members of the Council, the larger public is welcomed to ask questions and voice concerns on matters raised in the meetings. Agendas are publicized in advance of the meetings to provide broad notice to the public of the items to be discussed. Two presentations were made to the City Council and public on the status of progress and the next steps in the development of the CDBG-MIT Action Plan. Those meetings were held in the City Council Chambers on February 25 and April 21, 2020 (virtual meeting).

The City intends to use its social media channel as well as its television station to further publicize the mitigation program and the availability of the CDBG-MIT Action Plan for review. The City's Public Information Office will send out press releases and request time on the City's morning television and radio talk shows to reach the broadest possible audience.

In accordance with the Public Comment requirements of the City's CDBG-MIT allocation, the City has also provided the citizens of Columbia with 45 calendar days to review and comment on its Draft CDBG-MIT Action Plan. During this 45-day period, the City also held its final outreach session on the evening of April 6, 2020. As was noted in Section 5.2, this was conducted as a virtual public hearing. Comments on the plan were accepted in person at the first public hearing, and by telephone or computer at the second public hearing, as well as by mail, email, fax, or submittal via the City's CDBG-Mitigation website. Comments and concerns raised in this session and others have been incorporated in the City's final action plan (Section 7.0, Public Comments).

The action plan made available to the public included an extensive evaluation of unmet mitigation needs based upon best-available data; the basis for CDBG-MIT allocations; the budget of the proposed CDBG-MIT programs, including a description of eligible activities; and outlines of the methods by which the City of Columbia will meet all federal requirements. The initial action plan for the City was made accessible via the City's CDBG-Mitigation website in both English and Spanish. The notice for the availability of the action plan has also been posted in a prominent location on the City's main website and on the CDBG-Mitigation webpage. In addition, the City has provided contact information on the website for any citizen who may need reasonable accommodation to access the action plan or public outreach events pertaining to the development of the City's CDBG-MIT Action Plan.

The initial City of Columbia CDBG-MIT Action Plan was posted to the City's website on March 16, 2020, with a deadline for public comments ending on April 30, 2020. In addition, a public notice regarding the availability of the plan for review was published in *The State* newspaper, the publication with the widest circulation in the City of Columbia, on March 12, 2020. All public comments received on the plan have been incorporated into the final action plan submitted to HUD for review and approval.

Below is an inventory of all documents created to promote the public hearings.

**Initial Hearing (March 2, 2020):**

- Press Release
- Public Notice
- Social Media Content & Graphics (Facebook & Twitter)
- Bilingual (English/Spanish) hearing signage

- Bilingual (English/Spanish) hearing collateral
  - Mitigation Factsheet
  - Public Comment Forms

**Post-Publication Hearing (April 6, 2020):**

- Flyer
- Newsletter article
- Press Release
- Public Notice
- Social Media Content & Graphics
  - Content to promote the virtual public hearing
  - Content to promote the recording of the hearing on YouTube and City TV

All public hearing materials were created using plain-language principles to increase readability for low-literacy audiences. Hearing signage, collateral, and the Action Plan document were provided in both English and Spanish to ensure equal access for LEP audiences. All electronic materials were developed to be 508 compliant to enhance accessibility for those with disabilities. Promotional materials were also developed for use on the City TV station to provide information and promote the hearings to those who do not have access to computers or other online platforms. Although the second hearing was conducted virtually, through Zoom, a telephone dial-in option was included for those who may not have computer access. Finally, the presentation and recording from the virtual hearing were broadcast on City TV with information on how to provide public comment to ensure access for those who were not able to attend the Zoom presentation.

The City's public relations staff provided the following information on the distribution of materials referenced above as the City promoted the public hearing and the Action Plan and encouraged public comment.

Two press releases (April 2 and April 6, 2020) were sent to the newspapers of general circulation in both English and Spanish as well as local television and radio stations. The public hearing was held via Zoom on April 6. In addition to the media promotion, it was consistently advertised on the City's CDBG-MIT website. The notice ran from April 6 to 12, 2020, in the City of Columbia's weekly newsletter that is published online. Social media messages in both English and Spanish were heavily used to encourage comment on the plan and to promote the rebroadcast:

- April 2, 2020 – 936 people reached
- April 4, 2020 – 936 people reached
- April 6, 2020 – 3,041 people reached
- April 28, 2020 – 1,200 people reached

## 5.4 Citizen Complaints and Concerns

During the project implementation process, citizens will be provided with the City’s Grievance Procedures, which contain a point of contact, street address, and telephone number, along with timeframes for filing a complaint or concern. As a part of this process, citizens will be required to sign a receipt that they acknowledge and understand the complaint process. The City (and subrecipients, if applicable) will provide a written response to each inquiry within 15 business days of receiving the complaint, as practicable. All citizen concerns and complaints shall be appropriately logged and filed in a central repository for HUD review and monitoring. In addition, a copy of the complaint or concern and the City’s response will be filed/uploaded to the project file. If the concern or complaint was forwarded to the City by HUD, the City’s (and/or subrecipient’s) response shall be copied to HUD and emailed to HUD’s designated MIT email address.

## 5.5 Receipt of Public Comments

The City provided many opportunities for citizens to comment on the Mitigation Action Plan and its proposed projects. These include the following:

- In person at City Council meeting (February 25) and virtually at the meeting on April 21, 2020
- At a public hearing:
  - March 2, 2020, 6:00 p.m., Edisto Discovery Park Facility, 1914 Wiley Street
  - April 6, 2020, 6:00 p.m., virtual public hearing
- By email: [CityMitigation@columbiasc.gov](mailto:CityMitigation@columbiasc.gov)
- Through the City’s Mitigation website: <http://mit.columbiasc.gov>

The pre-draft comments were gathered and considered in selecting projects for funding. Once the draft plan was posted for public comment, all comments were collected, logged, and responded to by the appropriate City staff. Comments and staff responses can be found in Section 7.0 of this document (Public Comments).

## 5.6 Amendments to the Mitigation Action Plan

As the mitigation needs of the City of Columbia change over time, the City may elect to update its needs assessment, modify or create new activities, or reprogram CDBG-MIT funds, as necessary.

Action plan amendments will be memorialized, approved, and include the following:

- Exactly what content is being added, deleted, or changed

- A chart that clearly identifies where funds are coming from and where they are going to
- Revised budget table that reflects all funds, as amended
- Description of how the amendment is consistent with the Mitigation Needs Assessment

#### 5.6.1 Substantial Amendments

The City defines substantial amendments to the action plan as those that propose one or more of the following changes to the initial plan:

- A change in the purpose, scope, location, or beneficiaries of an activity approved in an action plan or subsequent amendment
- The addition of a covered project
- The allocation or re-allocation of more than \$1 million
- The addition or deletion of any allowable activity described in the approved plan

Each amendment will include a single chart or table that illustrates, at the most practical level, how all funds are budgeted (e.g., by program, subrecipient, grantee-administered activity, or other category).

Only those amendments that meet the definition of a substantial amendment are subject to the citizen participation process. Citizens will be provided with at least 30 days to review and comment on all substantial action plan amendments. A summary of all comments received and a response to those comments will be included in the final substantial amendment submitted to HUD for approval.

#### 5.6.2 Non-Substantial Amendments

The City will notify HUD of all non-substantial action plan amendments in writing for review and comment at least 5 business days before the amendment becomes effective. If no changes are required, the non-substantial amendment will be posted to the CDBG-MIT website.

#### 5.6.3 Submittal of Amendments

A substantial amendment to the action plan will follow the same procedures for publication as the original action plan in accordance with the City's Citizen Participation Plan. All amendments (both substantial and non-substantial) will be numbered sequentially and posted on the City's Mitigation website. The beginning of every amendment will include a section that identifies the content that is being added, deleted, or changed. In addition, this section will include a revised budget allocation table that reflects the entirety of all funds and will clearly illustrate the movement or

reallocation of program funding. The City’s most recent version of the entire action plan will be accessible for reviewing as a single document at any given time.

### 5.7 City of Columbia Resilience Advisory Committee

Following approval of the action plan, the City will form the Columbia Resilience Advisory Committee. The committee will be composed of city residents, representatives of impacted city departments, experts in the mitigation field, and others as the City reviews its needs. The advisory committee will convene for an open public meeting at least twice annually to provide increased transparency in the implementation of CDBG-MIT funds, solicit and respond to public comment and input regarding the City’s mitigation activities and needs, and serve as an ongoing public forum to continuously inform the City’s CDBG-MIT projects and programs.

### 5.8 Mitigation Website

The City created a Mitigation website that went live on February 19, 2020. The site provides information on the purpose of the Community Development Block Grant Mitigation allocation and the amount of funding allocated to the City of Columbia. In addition, a section helps residents to understand what mitigation is and how this new resource can help communities lessen the impact of disasters and reduce the long-term risk of death, injury, property loss, property damage, suffering, and hardship.

The website provides an explanation of how data-informed investments can have a positive impact on critical community lifelines, such as public safety; food, water, and shelter; health and medical services; energy; communications; transportation; and hazardous materials handling.

The website will include, but not be limited to, the following information:

- The Mitigation Action Plan (including all amendments)
- All Quarterly Progress Reports
- Procurement policies and procedures
- All public hearing notices and the public comments portal
- All Advisory Committee meeting notices and minutes of the meetings
- All executed contracts that will be paid with CDBG-MIT funds
- The status of services or goods currently being procured (e.g., phase of the procurement, requirements for proposals)

The web address is <http://mit.columbiasc.gov>.

## 6.0 Additional Requirements and Considerations

### 6.1 Pre-Award Cost Reimbursement

The City of Columbia will reimburse itself for pre-award costs associated with the development of the CDBG-MIT Action Plan. Section 24 CFR 570.200(h)(1)(i) will not apply to the extent that it requires pre-agreement activities to be included in a consolidated plan. All pre-agreement costs, such as engineering, planning, administration, and program delivery, are exempt from the environmental process in accordance with 24 CFR 58.34.

### 6.2 Promotion of Housing and Essential Services for Vulnerable Populations

In the furtherance of environmental justice and Executive Order 12898, the City will ensure that the environment and human health are protected fairly and equally for all people regardless of race, color, national origin, or income. The City is committed to preventing any federally assisted projects from having a disproportionately high or adverse human health or environmental effects on the City's minority and low-income populations.

All of the projects will address service areas that are over 50% low and moderate income. These projects were selected because they enable the City to improve both the safety of existing residents, and the City's ability to mitigate against future harm to those residents through loss of fire protection, potable drinking water, and the rapid response time of public safety services. All projects proposed are anticipated to have a positive, not adverse, impact on minority and low-income populations to be served.

The City will ensure that the environmental review record for all of the projects undertaken will contain one of the following:

- Evidence that the site or surrounding neighborhood does not suffer from adverse environmental conditions and evidence that the proposed action will not create an adverse and disproportional environmental impact or aggravate an existing impact.
- Evidence that the project is not in an environmental justice community of concern or evidence that the project does not disproportionately affect low-income or minority populations.
- If there are adverse effects on low-income or minority populations, documentation that the affected community residents have been meaningfully informed and involved in a participatory planning process to address the adverse effect from the project and the resulting changes.

The City will include in the specifications for the environmental assessment firm that will be retained, rigorous citizen participation and input requirements, and will take any suggestions into consideration in project design for all the projects funded with CDBG-MIT.

All of the projects to be undertaken using CDBG-MIT funds have long-term maintenance and operating commitments provided by the City to ensure that all projects continue to contribute to improving community resilience and mitigating future hazards.

The City recently completed and submitted to HUD its 2020 Analysis of Impediments to Fair Housing Choice, representing an in-depth examination of potential barriers, opportunities, and challenges to housing choice for Columbia residents on a citywide scale. Impediments to Fair Housing are defined as any actions, omissions, or decisions based upon race, color, religion, national origin, disability, gender, or familial status that restrict, or have the effect of restricting, housing choice or the availability of housing choice. Fair Housing Choice is the ability of persons of similar income levels – regardless of race, color, religion, national origin, disability, gender, or familial status – to have the same housing choices.

This Analysis of Impediments is an extension of the Citywide Consolidated Plan. The Analysis of Impediments is an integral component of the fair housing planning process and consists of a review of both public and private barriers to housing choice and involves a comprehensive inventory and assessment of the conditions, practices, laws, and policies that impact housing choice within a jurisdiction. It provides documentation of existing, perceived, and potential fair housing concerns and specific action strategies designed to mitigate or eliminate obstacles to housing choice for the City residents. The Analysis is intended to serve as a strategic planning and policy development resource for local decision-makers, staff, service providers, the private sector, and community leaders in the City of Columbia. As such, this Analysis of Impediments will ultimately serve as the foundation for fair housing planning in the City.

The City recognizes that in a disaster environment, it is low- and moderate-income households, along with persons with disabilities, the elderly, and those for whom English is not their primary language who bear the greatest impact. Not only are these individuals most directly impacted, due to constraints on resources and limited options; but they are the least able to recover from disaster effects. Transportation constraints may prevent them from evacuating. Lack of insurance to repair homes and replace belongings requires them to reside in unsafe and unsanitary conditions, to rely on overcrowded conditions or shelters, or to become homeless. Impacts on public transit systems impede return to employment. They often hold jobs that pay

low wages and command lower educational levels in retail and hospitality establishments. If the disaster destroys their place of employment, their options become even more limited. These businesses are frequently the ones that are unable to resume operations following a disaster. Homeowners often forego insurance due to its high cost (particularly that of flood insurance); and landlords may find that with the destruction of housing, they are able to command higher rents, thus reducing the inventory of affordable rental housing.

Additionally, vulnerable populations are often concentrated in industrial areas or near major highways, in areas with substandard infrastructure and inadequate public services. The City of Columbia has taken steps through the City's Stormwater Management Capital Improvement Program to address stormwater management and flooding issues in the City's neighborhoods with high and moderate concentrations of socially vulnerable residents. The City has also acted with CDBG-DR and HMGP funds, to:

- Buy out low-income homeowners of properties that have experienced repetitive flooding to enable them to move to safer locations.
- Provide homeowner repair resources for low-income homeowners.
- Increase the supply of affordable rental housing through a small rental repair and multifamily development program.

While the population of the City of Columbia is more than 50% low and moderate income, the City is committed to improving the resiliency of all residents, particularly those least able to protect themselves. The projects that were selected by the City for CDBG-MIT funding, along with actions already underway, will have a long-term positive impact on systems and services upon which vulnerable populations are reliant, through:

- More effective management of stormwater.
- Improving the resilience of the infrastructure on which a majority of city residents rely for potable drinking water and fire protection.
- Improving the facilities that provide fire and emergency response to a low-income portion of the city.
- Making the city's public safety resources more resilient to power outages.

These projects combined meet all the City and HUD's CDBG-MIT goals:

- Advancing long-term resilience to current and future hazards, particularly for those vulnerable populations least prepared to respond with their own resources.
- Aligning local projects with both planned federal and local investments, many of which are supported by State and Regional Hazard Mitigation Plans.
- Promoting community-level planning, including fair housing planning to

address barriers to housing choice, improve the availability of safe and affordable housing, and continue to mitigate future hazards and improve resilience.

The City is proposing the following additional actions in its Fair Housing Action Plan submitted to HUD on May 1, 2020, the same day that the CDBG-MIT Action Plan was submitted to HUD.

*Action A – Establish incentives to encourage developers to construct affordable housing units.*

Incentives start with continued efforts that remove barriers to creating affordable housing. One important action is to give a greater ability to the Planning Commission and the Board of Zoning Appeals to increase density under specified circumstances that support housing diversity.

The City should apply the green building incentives approach for developers to construct affordable housing units. Affordable housing incentives can be modeled after the green building incentives approach to offer density bonuses; increases in height; increases in lot coverage; and reduction from minimum parking requirements. The incentives should also consider regulatory waivers, as well as an expansion of the tax abatement program.

It is further recommended that the City waive or significantly discount plan review, building permit, rezoning, and subdivision fees for affordable housing projects. These discounts and/or waivers should also be applied to sanitary sewer tap fees and water tap fees.<sup>72</sup>

*Action B – Leverage public land and funding to develop affordable housing.*

The City should offer discounted public lands to affordable housing developers, including acquisition of additional public land for the provision of affordable housing. In addition, the City should also routinely and actively support the University of South Carolina's commitment to the South Carolina Commission of Higher Education to construct more on-campus student housing facilities.

*Action C – Incentivize development of multi-unit housing.*

By expanding and incentivizing the development of housing, the City can help provide people with more housing options that are affordable, meet the changing preferences of aging residents and younger workers and families, and provide more opportunities for people to age in place. New housing will also serve to offset the city's jobs/housing imbalance in which 85% of Columbia workers live outside the City.

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<sup>72</sup> City of Columbia Residential Development Review Fees 2019

*Action D – Create a Columbia Housing Trust Fund.*

Although the Midlands Housing Trust Fund is currently supported financially by the City of Columbia, other public and new private revenues may be generated and applied within the City of Columbia that will further efforts to create more affordable housing. A Columbia Trust Fund can prioritize city funds and leverage federal, state, and private resources to those households and/or neighborhoods most in need of affordable housing and the development of more housing options. The City’s Housing Trust Funds should prioritize:

- Supporting multi-family new construction and rehabilitation.
- Facilitating homeownership development in targeted neighborhoods.
- Assisting housing for seniors, disabled, and homeless populations.
- Acquiring selected properties for resale for development of affordable housing.

*Action E – Revise the Zoning Ordinance and Land Development Regulations.*

Although revisions to the city’s Zoning Ordinance are underway, it is recommended that these revisions include the following:

- Policies that encourage the development of more off-campus student housing combined with appropriate regulations to regulate parking, noise, and other issues arising from student rental housing.
- Promoting awareness and the use of accessory dwelling units to expand the range of housing options in conjunction with single-family residential units.
- Offering certain regulatory waivers for a variety of unit types, especially affordable housing units, within a development.
- Streamlining existing regulations for developers and property owners to make it easier for compliance with the regulations.
- Accommodating and supporting the development of transitional and emergency housing to clarify the standards for housing in serving populations needing such housing.

The City should also evaluate establishing citywide overlay zoning to reduce the incidence of residential teardowns and educate property owners and other members of the community about why these policies and protections are in place.

*Action F – Increase the Housing Inventory by Promoting Infill and Additional New Residential Redevelopment.*

It is recommended that the city use its locational criteria to be more geographically flexible and expand where new affordable housing can be located. It is important to ensure that these geographic designations are updated annually to keep up with market conditions and residential development trends. This includes planning for the use of existing underutilized properties along commercial corridors for infill and redevelopment that facilitates residential uses.

The protection of historical characteristics can be supported by incentives for property owners to maintain and improve their older homes compatible with the surrounding character. This action includes promoting the use of the South Carolina Abandoned Buildings Act tax credits to incentivize the rehabilitation, renovation, or redevelopment of abandoned buildings and sites. This action should also promote the use of the Bailey Bill property tax exemptions to encourage the rehabilitation of historic properties.

*Action G – Increase the Promotion of Fair Housing.*

Increased public educational efforts are needed to understand the importance of affordable housing in the community. The City and local nonprofits need to continue to educate area realtors, bankers, and landlords to ensure awareness of discriminatory housing policies and promote fair housing opportunities for all residents and continue to educate and make residents aware of their rights under the Fair Housing Act and the Americans with Disabilities Act (ADA).

*Action H – Expand and Leverage Financial Support to Housing Assistance Programs.*

Increases in state and federal resources will not completely address the city's housing needs.<sup>73</sup> Therefore, despite the city's existing financial and resource commitments, it is recommended that additional funding be annually allocated to the Emergency Loan (HELP) program to provide deferred loan payments to qualified households for homeowner repair and emergency rehabilitation. The City should also increase funding and leverage other funding and promote the City Lender and the Maintenance Assistance Programs.

*Action I – Strengthen the Rental Housing Regulations Ordinance.*

The City should increase the use of property maintenance and code enforcement inspections so rental units are safe and well maintained through a more aggressive system of inspections. These code revisions should also require a yearly inspection of the property with the city.<sup>74</sup> Recognition and awards/publicity could also be given to projects with the "highest level" buildings or landlords.

The MIT Action Plan plans to use 86% of the total allocation to fund the Olympia Fire Station Replacement (\$7,000,000), the replacement of 12 Head Gates in the Columbia Canal (\$8,000,000), and the installation of back-up generation capacity for Police Headquarters and the Fleet Services facility (\$950,000). Each of these facilities serves an area that is predominantly low and moderate income

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<sup>73</sup> South Carolina Housing Needs Assessment 2019

<sup>74</sup> City of Clemson Rental Housing Regulations - <http://online.encodeplus.com/regs/clemson-sc/doc-viewer.aspx#secid-901>

The fire station serves an area that is 65.35% low and moderate income.<sup>75</sup> The new fire station site will provide better access to the local service area, particularly during high traffic periods and during times of localized street flooding. In addition, it will be better equipped to respond to fire and other incidents in the new multi-story housing being constructed in the area. The station will also be providing an additional bay for future use.

The service area for the floodgate project covers the entire City of Columbia and portions of Richland County that in the aggregate are 52% low and moderate income.<sup>76</sup> The project will provide drinking water and water for residential uses and for fire protection. Currently, stopgap measures are being used to provide water services. The completion of the head gate project will ensure an adequate supply of potable water, critical for resident health and well-being far into the future.

The critical facility generator projects serve the entire City of Columbia, which is 53.45% low and moderate income.<sup>77</sup> These two projects will ensure that the city is able to continue to operate without interruption in the event of natural disaster. The Fleet Services facility generator provides the City with the ability to fuel all emergency vehicles should a power outage occur.

In combination, these projects will enable the City to provide more stable, comprehensive, and effective response to natural hazard related impacts in racially and ethnically concentrated areas of the community, and specifically in areas with concentrations of low- and moderate-income housing.

In concert with revisions to its Consolidated Plan, the City of Columbia has prepared an Analysis of Impediments to Fair Housing Choice (AI) to satisfy the requirements of the Housing and Community Development Act of 1974, as amended. This Analysis to Impediments and the strategies to address them is in the public comment period at the time of this Action Plan submission. The document is scheduled to be submitted to HUD on or before May 15, 2020, for review and approval.

To ensure that all residents in the city are protected under state and local law, and to adhere with the Department of Housing and Urban Development (HUD) regulations on fair housing as required by HUD entitlement grants, the City of Columbia has taken steps to promote fair housing and to educate its leadership, staff, and residents on what HUD defines as fair housing and discrimination in housing. Further, the city has identified what steps it must take to overcome the barriers identified and to propose

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<sup>75</sup> ACS 5-Year 2011–2015 Low and Moderate Income Summary Data, <https://www.hudexchange.info/programs/acs-low-mod-summary-data/>

<sup>76</sup> Ibid.

<sup>77</sup> Ibid.

consequences for those who do not adhere to a policy of fair housing and non-discrimination.

Additional strategic actions that the City may undertake to address impediments identified in the Analysis include:

- Establish incentives to encourage developers to construct affordable housing units.
- Leverage public land and funding to develop affordable housing.
- Incentivize development of multi-unit housing.
- Create a Columbia Housing Trust Fund.
- Revise the Zoning Ordinance and Land Development Regulations.
- Increase the Housing Inventory by Promoting Infill and Additional New Residential Redevelopment.
- Increase the Promotion of Fair Housing.
- Expand and Leverage Financial Support to Housing Assistance Programs.
- Strengthen the Rental Housing Regulations Ordinance.

The projects to be undertaken with CDBG-MIT funding will support the safe development of additional multifamily housing in the Olympia neighborhood, expanding capacity for emergency response and lowering insurance costs. It will guarantee a supply of safe drinking water and fire protection for areas that may be considered for future development within the City, and it reinforces the City's emergency response capability in the event of future disasters.

### 6.3 Plans to Minimize Displacement

Currently, there is no plan or expectation of displacement as the result of implementation of any of the CDBG-MIT funded projects.

In the event that relocation is required, the City will minimize displacement of persons or entities as a result of the implementation of CDBG-MIT projects by ensuring that all programs are administered in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act (URA) of 1970, as amended (49 CFR Part 24) and Section 104(d) of the Housing and Community Development Act of 1974 and the implementing regulations at 24 CFR Part 570.496(a), subject to any waivers or alternative requirements provided by HUD.

Any tenants permanently displaced by CDBG-MIT project activities will be provided relocation benefits in accordance with URA requirements, taking into consideration the functional needs of the displaced persons in accordance with HUD guidance.

Consistent with the goal of minimizing displacement, the City of Columbia will take the following steps to minimize either the direct or indirect displacement of persons as a result of CDBG-MIT investment:

- Assist any person who must be relocated temporarily as a result of CDBG-MIT related construction activities to find suitable housing. This assistance may also include compensation for rental, moving, and storage costs.
- If feasible, demolish only dwelling units that are not occupied or structures that have not been used for residential purposes.
- Target only those properties that are deemed essential to the success of the project.

There will be no land acquisition for the Head Gates project. The City has no intention of using eminent domain to acquire property for the Olympia Fire Station or for any buyout activities that may occur subsequent to Action Plan approval. All acquisition will be voluntary, and the appropriate documentation will be secured from the property owner to document fair market value and the voluntary nature of the acquisition for the project file.

The policy related to minimizing displacement and compliance with URA requirements is referenced above and can be found on the City's CDBG-DR website at <https://dr.columbiasc.gov/wp-content/uploads/2020/04/202004114-URA-Policies-Draft-CLEAN-VERSION.pdf>.

#### 6.4 Plans to Ensure Open Competition, Reasonable Cost Assessment, and Contractual Requirements

The City follows procurement guidelines outlined in 2 CFR Part 200.317 to 200.326. All procurements will be conducted in a manner to ensure free and open competition, and cost estimates will be provided by the appropriate City department or contracted architecture and engineering firm in advance of any bid postings.

All construction activities that utilize CDBG-MIT funds will be reasonable and consistent with market costs at the time and place of construction. To comply with this requirement, the City will utilize and document independent cost estimates (ICEs) for all its projects. Specific parameters regarding ICE requirements will be outlined within policies and procedures on a program-by-program basis. No covered projects (infrastructure projects of \$100 million or more with at least \$50 million in CDBG funding) are anticipated at this time.

For all contracts with contractors used to provide discrete services or deliverables, the following contractual provisions will be added:

- The City (or procuring entity) will clearly state the period of performance or date of completion for all contracts.
- The City (or procuring entity) will incorporate performance requirements and liquidated damages or, for administrative and consultant contracts, penalties into each procured contract.
- The City (or procuring entity) may contract for administrative support but will not delegate or contract to any other party any inherently governmental responsibilities related to management of the grant.

## 6.5 Application of Elevation Standards, Natural and Green Infrastructure Standards

The City intends to promote high-quality, durable, sustainable, mold-resistant, and energy-efficient construction methods for all activities funded with CDBG-MIT resources, as applicable. All newly constructed buildings must meet all locally adopted building codes, standards, and ordinances. In the absence of specific locally adopted and enforced building codes, the requirements of the South Carolina State Uniform Building Code will apply.

As applicable, the City will – at a minimum – adhere to the advanced elevation requirements established in the Federal Register Notice (FR-6109-N-02), subtitled “Elevation standards for new construction, repair of substantial damage, or substantial improvement.” To this effect, future property damage will be minimized by requiring that any rebuilding be done according to the best available science for that area with respect to base flood elevations.

As applicable and within its policies and procedures on a program basis, the City or its subgrantees will document decisions to elevate structures. This documentation will address how projects will be evaluated and how elevation costs will be reasonably determined relative to other alternatives or strategies, such as infrastructure improvements to reduce the risk of loss of life and property.

The City recognizes that natural or green infrastructure methods provide drainage functions to reduce stormwater runoff while offering low-cost and attractive site design options. All commercial or institutional construction or retrofitting funded with CDBG-MIT will utilize one of the following green infrastructure strategies to reduce runoff, retain water, and improve water quality on the subject site:

- Retain or plant native vegetation.
- Remove existing impervious surface area or utilize pervious pavement.
- Install bioswales or other retention areas.
- Collect rainwater for non-potable uses.
- Install green roofs.

The fire station and any subsequent new construction or retrofit of public facilities will, to the maximum extent feasible, adopt one or more of the following programs:

- ENERGY STAR
- Enterprise Green Communities
- LEED
- ICC-700 National Building Standard
- U.S. EPA Indoor AirPlus
- Any other equivalent comprehensive green building program deemed acceptable to HUD and approved by the City

For construction projects completed, under construction, or under contract prior to the date that assistance is approved for the project, adherence to the applicable standards to the extent feasible will be encouraged, but not required.

## 6.6 Ongoing Operation and Maintenance Agreements

The City is committed to funding the ongoing maintenance and operational costs of CDBG-MIT funded projects.

Copies of the maintenance and operations commitment letters for the Olympia Fire Station, Columbia Canal Head Gates, and critical facility generator projects can be found in Section 8.4.

## 6.7 Timely Expenditure of Funds

HUD CDBG-MIT requirements state that grantees must expend 50% of their allocation within 6 years and 100% of their allocation in 12 years from the date that the grantees sign the grant agreement with HUD. To meet these requirements, the City will evaluate and report the timeliness of the overall CDBG-MIT expenditure rate, as well as progress toward meeting outcome measures and the comparison of obligations to expenditures.

The City is providing a projection of expenditures and outcomes with the submission of this action plan (Section 8.6, Projections for Expenditures and Performance Outcomes).

Whenever program changes affect projected outcomes, funding levels, or recovery timelines, HUD will be provided with revised projections.

The City will track all requests for payment and will keep records of expenditures. All programs and projects will provide a draw-down summary and balance sheet monthly. Program and project timelines will be submitted to the City's CDBG-MIT

project manager, Department of Community Development director, and budget director, along with a detailed plan with measurable benchmarks and critical milestones. In the case of any failure to meet benchmarks, program and project managers will be required to provide an action plan to detail corrective actions that will ensure that the program meets the benchmarks. Technical assistance and monitoring will be provided as needed. If the corrective action is not successful in meeting the stated benchmarks, the program or project may be terminated and the funds re-obligated.

A program or project shall be de-obligated if it fails to correct identified program deficiencies (i.e., Findings) or demonstrate that corrective actions are being implemented to address identified deficiencies within 60 days of receipt of a monitoring letter or other correspondence outlining the deficiencies to be corrected. A "finding" is defined as a deficiency in program performance based on noncompliance with a federal statute or regulation. If there is an unexpended balance remaining after payment/reimbursement of all eligible, approved program costs upon completion of the project, the remaining funds will be re-obligated.

Once a project has met one or more of the criteria listed above, the reprogramming process shall proceed as follows:

1. Supporting documentation shall be compiled to justify the recommendation for re-obligation of funds. The documentation shall include a summary of technical assistance provided to date and any other documents as may be applicable. The CDBG-MIT project manager and budget director shall review the facts of the case and together make the recommendation regarding re-obligation, as necessary.
2. A first notice letter shall be developed that includes the specific reason(s) that the project is being considered for de-obligation. The letter will provide 30 days from receipt of the letter to implement corrective actions.
3. CDBG-MIT program staff shall take the appropriate measures to ensure that the subrecipient receives the first notice (i.e., the notice shall be sent via first class certified mail with a copy sent via read-receipt email). Within 10 days of issuance of the first notice, CDBG staff shall follow up with the subrecipient to offer technical assistance specific to the deficiencies. The outcome of the initial outreach (as well as any subsequent contacts) will be documented in file notes.
4. If corrective measures have not been implemented by 30 days after the initial letter has been received, a Notice of Termination shall be developed and transmitted following the delivery methods described above. The second notice provides a deadline of 15 days from receipt of the letter to demonstrate that corrective actions have been implemented. The letter further advises that at the end of the 15 days, the funds will be de-obligated.

5. Upon expiration of the 15-day termination notice, the request for approval of reprogramming/recommendation for termination shall then be prepared and submitted to the Department of Community Development director through the budget director. Once the director has approved the de-obligation action, the final letter is signed by the director and transmitted via certified mail.

Note: When monies are being de-obligated as the result of completion of a project with an unexpended balance of funds, upon acceptance of the Close-out Report, CDBG-MIT will transmit a letter acknowledging successful close-out of the project and confirming the balance to be re-obligated.

When funds are re-obligated, the City will identify additional eligible recipients or projects, in accordance with the action plan, that require additional funding, or the City can move forward immediately to expend funds and achieve program goals and comply with all program requirements.

In recognition of the lengthy timeline for major infrastructure projects, the City is funding the architectural and engineering work for the Head Gates project with CDBG-DR funds so that the NEPA review can begin as soon as possible.

## 6.8 Program Income

As an entity that receives CDBG entitlement funding, the City of Columbia understands that when implementing certain activities with CDBG-MIT funds, there is the potential for generating program income. All program income generated by CDBG-MIT funds will be accounted for and expended in accordance with HUD regulations and current program income procedures. Program income will continue to be spent on projects that further recovery in areas impacted by the October 2015 flood event. These funds will continue to be considered Mitigation funds and will be subject to all CDBG-MIT regulations and eligible activities. Any program income generated will be governed by the program income guidance provided in the regulations at 24 CFR 570.489(e) and 24 CFR 85.25 and all applicable waivers.

## 6.9 Duplication of Benefits

The Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) requires that “recipients of federal disaster recovery funding make certain that no person, business concern or other entity will receive duplicative assistance.” Because disaster assistance to each person/entity varies widely based on their insurance coverage and eligibility for federal funding, grantees cannot comply with the Stafford Act without first completing a duplication of benefits (DOB) analysis specific to each program and activity.

A DOB occurs when:

- A beneficiary receives assistance,
- The assistance is from multiple sources, and
- The assistance amount exceeds the need for a particular recovery purpose.

The City of Columbia, in its DOB policy and procedures, will include the following:

- Verification of all sources of assistance received by the applicant, as applicable, prior to the award of CDBG-MIT funds.
- Determination of the applicant’s remaining funding need(s) for CDBG-MIT assistance before committing funds or awarding assistance.
- The requirement that all beneficiaries, subgrantees, or subrecipients enter into a signed agreement to repay any duplicative assistance if they later receive additional assistance for the same purpose for which the CDBG-MIT award was provided.
- Include in all agreements the following language: “Warning: Any person who knowingly makes a false claim or statement to HUD may be subject to civil or criminal penalties under 18 U.S.C. § 287, 1001 and 31 U.S.C. § 3729.”

The City’s policies and procedures governing DOB indicate that, prior to the award of assistance, the grantee will use the best, most recent available data from FEMA; the Small Business Administration; insurers; and any other sources of local, state, and federal sources of funding to prevent DOB. This will include recent HUD guidance published on June 20, 2019, entitled “Updates to Duplication of Benefits Requirements Under the Stafford Act for Community Development Block Grant (CDBG) Disaster Recovery Grantees” 2019 DOB Notice) (84 FR 28836).

As part of the Risk Analysis and Pre-Implementation Plan, the City has developed a plan to implement DOB policies and procedures, as well as conduct compliance and monitoring activities.

## 7.0 Consideration of Public Comments

### Comment #1

#### Support for Action Plan

Various commenters expressed support for projects in the Action Plan.

#### Staff Response:

The City appreciates the support offered by commenters for the Action Plan.

The projects selected by the City were those that address unmet needs and are critical to maintaining essential lifelines in the event of another disaster. The completion of the Head Gates project, a partnership between the City and FEMA, will ensure that threats to the water supply to the City are minimized during future flood events. The replacement of the Olympia Fire Station will help the City to provide state of the art fire and safety protection to a growing area of the community. The generator projects were identified as high priority in both state and regional hazard mitigation plans, but up to now, have lacked the funding to implement.

### Comment #2

#### Buyouts

The commenter recommended the addition of a project to acquire floodplain property as a means of mitigating flood hazards, directing funding toward the removal of floodplain properties from development plans.

#### Staff Response:

The City recognizes the important role that strategic acquisition of property can have in flood mitigation efforts. Returning the built environment in floodplains to permanent greenspace supports their natural functions and preserves valuable resources.

As was mentioned earlier in the Plan, the City is providing a match to CDBG-DR funding to match HMGP funds to buy out a number of properties where low- and moderate-income homeowners have been subject to repetitive flooding.

The projects selected were prioritized based on the broad and significant impact they will have on the community, on socially vulnerable populations, and on low- and moderate-income populations.

The County is developing a transportation program, funded locally, that includes the Gills Creek Greenway. This project includes the acquisition of the

three strategic parcels referenced in the public comments provided by the commenter. All three of the target properties are commercial and not residential in nature. One of the owners has consistently refused to sell. It is for this reason that this project was not initially included in the Action Plan. The City has not ruled out additional financial support in the future, in addition to what they are already providing for the Greenway Project, should voluntary acquisition become possible.

The City will continue to evaluate the possibility of using CDBG-MIT funding, for the acquisition of strategic properties, if funding is available to do so.

### **Comment #3**

#### **Creation of a City Flood Mitigation Commission**

The commenter recommended formation of a City Flood Mitigation Commission to identify and prioritize property acquisitions, head off future issues, and identify funding opportunities.

##### **Staff Response:**

Following approval of the action plan, the City will form the Columbia Resilience Advisory Committee. The committee will be composed of city residents, representatives of impacted city departments, experts in the mitigation field, and others as the City reviews its needs. The advisory committee will convene for an open public meeting at least twice annually. It will have as its mission:

- to provide increased transparency in the implementation of CDBG-MIT funds; and
- to solicit and respond to public comment and input regarding the City's mitigation activities and needs.

### **Comment #4**

#### **Use of CDBG-MIT Funding for COVID-19 Response**

The commenter asked if CDBG-MIT funding could be used for the City's response to COVID-19.

##### **Staff Response:**

The CDBG-MIT funding provided by HUD is governed by "Further Additional Supplemental Appropriations for Disaster Relief Requirements Act, 2018" (Public Law 115-123, approved February 9, 2018) (the "Appropriations Act"), and the subsequent Federal Register Notice FR-6109-N-02. The appropriations act and the Federal Register Notice restrict the use of CDBG-MIT.

The City expects to receive funding from the CARES Act (once an amendment is provided and approved) to address the impacts of COVID-19, as well as receiving some additional flexibility from HUD to use regular FY 2019 and 2020 CDBG allocations for community impacts from the virus.

#### **Comment #5**

##### **Olympia Fire Station Service Area**

The commenter asked if the service area for the fire station would change when the new facility is constructed.

##### **Staff Response:**

In order to maintain the response time that the City requires, the new station will be sited in the same general area as the current station. The service area will remain the Downtown Corridor: Rosewood to the Industrial Park to Olympia neighborhood to City Hall. The station will serve a mixture of residential and commercial areas. The station will also serve portions of Richland County, as it does now.

#### **Comment #6**

##### **Fire Station Cost**

The commenter asked, given the current challenges facing the City's budget, how much of the cost of the new fire station will be borne by the City.

##### **Staff Response:**

The City is projecting that the entire construction cost of the new fire station will be covered by the amount of CDBG-MIT funding proposed in the Action Plan.

#### **Comment #7**

##### **Hydro Plant**

A commenter questioned whether HUD's approval of funding for the Head Gates project is reliant upon the City deciding to recommission the hydro plant.

##### **Staff Response:**

HUD approval of the Action Plan, which includes funding for the Head Gates project, is not dependent on any commitment from the City regarding the future of the hydro plant.

## 8.0 Appendices

### 8.1 Definitions

**Action plan amendment:** As the grantee continues to finalize its long-term mitigation goals, or as mitigation needs change, the grantee must submit an action plan amendment to HUD that updates its needs assessment, modifies or creates new activities, and/or re-programs funds, as necessary. There are two types of action plan amendments: substantial and non-substantial. See Section 5.6 of this action plan for more detail.

**CDBG-DR:** Community Development Block Grant–Disaster Recovery assistance is the term for the HUD funding stream that is allocated to eligible disaster recovery entities via congressional appropriations. HUD provides flexible CDBG-DR grants to cities, counties, and states to help them recover from presidentially declared disasters, especially in low-income areas. This funding provides crucial seed money to begin the recovery process and rebuild in disaster-affected areas. Since CDBG-DR assistance funds a broad range of recovery activities, such as housing, infrastructure, and economic development, HUD can help communities and neighborhoods that may not otherwise recover because of limited resources.

**CFR:** The Code of Federal Regulations is the annual collection of general and permanent rules and regulations (sometimes called “administrative law”) that were published in the Federal Register by executive departments and agencies of the federal government. The CFR is divided into 50 titles that represent broad areas subject to federal regulation.

**Data collection:** Gathering, extracting, or measuring scattered and widespread data that are used to support hydrologic and hydraulic analysis and flood risk assessment.

**Data management:** Effective management of observational and analytical data related to flood risk assessment and risk mitigation.

**Decision-making support:** The capacity to understand the potential short- and long-term, as well as upstream and downstream, effects of development, maintenance, and project activities on flood risk, equitable benefit, and the natural and beneficial functions of the environment.

**Financial and grant management capabilities:** Tools and capabilities to manage funds, contracts, and grants associated with floodplain management and watershed-based initiatives.

**Flash flooding:** Flash flooding occurs when a locally intense precipitation inundates an area in a short amount of time, resulting in local streamflow and drainage capacity being overwhelmed.

**Flood:** An overflow of water onto lands that are used or usable by persons and not normally covered by water. Floods have two essential characteristics: The inundation of land is temporary, and the land is adjacent to and inundated by overflow from a river, stream, lake, or ocean.<sup>78</sup>

**Flood mapping:** Geographic flood hazard information that supports decision making and provides stakeholders with high-resolution flood risk data, including flood elevation and risk assessment.

**Flood risk assessment:** Estimations of flood losses and damages at a given depth of flooding, which are calculated at the structure level or aggregated at the census block level. Risk assessment will require cross reference with the latest predictions concerning the future change of climatic and physical conditions (e.g., predictions of sea level rise, land loss rates), as well as anthropogenic conditions (e.g., predicted land use and development patterns) over the coming decades.

**Green infrastructure:** Green infrastructure is the interconnected systems of natural areas and open spaces that are protected and managed for the ecological benefits they provide to people and the environment. With green infrastructure, green space is considered a form of infrastructure in the same manner as roads, water lines, and sewers. It includes large metropolitan parks, neighborhood parks, riparian buffers, linear parks and greenways, trees and forests, farms, and residential landscapes and urban gardens. It uses stormwater storage areas, water conveyance areas, and other natural flooded areas as part of the community infrastructure for stormwater management and flood damage reduction, as well as for parks, trails, and other recreation areas.

**HAZUS:** A nationally applicable standardized methodology developed and freely distributed by FEMA that contains models for estimating potential losses from earthquakes, floods, hurricanes, and tsunamis.

**Natural floodplain functions:** The functions associated with the natural or relatively undisturbed floodplain that moderate flooding, maintain water quality, recharge groundwater, reduce erosion, redistribute sand and sediment, and provide fish and wildlife habitat.<sup>79</sup>

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<sup>78</sup> U.S. Geological Survey Water Science Glossary of Terms.

<sup>79</sup> Ibid.

**Nonstructural mitigation measures:** Nonstructural measures offer a flood mitigation alternative to structural measures by accommodating floodwaters and either removing structures from harm's way or reducing the risk to existing buildings and infrastructure.

**Resilience:** The ability to anticipate, prepare for, and adapt to changing conditions and withstand, respond to, and recover rapidly from disruptions. Such disruptions may include, for example, a flooding event, a precipitous economic change, effects of long-term environmental degradation, or short-term or intermittent failure or underperformance of infrastructure such as the electrical grid. Resilience describes an area's capacity to prepare for, withstand, and recover from unpredictable shocks, minimizing the impacts on people, infrastructure, environments, and economies. In practice, resilience provides a framework for guiding planning, investment, and actions in order to reduce vulnerabilities.

**Riverine flooding:** Riverine flooding occurs along a river or smaller stream. It is the result of runoff from heavy rainfall or intensive snow or ice melt. The speed with which riverine flood levels rise and fall depends not only on the amount of rainfall, but even more on the capacity of the river itself and the shape and land cover of its drainage basin. The smaller the river, the faster water levels rise and fall.

**V-Zone:** Areas along coasts subject to inundation by the 1% annual chance flood event with additional hazards associated with storm-induced waves. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations or flood depths are shown. Mandatory flood insurance purchase requirements and floodplain management standards apply.<sup>80</sup>

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<sup>80</sup> FEMA. 2019. Zone V. <https://www.fema.gov/zone-v>

## 8.2 CDBG-MIT Action Plan List of Acronyms

ABFE	Advisory Base Flood Elevation
ACS	American Community Survey
ADA	Americans with Disabilities Act
AI/AN	American Indian/Alaska Native
AMI	Area Median Income
BFE	Base Flood Elevation
CDBG-DR	Community Development Block Grant–Disaster Recovery
CHA	Columbia Housing Authority
CPAC	Climate Protection Action Committee
DOA	U.S. Department of Agriculture
DOB	Duplication of Benefits
DRGR	Disaster Recovery Grant Reporting
EGCC	Enterprise Green Community Criteria
EPA	U.S. Environmental Protection Agency
FEMA	Federal Emergency Management Agency
FEMA IA	FEMA Individual Assistance
FEMA IHP	FEMA Individual and Households Program
FEMA PA	FEMA Public Assistance
FIRM	Flood Insurance Rate Map
HMGP	Hazard Mitigation Grant Program
HUD	U.S. Department of Housing and Urban Development
ICC	Increased Cost of Compliance
LEED	Leadership in Energy and Environmental Design
LID	Low-Impact Development
LMI	Low and Moderate Income
MFRG	Midlands Flood Recovery Group
MGD	Million Gallons Per Day
MSA	Metropolitan Statistical Area

NFIP	National Flood Insurance Program
OIG	Office of Inspector General
PA	Programmatic Agreement
PP FVL	Personal Property FEMA Verified Loss
QA/QC	Quality Assurance/Quality Control
QPR	Quarterly Progress Report
RP FVL	Real Property FEMA Verified Loss
SCDNR	South Carolina Department of Natural Resources
SFHA	Special Flood Hazard Area
URA	Uniform Relocation Assistance and Real Property Acquisition Policies Act
USACE	U.S. Army Corps of Engineers

## 8.3 Project Service Area Census Tracts

### 8.3.1 Columbia Head Gates and Lock Gate Repair<sup>81</sup>

Geographic Identity	Census Tract/Block Group	HUD MOD Percentage	Water Service Area	City Limits	Total Population	Low- and Moderate- Income Population
<b>Canal Head Gates Service Area</b>						
1500000US450790001001	000100-1	68%	Canal	Yes	1940	1315
1500000US450790001002	000100-2	0%	Canal	Yes	0	0
1500000US450790002001	000200-1	70%	Canal	Yes	910	640
1500000US450790002002	000200-2	61%	Canal	Yes	570	350
1500000US450790003001	000300-1	85%	Canal	Yes	920	780
1500000US450790003002	000300-2	83%	Canal	Yes	2325	1930
1500000US450790004001	000400-1	51%	Canal	Yes	690	355
1500000US450790004002	000400-2	47%	Canal	Yes	1250	590
1500000US450790005001	000500-1	78%	Canal	Yes	610	475
1500000US450790005002	000500-2	89%	Canal	Yes	1540	1370
1500000US450790006001	000600-1	49%	Canal	Yes	1030	505
1500000US450790006002	000600-2	53%	Canal	Yes	1595	845
1500000US450790007001	000700-1	39%	Canal	Yes	635	245
1500000US450790007002	000700-2	44%	Canal	Yes	965	425
1500000US450790009001	000900-1	94%	Canal	Yes	540	505
1500000US450790009002	000900-2	76%	Canal	Yes	1455	1105
1500000US450790009003	000900-3	95%	Canal	Yes	485	460
1500000US450790010001	001000-1	90%	Canal	Yes	725	655
1500000US450790010002	001000-2	74%	Canal	Yes	945	695
1500000US450790010003	001000-3	100%	Canal	Yes	20	20
1500000US450790011001	001100-1	67%	Canal	Yes	420	280
1500000US450790011002	001100-2	76%	Canal	Yes	1115	850
1500000US450790011003	001100-3	35%	Canal	Yes	755	265
1500000US450790011004	001100-4	58%	Canal	Yes	1200	695
1500000US450790011005	001100-5	81%	Canal	Yes	730	590
1500000US450790012001	001200-1	18%	Canal	Yes	950	175
1500000US450790012002	001200-2	13%	Canal	Yes	725	95
1500000US450790013001	001300-1	93%	Canal	Yes	485	450
1500000US450790013002	001300-2	85%	Canal	Yes	640	545
1500000US450790013003	001300-3	81%	Canal	Yes	655	530
1500000US450790013004	001300-4	73%	Canal	Yes	310	225
1500000US450790016001	001600-1	22%	Canal	Yes	405	90
1500000US450790016002	001600-2	59%	Canal	Yes	950	565

<sup>81</sup> FY 2020 ACS 5-year ACS Low- & Moderate-Income Summary Data, 4/10/2020.

<https://www.hudexchange.info/programs/acs-low-mod-summary-data/>

1500000US450790021001	002100-1	46%	Canal	Yes	1050	485
1500000US450790021002	002100-2	41%	Canal	Yes	620	255
1500000US450790021003	002100-3	80%	Canal	Yes	1205	970
1500000US450790022001	002200-1	39%	Canal	Yes	620	240
1500000US450790022002	002200-2	74%	Canal	Yes	860	640
1500000US450790023001	002300-1	25%	Canal	Yes	635	160
1500000US450790023002	002300-2	11%	Canal	Yes	785	90
1500000US450790023003	002300-3	10%	Canal	Yes	710	70
1500000US450790024001	002400-1	23%	Canal	Yes	1965	445
1500000US450790024002	002400-2	35%	Canal	Yes	1300	460
1500000US450790024003	002400-3	13%	Canal	Yes	1105	145
1500000US450790025001	002500-1	29%	Canal	Yes	805	230
1500000US450790025002	002500-2	33%	Canal	Yes	1300	425
1500000US450790025003	002500-3	22%	Canal	Yes	880	190
1500000US450790025004	002500-4	26%	Canal	Yes	645	165
1500000US450790026021	002602-1	44%	Canal	Yes	1910	835
1500000US450790026022	002602-2	67%	Canal	Yes	880	590
1500000US450790026031	002603-1	66%	Canal	Yes	1555	1020
1500000US450790026032	002603-2	85%	Canal	Yes	1180	1000
1500000US450790026033	002603-3	86%	Canal	Yes	2070	1775
1500000US450790026041	002604-1	83%	Canal	Yes	1470	1220
1500000US450790027001	002700-1	80%	Canal	Yes	475	380
1500000US450790027002	002700-2	31%	Canal	Yes	1000	305
1500000US450790027003	002700-3	46%	Canal	Yes	1395	640
1500000US450790027004	002700-4	85%	Canal	Yes	230	195
1500000US450790028001	002800-1	86%	Canal	Yes	2270	1960
1500000US450790028002	002800-2	84%	Canal	Yes	1325	1110
1500000US450790028003	002800-3	94%	Canal	Yes	445	420
1500000US450790029001	002900-1	33%	Canal	Yes	200	65
1500000US450790029002	002900-2	71%	Canal	Yes	665	470
1500000US450790029003	002900-3	0%	Canal	Yes	0	0
1500000US450790030001	003000-1	83%	Canal	Yes	265	220
1500000US450790030002	003000-2	91%	Canal	Yes	700	640
1500000US450790030003	003000-3	59%	Canal	Yes	785	460
1500000US450790031001	003100-1	93%	Canal	Yes	305	285
1500000US450790031002	003100-2	55%	Canal	Yes	345	190
1500000US450790105021	010502-1	61%	Canal	Yes	545	335
1500000US450790106001	010600-1	61%	Canal	Yes	1005	615
1500000US450790106002	010600-2	75%	Canal	Yes	1325	1000
1500000US450790106003	010600-3	80%	Canal	Yes	1620	1295
1500000US450790106004	010600-4	76%	Canal	Yes	505	385
1500000US450790107031	010703-1	71%	Canal	Yes	995	705
1500000US450790107032	010703-2	45%	Canal	Yes	570	255
1500000US450790107033	010703-3	66%	Canal	Yes	735	485
1500000US450790107034	010703-4	43%	Canal	Yes	800	345

1500000US450790108031	010803-1	58%	Canal	No	760	440
1500000US450790108032	010803-2	71%	Canal	Yes	865	615
1500000US450790108033	010803-3	68%	Canal	No	855	585
1500000US450790108041	010804-1	64%	Canal	Yes	1380	885
1500000US450790108042	010804-2	51%	Canal	Yes	970	495
1500000US450790109001	010900-1	57%	Canal	Yes	625	355
1500000US450790109002	010900-2	96%	Canal	Yes	2235	2150
1500000US450790110001	011000-1	67%	Canal	Yes	790	530
1500000US450790110002	011000-2	68%	Canal	Yes	965	660
1500000US450790111011	011101-1	27%	Canal	Yes	1205	325
1500000US450790111012	011101-2	48%	Canal	Yes	800	385
1500000US450790111013	011101-3	51%	Canal	Yes	1360	700
1500000US450790111021	011102-1	52%	Canal	No	1890	980
1500000US450790111022	011102-2	24%	Canal	No	800	190
1500000US450790111023	011102-3	14%	Canal	No	1345	195
1500000US450790112011	011201-1	27%	Canal	Yes	1250	335
1500000US450790112012	011201-2	19%	Canal	Yes	835	160
1500000US450790112021	011202-1	22%	Canal	Yes	1575	345
1500000US450790112022	011202-2	50%	Canal	Yes	1910	950
1500000US450790113011	011301-1	24%	Canal	No	580	140
1500000US450790113012	011301-2	25%	Canal	No	765	195
1500000US450790113013	011301-3	59%	Canal	Yes	555	325
1500000US450790113014	011301-4	17%	Canal	Yes	945	165
1500000US450790113015	011301-5	66%	Canal	Yes	530	350
1500000US450790113016	011301-6	70%	Canal	Yes	1145	805
1500000US450790113017	011301-7	25%	Canal	Yes	1055	260
1500000US450790113032	011303-2	38%	Canal	No	795	300
1500000US450790113033	011303-3	69%	Canal	No	2610	1790
1500000US450790113041	011304-1	73%	Canal	No	1015	740
1500000US450790113042	011304-2	24%	Canal	No	995	240
1500000US450790113043	011304-3	48%	Canal	No	1750	840
1500000US450790113044	011304-4	63%	Canal	No	1690	1065
1500000US450790113051	011305-1	44%	Canal	Yes	870	380
1500000US450790113052	011305-2	82%	Canal	Yes	1730	1410
1500000US450790113053	011305-3	35%	Canal	Yes	1365	480
1500000US450790113054	011305-4	54%	Canal	Yes	1255	680
1500000US450790114042	011404-2	24%	Canal	No	2550	620
1500000US450790114043	011404-3	63%	Canal	No	1210	760
1500000US450790114044	011404-4	34%	Canal	No	820	275
1500000US450790114071	011407-1	26%	Canal	Yes	3300	860
1500000US450790114111	011411-1	32%	Canal	No	2075	670
1500000US450790114112	011411-2	17%	Canal	No	590	100
1500000US450790114113	011411-3	21%	Canal	No	870	180
1500000US450790114121	011412-1	36%	Canal	Yes	2550	930
1500000US450790114122	011412-2	42%	Canal	Yes	1300	550

1500000US450790114123	011412-3	31%	Canal	No	650	200
1500000US450790114131	011413-1	33%	Canal	Yes	5145	1685
1500000US450790114132	011413-2	17%	Canal	Yes	3190	555
1500000US450790115011	011501-1	0%	Canal	Yes	0	0
1500000US450790115012	011501-2	0%	Canal	Yes	0	0
1500000US450790115013	011501-3	0%	Canal	Yes	0	0
1500000US450790115014	011501-4	0%	Canal	Yes	0	0
1500000US450790115021	011502-1	36%	Canal	Yes	1245	450
1500000US450790115022	011502-2	64%	Canal	Yes	1080	695
1500000US450790116031	011603-1	26%	Canal	Yes	4035	1065
1500000US450790116032	011603-2	59%	Canal	Yes	850	505
1500000US450790116041	011604-1	35%	Canal	Yes	750	265
1500000US450790116042	011604-2	9%	Canal	Yes	2155	185
1500000US450790116043	011604-3	29%	Canal	Yes	670	195
1500000US450790116044	011604-4	22%	Canal	Yes	1490	325
1500000US450790116061	011606-1	76%	Canal	Yes	1020	780
1500000US450790116062	011606-2	28%	Canal	Yes	1450	410
1500000US450790116063	011606-3	32%	Canal	No	1120	360
1500000US450790116064	011606-4	29%	Canal	Yes	1550	455
1500000US450790116071	011607-1	66%	Canal	Yes	4120	2735
1500000US450790116081	011608-1	50%	Canal	Yes	1620	810
1500000US450790116082	011608-2	87%	Canal	Yes	1095	950
1500000US450790116083	011608-3	47%	Canal	Yes	1050	490
1500000US450790116084	011608-4	61%	Canal	Yes	845	515
1500000US450790116085	011608-5	76%	Canal	Yes	1925	1460
1500000US450790116086	011608-6	38%	Canal	Yes	385	145
1500000US450790117011	011701-1	95%	Canal	Yes	4060	3845
1500000US450790117012	011701-2	88%	Canal	Yes	1470	1290
1500000US450790117021	011702-1	70%	Canal	Yes	1630	1140
1500000US450790117022	011702-2	76%	Canal	Yes	1290	975
1500000US450790118001	011800-1	60%	Canal	No	1670	1000
1500000US450790118002	011800-2	43%	Canal	No	1260	540
1500000US450790118005	011800-5	69%	Canal	No	915	635
1500000US450790119011	011901-1	54%	Canal	Yes	2065	1115
1500000US450790119012	011901-2	61%	Canal	Yes	2925	1780
1500000US450790119013	011901-3	21%	Canal	No	1495	320
1500000US450790119014	011901-4	16%	Canal	No	2190	360
1500000US450790119021	011902-1	23%	Canal	Yes	2985	685
1500000US450790119022	011902-2	42%	Canal	No	755	315
1500000US450790119023	011902-3	48%	Canal	No	865	415
1500000US450790120002	012000-2	39%	Canal	No	880	340
1500000US450799801001	980100-1	40%	Canal	Yes	50	20
<b>TOTAL</b>		<b>52%</b>			<b>191,820</b>	<b>99,190</b>

8.3.2. Olympia Fire Station<sup>82</sup>

CDBGNAME	COUNTYNAME	TRACT	BLKGRP	LOWMOD	LOWMODUNIV	LOWMODPCT	MOE_LowmodPct	GEOID
Columbia	Richland County	001600	1	90	405	22.22%	+/-15.80	15000US450790016001
Columbia	Richland County	002602	1	835	1,910	43.72%	+/-12.46	15000US450790026021
Columbia	Richland County	002602	2	590	880	67.05%	+/-28.75	15000US450790026022
Columbia	Richland County	002700	1	380	475	80.00%	+/-29.05	15000US450790027001
Columbia	Richland County	002700	2	305	1,000	30.50%	+/-20.50	15000US450790027002
Columbia	Richland County	002700	3	640	1,395	45.88%	+/-27.24	15000US450790027003
Columbia	Richland County	002700	4	195	230	84.78%	+/-45.65	15000US450790027004
Columbia	Richland County	002900	1	65	200	32.50%	+/-18.00	15000US450790029001
Columbia	Richland County	002900	2	470	665	70.68%	+/-16.09	15000US450790029002
Columbia	Richland County	002900	3	0	0	0.00%		15000US450790029003
Columbia	Richland County	003000	2	640	700	91.43%	+/-38.29	15000US450790030002
Columbia	Richland County	003000	3	460	785	58.60%	+/-21.66	15000US450790030003
Columbia	Richland County	003100	2	190	345	55.07%	+/-17.10	15000US450790031002
Columbia	Richland County	011701	2	1,290	1,470	87.76%	+/-27.96	15000US450790117012
Lexington County	Lexington County	020100	2	285	330	86.36%	+/-45.45	15000US450630201002
Lexington County	Lexington County	020201	1	1,010	1,410	71.63%	+/-17.16	15000US450630202011
Lexington County	Lexington County	020300	1	1,065	1,665	63.96%	+/-17.72	15000US450630203001
Lexington County	Lexington County	020509	2	355	1,000	35.50%	+/-13.00	15000US450630205092
Richland County	Richland County	002800	1	1,960	2,270	86.34%	+/-18.28	15000US450790028001
Richland County	Richland County	002800	2	1,110	1,325	83.77%	+/-28.75	15000US450790028002
Richland County	Richland County	002800	3	420	445	94.38%	+/-33.26	15000US450790028003
<b>TOTAL</b>				<b>12,355</b>	<b>18,905</b>	<b>65.35%</b>		

<sup>82</sup> FY 2020 ACS 5-year ACS Low- & Moderate-Income Summary Data, 4/10/2020.

<https://www.hudexchange.info/programs/acs-low-mod-summary-data/>

8.3.3. Critical Facility Generators (Citywide Service Area)<sup>83</sup>

GEOld	BG	Low Mod %	Total Population	Low Mod Population	City Limit
<b>Critical Facility Generators - Citywide Service Area</b>					
1500000US450790001001	000100-1	67.78%	1940	1315	Yes
1500000US450790001002	000100-2	0.00%	0	0	Yes
1500000US450790002001	000200-1	70.33%	910	640	Yes
1500000US450790002002	000200-2	61.40%	570	350	Yes
1500000US450790003001	000300-1	84.78%	920	780	Yes
1500000US450790003002	000300-2	83.01%	2325	1930	Yes
1500000US450790004001	000400-1	51.45%	690	355	Yes
1500000US450790004002	000400-2	47.20%	1250	590	Yes
1500000US450790005001	000500-1	77.87%	610	475	Yes
1500000US450790005002	000500-2	88.96%	1540	1370	Yes
1500000US450790006001	000600-1	49.03%	1030	505	Yes
1500000US450790006002	000600-2	52.98%	1595	845	Yes
1500000US450790007001	000700-1	38.58%	635	245	Yes
1500000US450790007002	000700-2	44.04%	965	425	Yes
1500000US450790009001	000900-1	93.52%	540	505	Yes
1500000US450790009002	000900-2	75.95%	1455	1105	Yes
1500000US450790009003	000900-3	94.85%	485	460	Yes
1500000US450790010001	001000-1	90.34%	725	655	Yes
1500000US450790010002	001000-2	73.54%	945	695	Yes
1500000US450790010003	001000-3	100.00%	20	20	Yes
1500000US450790011001	001100-1	66.67%	420	280	Yes
1500000US450790011002	001100-2	76.23%	1115	850	Yes
1500000US450790011003	001100-3	35.10%	755	265	Yes
1500000US450790011004	001100-4	57.92%	1200	695	Yes
1500000US450790011005	001100-5	80.82%	730	590	Yes
1500000US450790012001	001200-1	18.42%	950	175	Yes
1500000US450790012002	001200-2	13.10%	725	95	Yes
1500000US450790013001	001300-1	92.78%	485	450	Yes
1500000US450790013002	001300-2	85.16%	640	545	Yes
1500000US450790013003	001300-3	80.92%	655	530	Yes
1500000US450790013004	001300-4	72.58%	310	225	Yes
1500000US450790016001	001600-1	22.22%	405	90	Yes
1500000US450790016002	001600-2	59.47%	950	565	Yes
1500000US450790021001	002100-1	46.19%	1050	485	Yes
1500000US450790021002	002100-2	41.13%	620	255	Yes
1500000US450790021003	002100-3	80.50%	1205	970	Yes
1500000US450790022001	002200-1	38.71%	620	240	Yes
1500000US450790022002	002200-2	74.42%	860	640	Yes

<sup>83</sup> FY 2020 ACS 5-year ACS Low- & Moderate-Income Summary Data, 4/10/2020.

<https://www.hudexchange.info/programs/acs-low-mod-summary-data/>

GEOld	BG	Low Mod %	Total Population	Low Mod Population	City Limit
<b>Critical Facility Generators - Citywide Service Area</b>					
1500000US450790023001	002300-1	25.20%	635	160	Yes
1500000US450790023002	002300-2	11.46%	785	90	Yes
1500000US450790023003	002300-3	9.86%	710	70	Yes
1500000US450790024001	002400-1	22.65%	1965	445	Yes
1500000US450790024002	002400-2	35.38%	1300	460	Yes
1500000US450790024003	002400-3	13.12%	1105	145	Yes
1500000US450790025001	002500-1	28.57%	805	230	Yes
1500000US450790025002	002500-2	32.69%	1300	425	Yes
1500000US450790025003	002500-3	21.59%	880	190	Yes
1500000US450790025004	002500-4	25.58%	645	165	Yes
1500000US450790026021	002602-1	43.72%	1910	835	Yes
1500000US450790026022	002602-2	67.05%	880	590	Yes
1500000US450790026031	002603-1	65.59%	1555	1020	Yes
1500000US450790026032	002603-2	84.75%	1180	1000	Yes
1500000US450790026033	002603-3	85.75%	2070	1775	Yes
1500000US450790026041	002604-1	82.99%	1470	1220	Yes
1500000US450790027001	002700-1	80.00%	475	380	Yes
1500000US450790027002	002700-2	30.50%	1000	305	Yes
1500000US450790027003	002700-3	45.88%	1395	640	Yes
1500000US450790027004	002700-4	84.78%	230	195	Yes
1500000US450790028001	002800-1	86.34%	2270	1960	Yes
1500000US450790028002	002800-2	83.77%	1325	1110	Yes
1500000US450790028003	002800-3	94.38%	445	420	Yes
1500000US450790029001	002900-1	32.50%	200	65	Yes
1500000US450790029002	002900-2	70.68%	665	470	Yes
1500000US450790029003	002900-3	0.00%	0	0	Yes
1500000US450790030001	003000-1	83.02%	265	220	Yes
1500000US450790030002	003000-2	91.43%	700	640	Yes
1500000US450790030003	003000-3	58.60%	785	460	Yes
1500000US450790031001	003100-1	93.44%	305	285	Yes
1500000US450790031002	003100-2	55.07%	345	190	Yes
1500000US450790105021	010502-1	61.47%	545	335	Yes
1500000US450790106001	010600-1	61.19%	1005	615	Yes
1500000US450790106002	010600-2	75.47%	1325	1000	Yes
1500000US450790106003	010600-3	79.94%	1620	1295	Yes
1500000US450790106004	010600-4	76.24%	505	385	Yes
1500000US450790107031	010703-1	70.85%	995	705	Yes
1500000US450790107032	010703-2	44.74%	570	255	Yes

GEOld	BG	Low Mod %	Total Population	Low Mod Population	City Limit
<b>Critical Facility Generators - Citywide Service Area</b>					
1500000US450790107033	010703-3	65.99%	735	485	Yes
1500000US450790107034	010703-4	43.13%	800	345	Yes
1500000US450790108032	010803-2	71.10%	865	615	Yes
1500000US450790108041	010804-1	64.13%	1380	885	Yes
1500000US450790108042	010804-2	51.03%	970	495	Yes
1500000US450790109001	010900-1	56.80%	625	355	Yes
1500000US450790109002	010900-2	96.20%	2235	2150	Yes
1500000US450790110001	011000-1	67.09%	790	530	Yes
1500000US450790110002	011000-2	68.39%	965	660	Yes
1500000US450790111011	011101-1	26.97%	1205	325	Yes
1500000US450790111012	011101-2	48.13%	800	385	Yes
1500000US450790111013	011101-3	51.47%	1360	700	Yes
1500000US450790112011	011201-1	26.80%	1250	335	Yes
1500000US450790112012	011201-2	19.16%	835	160	Yes
1500000US450790112021	011202-1	21.90%	1575	345	Yes
1500000US450790112022	011202-2	49.74%	1910	950	Yes
1500000US450790113013	011301-3	58.56%	555	325	Yes
1500000US450790113014	011301-4	17.46%	945	165	Yes
1500000US450790113015	011301-5	66.04%	530	350	Yes
1500000US450790113016	011301-6	70.31%	1145	805	Yes
1500000US450790113017	011301-7	24.64%	1055	260	Yes
1500000US450790113051	011305-1	43.68%	870	380	Yes
1500000US450790113052	011305-2	81.50%	1730	1410	Yes
1500000US450790113053	011305-3	35.16%	1365	480	Yes
1500000US450790113054	011305-4	54.18%	1255	680	Yes
1500000US450790114071	011407-1	26.06%	3300	860	Yes
1500000US450790114121	011412-1	36.47%	2550	930	Yes
1500000US450790114122	011412-2	42.31%	1300	550	Yes
1500000US450790114131	011413-1	32.75%	5145	1685	Yes
1500000US450790114132	011413-2	17.40%	3190	555	Yes
1500000US450790115011	011501-1	0.00%	0	0	Yes
1500000US450790115012	011501-2	0.00%	0	0	Yes
1500000US450790115013	011501-3	0.00%	0	0	Yes
1500000US450790115014	011501-4	0.00%	0	0	Yes
1500000US450790115021	011502-1	36.14%	1245	450	Yes
1500000US450790115022	011502-2	64.35%	1080	695	Yes

GEOld	BG	Low Mod %	Total Population	Low Mod Population	City Limit
<b>Critical Facility Generators - Citywide Service Area</b>					
1500000US450790116031	011603-1	26.39%	4035	1065	Yes
1500000US450790116032	011603-2	59.41%	850	505	Yes
1500000US450790116041	011604-1	35.33%	750	265	Yes
1500000US450790116042	011604-2	8.58%	2155	185	Yes
1500000US450790116043	011604-3	29.10%	670	195	Yes
1500000US450790116044	011604-4	21.81%	1490	325	Yes
1500000US450790116061	011606-1	76.47%	1020	780	Yes
1500000US450790116062	011606-2	28.28%	1450	410	Yes
1500000US450790116064	011606-4	29.35%	1550	455	Yes
1500000US450790116071	011607-1	66.38%	4120	2735	Yes
1500000US450790116081	011608-1	50.00%	1620	810	Yes
1500000US450790116082	011608-2	86.76%	1095	950	Yes
1500000US450790116083	011608-3	46.67%	1050	490	Yes
1500000US450790116084	011608-4	60.95%	845	515	Yes
1500000US450790116085	011608-5	75.84%	1925	1460	Yes
1500000US450790116086	011608-6	37.66%	385	145	Yes
1500000US450790117011	011701-1	94.70%	4060	3845	Yes
1500000US450790117012	011701-2	87.76%	1470	1290	Yes
1500000US450790117021	011702-1	69.94%	1630	1140	Yes
1500000US450790117022	011702-2	75.58%	1290	975	Yes
1500000US450790119011	011901-1	54.00%	2065	1115	Yes
1500000US450790119012	011901-2	60.85%	2925	1780	Yes
1500000US450790119021	011902-1	22.95%	2985	685	Yes
1500000US450799801001	980100-1	40.00%	50	20	Yes
1500000US450790102003	010200-3	32.98%	1425	470	Yes
1500000US450790103041	010304-1	44.98%	1545	695	Yes
1500000US450790103042	010304-2	59.70%	1340	800	Yes
1500000US450790103043	010304-3	55.38%	2465	1365	Yes
1500000US450790103044	010304-4	76.95%	1215	935	Yes
1500000US450790103052	010305-2	39.53%	860	340	Yes
1500000US450790103081	010308-1	25.41%	2145	545	Yes
1500000US450790103082	010308-2	18.82%	3480	655	Yes
1500000US450790103091	010309-1	17.79%	4890	870	Yes
1500000US450790103092	010309-2	40.37%	2675	1080	Yes
1500000US450790103093	010309-3	38.46%	2405	925	Yes
1500000US450790104031	010403-1	50.61%	1225	620	Yes
1500000US450790104032	010403-2	57.05%	780	445	Yes
1500000US450790104033	010403-3	71.43%	1890	1350	Yes
1500000US450790104071	010407-1	57.79%	1315	760	Yes
1500000US450790104072	010407-2	68.07%	1895	1290	Yes

GEOld	BG	Low Mod %	Total Population	Low Mod Population	City Limit
<b>Critical Facility Generators - Citywide Service Area</b>					
1500000US450790104081	010408-1	0.00%	0	0	Yes
1500000US450790104091	010409-1	74.73%	1820	1360	Yes
1500000US450790104101	010410-1	63.22%	1305	825	Yes
1500000US450790104103	010410-3	77.74%	1595	1240	Yes
1500000US450790104121	010412-1	73.75%	1505	1110	Yes
1500000US450790104122	010412-2	60.94%	1920	1170	Yes
1500000US450790104131	010413-1	68.56%	1320	905	Yes
1500000US450790104132	010413-2	50.00%	500	250	Yes
1500000US450790105011	010501-1	47.96%	1105	530	Yes
1500000US450790105012	010501-2	93.62%	705	660	Yes
1500000US450790107011	010701-1	92.75%	690	640	Yes
1500000US450790107012	010701-2	68.04%	1705	1160	Yes
1500000US450790107013	010701-3	29.03%	465	135	Yes
1500000US450790107021	010702-1	21.64%	670	145	Yes
1500000US450790107022	010702-2	15.69%	1020	160	Yes
1500000US450790107023	010702-3	70.33%	910	640	Yes
1500000US450790107024	010702-4	84.62%	1105	935	Yes
1500000US450790108051	010805-1	68.35%	2085	1425	Yes
1500000US450790108061	010806-1	0.00%	0	0	Yes
1500000US450790113031	011303-1	72.16%	970	700	Yes
1500000US450790114041	011404-1	55.35%	4490	2485	Yes
1500000US450790114141	011414-1	54.24%	3005	1630	Yes
1500000US450790114153	011415-3	21.16%	4065	860	Yes
1500000US450630205104	020510-4	26.73%	1085	290	Yes
1500000US450630211111	021111-1	35.64%	940	335	Yes
1500000US450630211113	021111-3	45.24%	1050	475	Yes
1500000US450630211122	021112-2	33.63%	1665	560	Yes
<b>TOTAL</b>		<b>52.45%</b>	<b>225,300</b>	<b>118,170</b>	

## 8.4 Maintenance and Operating Agreements

CITY OF COLUMBIA  
OFFICE OF THE CITY MANAGER  
1737 Main Street  
Columbia, SC 29201  
March 23, 2020

**Maintenance Agreement for CDBG-MIT Funded Project**

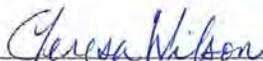
The City of Columbia, State of South Carolina, hereby agrees that if it receives any Federal aid as a result of the attached CDBG-MIT Action Plan, it will accept responsibility, at its own expense if necessary, for the routine maintenance of any real property, structures, or facilities acquired or constructed as a result of such Federal aid.

Routine maintenance shall include, but not be limited to, such responsibilities as keeping flood gates and head gates in good operating order.

The purpose of this agreement is to make clear the City's maintenance responsibilities following project award and to show the City's acceptance of these responsibilities. It does not replace, supersede, or add to any other maintenance responsibilities imposed by Federal law or regulation and which are in force on the date of project award.

Signed by Teresa Wilson, the duly authorized City Manager of The City of Columbia, SC, this 23rd of March 2020.

Signature



Teresa Wilson, City Manager

Columbia, South Carolina

Re: Columbia Head Gates Project



CITY OF COLUMBIA  
 OFFICE OF THE CITY MANAGER  
 1737 Main Street  
 Columbia, SC 29201  
 April 30, 2020

**Maintenance Agreement for CDBG-MIT Funded Project**

The City of Columbia, State of South Carolina, hereby agrees that if it receives any Federal aid as a result of the attached CDBG-MIT Action Plan, it will accept responsibility, at its own expense if necessary, for the routine maintenance of any real property, structures, or facilities acquired or constructed as a result of such Federal aid.

Routine maintenance shall include, but not be limited to, such responsibilities as keeping the Olympia Fire Station in good working order; vacant land clear of debris, garbage, and vermin; keeping facilities and equipment maintained pursuant to industry standards; and addressing any required maintenance and upkeep in a timely manner.

The purpose of this agreement is to make clear the City's maintenance responsibilities following project award and to show the City's acceptance of these responsibilities. It does not replace, supersede, or add to any other maintenance responsibilities imposed by Federal law or regulation and which are in force on the date of project award.

Signed by Teresa Wilson, the duly authorized City Manager of The City of Columbia, SC, this 30th of April 2020.

Signature *Teresa B. Wilson*  
 Teresa Wilson, City Manager  
 Columbia, South Carolina

Re: Olympia Fire Station Replacement



CITY OF COLUMBIA  
 OFFICE OF THE CITY MANAGER  
 1737 Main Street  
 Columbia, SC 29201  
 April 22, 2020

**Maintenance Agreement for CDBG-MIT Funded Project**

The City of Columbia, State of South Carolina, hereby agrees that if it receives any Federal aid as a result of the attached CDBG-MIT Action Plan, it will accept responsibility, at its own expense if necessary, for the routine maintenance of any real property, structures, or facilities acquired or constructed as a result of such Federal aid.

Routine maintenance shall include, but not be limited to, such responsibilities as keeping the generators in good working condition to ensure their functionality during instances of power loss to Columbia Police Department Headquarters and/or Fleet Services Facility.

The purpose of this agreement is to make clear the City's maintenance responsibilities following project award and to show the City's acceptance of these responsibilities. It does not replace, supersede, or add to any other maintenance responsibilities imposed by Federal law or regulation and which are in force on the date of project award.

Signed by Teresa Wilson, the duly authorized City Manager of The City of Columbia, SC, this 23rd of March 2020.

Signature *Teresa Wilson*  
 Teresa Wilson, City Manager  
 Columbia, South Carolina

Re: CPD and Fleet Services Generator

## 8.5 FEMA Project Worksheet Regarding Columbia Canal Head Gates and Lock Gate Repair

<b>PA-04-SC-4241-PW-00289(0)</b>	
Applicant Name	Application Title
COLUMBIA	RODDW02 - Columbia Canal
Period of Performance Start	Period of Performance End
10-05-2016	04-05-2017

Bundle Reference # (Amendment #)	Date Awarded

**Subgrant Application - FEMA Form 90-91**

**Note:** The Effective Cost Share for this application is 75%

FEDERAL EMERGENCY MANAGEMENT AGENCY  
PROJECT WORKSHEET

DISASTER FEMA 2011 DR SC	PROJECT NO RODDW02	PA ID NO 075-16000-00	DATE 06-26-2016	CATEGORY F
APPLICANT: COLUMBIA			WORK COMPLETE AS OF 01-20-2016 (5%)	

See 1 of 4

DAMAGED FACILITY Columbia Canal Hydroelectric Plant	COUNTY: Richland
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LOCATION: Current Version The Hydroelectric plant is located at the southerly most extent of the Columbia canal at the GPS coordinates shown to the right.	LATITUDE 33.997232	LONGITUDE 81.049282
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**DAMAGE DESCRIPTION AND DIMENSIONS:**

**Current Version**  
Severe storm and flooding during the incident period of October 1, 2015 through October 23, 2015 impacted large areas of the City of Columbia, SC (including severe damage to the Columbia Canal, a man-made waterway paralleling the Broad River for a length of approximately 3.1 miles). The canal was originally built between about 1820 and 1824 as a navigable waterway to bypass the rapids at the City of Columbia, and later expanded to its current configuration in 1891. Currently it is used for hydroelectric power generation for the city (since 1892) and as a water source for the city water works (since 1898). The canal is the water source for approximately 50% of the City of Columbia consumer base which includes all the following: 375,000 people; 5 major hospitals; 8 universities; the Fort Jackson military base; the state capital; and numerous state agencies; and the City of Columbia and Richland county offices, including 16 police stations and 15 fire stations.

Hydroelectric Plant (Sta. 250+00.00 to Sta. 251+05.00) The Hydroelectric Plant is a granite block and brick structure located at the south end of the canal. The building was inundated with floodwater and the main generators and electrical gear were submerged. Floodwaters entered the observation room through the main exterior door. The observation room is 6 feet (ft.) lower than the top of the dike which, in turn, surrounds the power house power generation room 25 ft. below. The observation room was flooded to a depth of 2 ft., from there it cascaded into the power generation room, flooding it to a depth of 12 ft. Additional water entered the generator room through all 4 windows.

Based on NEMA, ANSI, NEC and other recognized industry standards, these electrical components require replacement after flooding. Additionally, factory engineers from the manufacturer of the medium-voltage switchgear (Schneider Electric) conducted a site visit and reported the switchgear is unreparable. Specific damages sustained were as follows:

- The following major equipment manufactured by North-Fork Electric, Inc. (NFEI) was submerged and is not repairable:
  - a. 4 NFEI run-in-out control panels (unit 7 combined with station controls)
  - b. 7 NFEI generator protection relays
  - c. 1 NFEI Columbia SCADA HMI programming
  - d. 7 NFEI hydraulic power units & materials to rebuild/new starters
  - e. 7 NFEI static excitation systems including transformers
  - f. 1 new 17 section Square D MV MotorPac motor control center
- The following components were submerged and require repair/replacement:
  - a. The following miscellaneous electrical equipment will be replaced:
    - i. Medium voltage cables
    - ii. Control cables and terminal blocks
    - iii. Stress cone terminations
    - iv. Three-phase and single-phase station service transformers
    - v. Middle case breakers
    - vi. All junction boxes, conduit bodies and other electrical devices damaged by the flood
  - b. The following electrical wiring, breakers, and transformers require replacement due to having been submerged:
    - i. 400 MV-10S 40 feeder conductors from generator terminals to the MotorPac switchgear
    - ii. 40 terminations at each end
    - iii. 10 conductor 18 AWG multi-conductor tray cable from PLC cabinets to MotorPac I US drives/SPU Systems
    - iv. 12 triplex shielded 18 AWG from generator RTDs to PLC cabinets
    - v. 675V 3-phase breaker panel with breakers
    - vi. 240V/20V 1 phase breaker panel with breakers
    - vii. 25kVA 3PH 4800/240V delta dry type transformer
    - viii. 25kVA 1PH 4800/240/120 delta high-leg dry type transformer
    - ix. All receptacles, switches and other 480V electrical devices were subjected to flood damage
    - x. All electrical conduits, boxes, and fittings were flooded and require repair/replacement
  - c. A 16 linear feet (LF) x 20 LF observation room. Water flooded the room to a depth of 2 ft., requiring replacement of 320 square feet (SF) of carpet floor covering and 72 (LF) of baseboard molding
- The 34 kV/3 phase electric power distribution system which includes 4 standard wooden poles and approximately 1,800 LF of 34 kV power lines were swept away and must be replaced. The power lines run from the plant transformer building, across the Columbia Canal in an L-shaped configuration, and tie in to the national power grid at the substation across the river from the power plant.
- An area drawing for the hydro plant property is attached showing erosion occurred over an irregularly shaped area estimated to be 41,290 SF. FEMA estimates that the soil eroded to an average depth of 0.9 LF. Therefore 1,575 CY (41,290 SF x 0.9 LF = 37,125 cubic feet (CF)) of additional unclassified fill will be required. If it is determined that the amount of repair that more fill is required, documentation supporting the additional cost will be required.
- A steel bucket designed "Trash Rake" system 90 LF in length and 30 LF in height is installed at the power plant water intake point. It extends from the bottom of the canal to the top of the dam with large screens that filter the intake water, protecting the seven generator turbine impellers from being damaged by foreign objects and debris. It employs a complex system of rakes, cables, cable restraints, and pulleys to remove trapped debris from the screens and deposit them in a collection channel at the top of the dam. 90 LF long x 30 LF high = 2,700 SF of water input screens that must be cleaned. In addition, the rake lift system sustained minor damage during the flood and requires mechanical repairs.
- The generators were also inundated when the building was flooded which resulted in the windings being submerged. The applicant has presented a report from Siemens Inc. which makes the point that the generators should be removed because of the potential for oil to have penetrated the windings and would not be removed during the process of rinsing and drying the windings after the flood. The City contends that the presence of oil would act as an insulator, which when subjected to the vibrations during normal operation, would degrade the insulation ultimately resulting in short circuits and failure of the generator over time. It should be noted that the City's insurance company has indicated that it will not remove the generators if they are not removed before being put into operation.
- Repair and replace a Trash Trough which is used to move large debris items from the trash rakes, around the power building and into the tailrace. The trough is approximately 120 LF and is formed of stainless-steel sheet metal. It is 24 in x 18 in dimensions in a U shape. There is a 3 LF high splash guard at the lower corner and supports and concrete will be needed as locally fabricated.
- Repair asphalt road adjacent to the hydroelectric plant and the office. Portions of the existing road have collapsed and will need to be removed in order to properly backfill around the plant and office. Approximately 30 LF x 30 LF, for a total of 1,800 SF of road surface will need to be removed and then replaced.

SCOPE OF WORK: Current Version All flow work will be performed by contractors. Replace the following North Fork Electric, Inc. (NFEI) manufactured equipment which is not repairable. (Prices based on NFEI quotation, supplied by applicant.)
---

Almost all the electrical equipment inside the Columbia Canal powerhouse was totally submerged in muddy river water during the October 4, 2015 flood. Based on NEMA, ANSI, NEC and other recognized industry standards, these electrical components require replacement after flooding. Additionally, factory engineers from the manufacturer of the medium voltage switchgear (Schneider Electric) conducted a site visit and reported the switchgear is repairable.

1) The following major equipment manufactured by North Fork Electric, Inc. (NFEI) was submerged and is not repairable:

- a) 4 NFEI two unit control panels (7 units combined with station controls)
- b) 7 NFEI generator protection relays
- c) 1 NFEI Columbia SCADA/HMI programming
- d) 7 NFEI hydraulic power units & materials to rebuild / new starters
- e) 7 NFEI static excitation systems including transformers
- f) 1 New 17 section Square D My MotorPac motor control center

Subtotal cost for major equipment replacement is \$507,350.00. This cost has been loaded with a 4-year markup from the original cost estimate.

2) SITEWORK/ MATERIALS TO REPLACE, REPAIR AND INSTALL

a) The following miscellaneous electrical equipment was damaged and requires replacement:

- i) Medium voltage cables
- ii) Control cables and terminal blocks
- iii) Stress-cone terminations
- iv) Three-phase and single-phase station service transformers
- v) Molded-case breakers
- vi) Junction boxes and other electrical devices

b) Supply and install the following:

- i) New 40 MV-105 4.0 feeder conductors from generator terminals to the MotorPac switchgear.
- ii) New 4.0 terminations at each end
- iii) New 19 conductor 18 AWG multi-conductor tray cable from PLC cabinets to MotorPac / U9 Jboxes/HPU Systems
- iv) New 12 bi-plex shielded 18 AWG from generator RTD to PLC cabinets
- v) New 575V 3-phase breaker panel with breakers
- vi) New 240V/20V 1 phase breaker panel with breakers
- vii) New 225KVA 1PH 480V/240V delta dry-type transformer
- viii) New 25KVA 1PH 480V/240V/20 delta high-leg dry-type transformer
- ix) Replace receptacles, switches and other ESDY electrical devices subjected to flood damage
- x) Replace, repair, or clean and dry out all electrical boxes and fittings. Clean and dry out all conduit and pull new wiring into conduit.
- xi) Digging labor to remove/install new switchgear and other equipment.
- xii) Labor and miscellaneous materials to install the above

Subtotal estimated cost for site work: \$656,700.00 (Price based on NFEI quotation supplied by applicant). NFEI is the OEM for the equipment quoted. This cost has been loaded with a 4-year markup from the original cost estimate.

3) Replace 320 sf of carpet floor covering and 72 LF of baseboard molding in the observation room. FEMA estimate for 320 sf of carpet with molding is 320 sf x \$7.50/sf = \$2,400.00

4) Reinstall 4 new standard power poles and install 1,800 ft. of 3 phase 34 kV power lines. Connect the new lines from the power plant output station to the city electric power sub-station across the Canal. Cost estimate \$82,000.00.

5) Provide fill and shaping of the 41,250 SF area eroded by the flood: 1,375 cy @ \$17.80/cy = \$24,475.00 (Total Cost of Materials using FEMA cost code 4200 for Unclassified Fill shall event within 6 mile-d). Cost estimate for labor and equipment is as follows:

**EQUIPMENT COST ESTIMATE**

8723	2ea	Dump Truck - 18 CY	80hrs @ \$77.25 = \$6,180.00
8283	1ea	Excavator/Crawler - 7.5 CY	40hrs @ \$128.50 = \$5,140.00
8253	1ea	Digger/Crawler - 350 HP	40hrs @ \$77.25 = \$3,090.00
8382	1ea	Loader/Crawler - 118 HP	40hrs @ \$49.00 = \$1,960.00
8802	1	Pickup Truck - 1 Ton	80hrs @ \$26.00 = \$2,080.00
Total Equipment			\$16,450.00

**LABOR COST ESTIMATE** - (based on 1 week Project for 40 hours)

9007	2ea	Dump Truck Driver	80hrs @ \$30.00 = \$2,400.00
9012	1ea	Excavator Operator	40hrs @ \$35.00 = \$1,400.00
9012	1ea	Digger Operator	40hrs @ \$35.00 = \$1,400.00
9012	1ea	Loader Operator	40hrs @ \$30.00 = \$1,200.00
9014	1ea	Project Lead	40hrs @ \$35.00 = \$1,400.00
Total Labor			\$7,800.00

**MATERIALS COST ESTIMATE**

3000FL00 Unclassified Fill 1275CY @ \$17.80 = \$24,475.00

(Price Ersson Repair Cost is \$100,000.00). This cost has been loaded with a 4-year markup from the original cost estimate.

6) Minor repair to the Trash Rake at the Hydes Dam including (1) Cleaning debris from the screens, and (2) repairing damage to the custom designed cable and pulley system that crosses the canal and is used to operate the trash rake. Both issues can be seen in the attached photos. Applicant's cost estimate is \$20,000.00. This cost has been loaded with a 4-year markup from the original cost estimate.

7) Original estimate cost from the applicant November 2015 cost estimate is 1,081 V of generators x \$256,000 per, \$1,099,000.00. Total rewinding cost \$2,294,200.00. This cost has been loaded with a 4-year markup from the original cost estimate.

8) Repair and replace a Trash Through which is used to move large debris items from the trash rakes around the power building and into the lake. The trough is approximately 120 LF and is formed of stainless-steel sheet metal, 18 IN x 24 IN x 1/8 IN dimensions in a U shape. There is a 3 LF high splash guard at the lower corner and supports and concrete will be needed at locally fabricated. Total current cost estimate for this work is \$2,000.00.

9) Repair asphalt road adjacent to the hydroelectric plant and the office. Portions of the existing road have collapsed and will need to be removed in order to properly backfill around the plant and office. Approximately 20 LF x 10 LF, for a total of 1,800 SF of road surface will need to be removed and then replaced. Total current cost estimate for this work is \$16,700.00.

Total Facility Cost \$ 4,036,050.00

Site 2 of 4

DAMAGED FACILITY:		COUNTY: Richland
Canal Spillway and Tainter Gates:		
LOCATION:	LATITUDE: 34.101881	LONGITUDE: 81.663715
Current Version: Columbia Canal Emergency Spillway (with stop logs and two tainter gates) is located beneath the Three Rivers Greenway Bridge just south of the Columbia Water Treatment Plant on the west bank of the 3.7 mile long Columbia Canal. The spillway bridge is adjacent to the Historic Water Pump House also referred to as the Riverside Park Amphitheater. The Emergency Spillway diverts excess water from the canal back into the Broad River. Latitude 34.00200 Longitude -81.05272.		
DAMAGE DESCRIPTION AND DIMENSIONS:		
Current Version: BACKGROUND		
Severe storms and flooding during the incident period of October 1, 2015 through October 23, 2015 impacted large areas of the City of Columbia, SC, including severe damage to the Columbia Canal, a man-made waterway paralleling the Broad River for a length of approximately 3.1 miles. The canal was originally built between about 1820 and 1824 as a navigable waterway to bypass the rapids at the City of Columbia, and later expanded to its current configuration in 1891. Currently it is used for hydroelectric power generation for the city (since 1892) and as a water source for the city water works (since 1899).		
The canal is the water source for approximately 50% of the City of Columbia consumer base which includes all the following: 275,000 people, 5 major hospitals, 5 universities, the Fort Jackson military base, the state capital and numerous state agencies and the City of Columbia and Richland county offices, including 16 police stations and 15 fire stations.		
DAMAGE DESCRIPTION AND DIMENSIONS		
The emergency spillway structure is made up of 12 weir openings, each measuring 12 feet (ft.) wide, with Tainter Gates on either end of the weir structure. The weir openings are fitted with sloping guides. All the limbs of the event, all twelve weir openings were partially blocked with stoplogs. Each stoplog plug was 5.5 ft. high x 13 ft. wide x 6 inches thick. The weir stoplogs relied on a rigid plastic sheet on the upstream side to prevent seepage after the		

Disaster Event:

Out of concern that the inflow from the canal headgates might cause the water level in the canal to rise, the decision was made to remove the stop logs to limit the pool elevation and to minimize the overflow potential at the Temporary Cellar during future flood events. Consequently, on or about October 3, 6 days after the event, workers from the Town of Lexington, withdrew from a boat, cut out and removed all the stop logs (12) daily from the spillway. That work was performed as an emergency protective measure and is not reimbursed in this PW. However, the repair/replacement of the stoplogs will be reimbursed.

No other disaster-related damage to the spillway was observed by FEMA. The lack of damage was confirmed by the applicant's engineering firm, Kleinschmidt. Based on Kleinschmidt's assessment, October 10, 2015, "there is no apparent flood damage of note to the stone masonry structures, the bridge support piers or the radial gates themselves. The inspector's observations were validated in discussions with the hydro plant operator who has worked at the site for 40 years." "Leakage through the stone masonry wall on the north side of the south most radial gate and through its abutment wingwall appear unchanged from that which occurred prior to the flood." (Kleinschmidt, Columbia Canal Embankment Repair Services, Phase I, Task 13, Technical Basis Report for the Canal Structures Analysis (TBR), Section D.4, March 3, 2017, page 21)

The report went on to state: "There was only one change in the condition observed, an increase in leakage from a 21-inch square opening at the base of the canal spillway near the south most radial gate. The plant operator concurred that this leakage had increased quite a bit over that which occurred prior to the flood. The inspector had the opening probed. From dimensions obtained it appeared to be a formal passage at the base of the spillway. "It is believed that sediment along the base of the spillway on the upstream side may have been scoured away from the spillway during the October 2015 breach of the canal and the type of sediment has resulted in the increase in flow for the passageway." (Kleinschmidt, Columbia Canal Embankment Repair Services, Phase I, Task 13, Technical Basis Report for the Canal Structures Analysis (TBR), Section D.4, March 3, 2017, page 22)

Kleinschmidt's report has not been attached to this PW since it contains Critical Energy Infrastructure Information which cannot be released to the general public due to concerns of national security. The report can be found on FEMA's server that contains the project files for this PW.

**SCOPE OF WORK:**

**Current Version:**  
There was no apparent flood damage of note, therefore the eligible repairs to the spillway are limited to the replacement of the stop logs to their pre-disaster design, function and capacity, and to repair the 21 square inch formed passage seepage hole. In the Applicant's final submittal that outlined their claim for damages for all sites within the Canal Facility (attached as "Columbia Canal Submittal - Bookmarked BINDER.pdf"), the applicant stated that the bridge would have to be removed from the spillway in order to replace the stop logs for an estimated cost of \$600,000 (including the reinstatement of the bridge). However, no disaster-related damages were incurred to the bridge over the spillway and a field inspection of the pier by FEMA indicates that the stop logs can be replaced from beneath the bridge by accessing the spillway from a barge and dropping the stop logs into the bays of channels that are cast into the piers. Photographs of the channels in the piers are included in the attached "Photo Log - Spillway.pdf".

This approach is supported by Kleinschmidt which placed the estimate to replace the wooden stoplogs in-kind at \$36,000. (Kleinschmidt, Columbia Canal Embankment Repair Services, Phase I, Task 13, Technical Basis Report for the Canal Structures Analysis, Section D.4, March 3, 2017, page 22). This action was taken as a temporary emergency measure and will be reimbursed with an estimated cost of \$37,000.00. This cost has been loaded with a 4-year markup from the original cost estimate.

In addition, the Applicant's final submittal claimed the leak at the base of the spillway is disaster-related damage with an estimated cost of repair of \$10,000.00. This cost has been loaded with a 4-year markup from the original cost estimate.

Total Facility Cost \$47,700.00

Site 3 of 4

<b>DAMAGED FACILITY:</b>		<b>COUNTY:</b> Richland	
<b>Head Gates</b>			
<b>LOCATION:</b>		<b>LATITUDE:</b>	<b>LONGITUDE:</b>
Current Version: At the upstream end of the canal, 2600 feet upstream of Broad River Road. (34.033314°, -81.009695°)		34.033314	-81.009695

**DAMAGE DESCRIPTION AND DIMENSIONS:**

**Current Version:**  
**BACKGROUND:**  
The headgates of the canal are composed of (12) twelve 13-foot x 13-foot x 12-inch thick steel reinforced gates on a pulley and cable system each connected to a manually operated hoist that can be powered by a portable, electrically operated, drive motor that is moved from hoist to hoist. The hoists only lift the gates, the gates drop into the closed position by gravity when the hoist cable is allowed to go slack. Gates #1, #2, #3 and #4 are skinned both sides with 1/2 inch steel plates and filled with concrete. Gates #5 through #12 are skinned both sides with 1/2 inch steel plates, but not filled with concrete. The concrete was apparently added at some time when the original construction of selected gates to act as ballast to assist in lowering the gates when under unbalanced heads. The gates are numbered west to east, with #1 being closest to the lock.

The gates consist of a pair of 12-inch steel beams 32 feet tall. The gates seat against the floor without a sill or guide slot. The top header, also a 12-inch steel I-beam, spans 14 feet between the vertical guide beams. In preparation for the larger rainfall event, the City closed (6) six of the (12) twelve headgates on October 3, 2015 and attempted to close the remaining (6) six headgates on October 4, 2015 before the peak flooding occurred. Despite the City's best efforts, the gates could not be fully closed as woody debris had been drawn into the gate openings. No system was in place at the time of the event to limit debris from becoming lodged in the gates preventing them from closing, although a review of historical imagery on Google Earth indicates that a debris boom had previously been in place as late as February 2013.

On October 9, 2015, O&L Rigging and Machinery (Contractor) mobilized a floating platform (barges) and a bucket excavator to lift all (12) headgates, to pull out obstructions and debris on which the gates were resting and to fully close all the gates. Once debris was cleared, so long as possible, the Contractor used the excavator bucket to force the gates down as far as possible. Sand bags and rock-filled bags were then dropped in front of each gate to block flow through and under the headgates. Because 3 or 4 of the gates could not be sealed on the gate floor, temporary steel frames were placed in front of those gates to contain the bags and prevent the jacking and rock-filled bags from migrating downstream through the partially open gate.

Since the gates could not be fully closed and sealed, as an emergency protective measure, the City subsequently installed bulkheads (steel panels) upstream of each gate between late October and late November 2015. Limited control of flow into the canal through the canal headgates was achieved on November 23 with the completion of the bulkheads at the upstream end of the canal headgates. As of January 2017, (11) eleven of the (12) twelve bulkheads remain in place with the Gate #1 bulkhead adjusted partially open to allow flow into the canal to meet the needs of the municipal water supply.

**DAMAGES:**  
The applicant is claiming the loss of 4 half-circle stones capping the lower step of the upstream piers as reported by Kleinschmidt. Flood damage to the head gate structure appears to have been limited to the minor, non-structural loss of a number of the half-circle stones capping the lower step of the structure's upstream pier. (Kleinschmidt, Phase I Flood Damage Assessment Report, Columbia Canal, Headgates Repair Services, City of Columbia, SC, February 2017, page 1-3). Figure 2-2 "Photos" attached to that report illustrates an image taken by FERC dated 10/20/14 two cap stones were previously missing. That report is classified as Critical Energy Infrastructure Information (CEII) which is not for public dissemination and therefore not attached to this PW. The report can be found on FEMA's server with other project related files.

The applicant is also claiming damage to the 12 head gates, guides and hoists. However, the claim for these damages is unsupported except for a broken steel gear on the hoist for #12 which Kleinschmidt indicated was broken while operating during the flood.

**SCOPE OF WORK:**

**Current Version:**  
1. Replace four (4) half-circle stones. An estimate for this work was provided by Kleinschmidt: "Repair missing stone masonry, Item 20: \$41,000." (Kleinschmidt, Phase I, Flood Damage Assessment Report, Columbia Canal, Headgates Repair Services, City of Columbia, SC, February 2017, page 1-4). This item is considered eligible for reimbursement. The estimated cost for the repair is \$43,450.00. This cost has been loaded with a 4-year markup from the original cost estimate.

2. Remove temporary emergency bulkheads (steel blocking panels) from 12 gate openings which were applied in order to stop water flow through the head gate mechanisms. Current estimate \$5,300.00.00. This cost has been loaded with a 4-year markup from the original cost estimate.

3. Remove emergency sandbags and other debris lodged under the head gates. This will require in-water operations in order to effectively remove all subsequent storm and emergency measure debris from the gates. Current estimate of \$265,000.00. This cost has been loaded with a 4-year markup from the original cost estimate.

Overall, the head gate system can be described as undamaged, deteriorated and in the end of its useful life. Nonetheless, they remain marginally functional. The age and deteriorated condition of the gates clearly has made the gates susceptible to damage under normal operating conditions and the weakened integrity of the gates components. None of the other structures in the water barrier, by FEMA or other parties, indicate disaster-related damage has occurred to the gates. Furthermore, no subsequent inspection information is available to date to show how disaster-related damage may exist.

Total Facility Cost is \$838,450.00

Site 4 of 4

<b>DAMAGED FACILITY:</b>		<b>COUNTY:</b> Richland	
<b>Canal and Dam</b>			
<b>LOCATION:</b>		<b>LATITUDE:</b>	<b>LONGITUDE:</b>
Current Version: The 31 mile long Columbia Canal draws water from the Broad River through the Head Gates structure to the Columbia Water Treatment Plant and the Columbia Hydroelectric Plant. Head Gates Latitude: 34.03333, Longitude: -81.00870, Hydroelectric Plant Latitude: -81.3359738, Longitude: -81.04923.			

**DAMAGE DESCRIPTION AND DIMENSIONS:**

**Current Version:**  
**BACKGROUND:**  
Severe storms and flooding during the incident period of October 1, 2015 through October 23, 2015 impacted large areas of the City of Columbia, SC, including severe damage to the Columbia Canal, an unimproved waterway paralleling the Broad River for a length of approximately 3 miles.

The canal was originally built between about 1820 and 1824 as a navigable waterway to bypass the rapids at the City of Columbia, and later expanded to its current configuration in 1891. Currently it is used for hydroelectric power generation for the city (since 1952) and as a water source for the city water works (since 1955). It was constructed by excavating a naturally low "ravine" that paralleled the river and using the excavated soil to build the dike. The

dike is typically trapezoidal in cross section and ranges in height above the natural ground on the river side from about 30 feet (ft) near the headgates to 20 ft in downstream locations. The dike crest is generally 16 ft wide and supports an asphalt paved walking and bicycle path. The base of the dike expands to widths on the order of 100 ft when not influenced by natural landscape. The embankments on the river side of the dike typically slope on the order of 2:1 (horizontal to vertical) while those on the canal side have a typical slope on the order of 2:1 and decrease to as little as about 1:1 in the southern sections. The walking beam of the dike consists of a cut bank that is largely unimproved except in the vicinity of the water treatment facility, where bridge abutments are constructed or a culvert that was recently replaced by the railroad. No plans or specifications have been provided to FEMA to indicate what requirements were followed during construction in the 1920's.

The canal is the water source for approximately 50% of the consumer base, which includes all of the following: 375,000 people, 5 major hospitals, 6 universities, the state capital and numerous state agencies, and the City of Columbia and Richland county offices, including 16 police stations and 15 fire stations. The canal, including the dike, headgates, spillway and hydroelectric plant, are currently regulated by the Federal Energy Regulatory Commission (FERC). When notified in 2008 by the previous owner (South Carolina Electric and Gas (SCE&G)) that the City of Columbia used the canal as a significant portion of its water supply, FERC changed the "hazard potential classification" of the canal from "Low" to "Significant." This change in status was predicated solely on the risk of loss of the water supply source since there is no risk of loss of property or life due to the breach of the canal because its limited storage volume would not be a significant addition to flows of the river.

To operate the hydroelectric plant efficiently, the Canal has a normal operating level of approximately 153 ft above mean sea level (msl) near the headgates which decreases to 145 ft-msl at the power plant due to the flow gradient. The optimum operating level is above the top of railway elevation of 145.6 ft-msl requiring slopes to be in place on the spillway to attain operating levels. The high water level is regulated by Tamlin Gates at each end of the spillway which are set to open at pool elevation of 152.6 ft. The minimum pool elevation, approximately 146.5 ft msl, is necessary to keep the intakes for the water treatment plant sufficiently submerged for raw water withdrawal to occur. The elevation of the dike crest ranges from a low of approximately 154 ft-msl in the vicinity of the north end of the power house to a high of about 170 ft-msl proximate to the headgates. The canal bottom ranges in elevation from 140 ft-msl near the headgates to about 135 ft-msl in the vicinity of the spillway. Neither the City nor SCE&G installed a program to manage canal bottom elevation changes that occur from sediment deposition or scouring.

Station numbers were established by the City along a baseline on the crest of the dike as shown on the attachment "20070109 Base Map (LIDAR, Bathymetry & Previous Survey).pdf". Station locations are not marked on the ground. Their location must be established by reflecting the aerial photograph background of the Base Maps. Cross sections of the canal and dike are attached as "Cross-Sections PDF".

FEMA has reviewed the report filed by SCE&G to FERC on the topic of a "circular slip-type failure" at the crown of the dike that occurred on July 4, 1985 (attached as "1985-01-15 Report Regarding Breach and Repair.pdf"). The failure was located near Station 200+00. The failure spread about 8 to 10 ft on either side of the paved path, was approximately three feet deep and twenty feet long. The disturbed soils were removed, and clay soils were placed and compacted with a bulldozer. Test borings were performed and found homogeneous soils to 20 feet in depth (not described) and a water table at approximately 20 feet below the top of the dike.

Repeatedly, the canal's history of slope stability issues ultimately lead to SCE&G removing bare soil vegetation from the canal-side embankments of the dike in the late 1980's and early 1990's (City of Columbia Final Submittal - Deemed-as-BINDER.pdf). The canal level was lowered to 147.6 ft-msl during this process to facilitate placement of rip rap below the water line. Repeatedly, efforts were made to place the rip rap on the side of 2 feet or less. Assuming that the dike embankment below the water surface sloped at 2:1 degrees below the horizontal, the toe of slope would have been located between 14 feet and 20 feet from the shoreline for canal bottom depths of 7 ft and 12 ft, respectively. That distance would expand to between 24 ft and 36 ft from the shoreline if the embankment sloped below the waterline at 2:0 degrees as is the typical slope for the canal side embankment. In the event that sediment deposition had occurred in the embankment, the toe of slope could have been shallower and closer to the shoreline in which case the rip rap would have been placed over accumulated sediments. No measurements were made by SCE&G to identify the location of the toe of slope prior to placement nor was the as-placed extent of rip rap below the water line surveyed upon completion.

Starting about 800 ft north of the foot bridge, the tree-side embankments of the dike are largely vegetated from near the crest to the toe of slope with a mature forest. This slope is not subject to a regular maintenance program but evidence of repairs to washouts was noted beneath the L-26 overpass as well as adjacent to the observation deck located to the south of the railroad tracks. To the south of this area, the river-side dike embankment is for the most part free of trees except for those intentionally planted. A tree management program was recommended in a report dated October, 2011, by Clark and Associates to monitor trees and their potential impact to the dike because of the potential for going within the dike due to the presence of roots. The report recommended limiting removals to dead/dying trees and young trees that are less than 6 inches in diameter. It is not clear that this program was ever implemented.

A seepage inventory (SC&E September 25, 2007 Seepage Investigation Report) was also established and submitted to FERC by SCE&G in 2007; however, it is not clear that the program was active due to the lack of subsequent reports filed with FERC. The 2007 report details several pre-existing seepage and slope failure locations. Some sites where the Applicant is now claiming that the riprap moved as a result of the October 2015 event may, in fact, have been pre-existing in 2007. Other than the report completed shortly after the October 4, 2015 event, the Applicant has provided no documentation for repair work completed between 2007 and 2015.

**DAMAGE DESCRIPTION AND DIMENSIONS**

On October 4, 2015 about 17:00 hours, runoff from the recent rain event overtopped the canal embankment resulting in a approximately 125 LF long breach of the canal embankment immediately upstream of the powerhouse, in the vicinity of the foundations of a previously abandoned greenhouse buried in the canal embankment (Station 246+11 to 247+00). Flow through this breach led to the rapid de-watering of the canal. Stair on river dike shown on FEMA Flood Maps, near flows at the Drayson Dam (on the Broad River) ranged between a 10- and a 25-year flood.

Because the canal is the sole source of raw water for the nearby Columbia Water Treatment Plant, it was incumbent on the City to restore the canal water level at the intake as soon as possible. Thus, the City decided to construct a temporary cofferdam across the canal between the Water Treatment Plant intake and the breach. The temporary cofferdam is located immediately downstream of the Jarvis Khorman Blvd. Bridge (Elev. =151 ft-msl). This isolated the hydroelectric plant and breach in the dewatered section of the canal.

During the installation of the temporary riprap cofferdam, canal flows were pinched between the westward advancing face of the cofferdam and the east side of the canal embankment. As the closure proceeded, higher velocities were created in response to the area shrinking area of flow. These higher velocities diverted against the canal embankment caused a secondary failure of a section of the embankment (Station 240+47 to 243+00). Although a large section of the embankment was eroded away, the embankment did not breach, and no additional release of water occurred at this secondary embankment failure. Placement and removal of the cofferdam will be undertaken in a separate Category B FWP.

Elsewhere along the embankment, the sudden drop in the water levels in the canal, 12 feet in four hours, resulted in localized bank failures. The slides were shallow (generally within the upper 5 to 10 feet of material) and generally did not extend to the crest of the dike. These failures have been temporarily repaired by the City.

For the purposes of categorizing damage to the canal, a zone system was established by the City's consultants as shown on the attachment "Diagram of Canal Elements by Zone.pdf". The zones are:

1. Left (East) Bank (embankment above the water line).
2. Left (East) Slope (bank below the water line).
3. Canal Bottom (all area between the toes of the bank and the embankment).
4. Right Slope (west bank of dike below the water line).
5. Crest (extending from the waterline on the Right Slope to the west edge of the crest).
6. Dike Riverside (west flank of the dike from crest to toe of slope).

The City of Columbia has presented a narrative of its claim for damages on the canal in the attachment "City of Columbia Final Submittal - Deemed-as-BINDER.pdf". The claimed damages to the canal are also summarized in the attachment "CCR Repair and Damage Estimate.pdf".

After a three-day on-site inspection performed by a FEMA representative and a Technical Expert, as well as an in-depth study of the various documents regarding the claimed facility damages, the following eligible damage areas of the canal dike has been identified:

Toe scour areas have been identified along the 2.1-mile dike. These areas are currently under water and have been identified based on the difference between the 2005 and the 2016 bathymetry data. The sites are listed as follows:

- Station 129+50 to Station 127+00
- Station 186+00 to Station 220+00
- Station 191+00 to Station 195+00
- Station 200+75 to Station 217+00
- Station 220+00 to Station 223+00

Total linear feet of damage is 10,476 feet.

Embankment soil slip damage has been identified at the following locations:

- Embankment repair on the west bank, station 122+00 to station 126+00
- Embankment repair on the west bank, station 127+00 to station 129+50
- Embankment repair on the west bank, station 177+00 to station 180+00
- Embankment repair on the west bank, station 186+00 to station 191+00
- Embankment repair on the west bank, station 195+00 to station 198+00
- Embankment repair on the west bank, station 199+25 to station 200+75
- Embankment repair on the west bank, station 217+00 to station 220+00
- Embankment repair on the west bank, station 223+00 to station 226+00
- Embankment repair on the east bank, station 225+00 to station 227+75

Total length of damage is 3,500 LF.

**SCOPE OF WORK:**

Current Vermin:  
Repairs to the top of the dike slope will be made using a bagge (liner) for equipment and a loader for material. The repair will consist of placing geotextile fabric in the slope, then placing stone (similar to #57) and rip rap on the fabric to the required dimensions. Estimated stone loss is 25% due to underwater placement. Average amount of replacement material will be approximately 4 CY. Where the toe repairs intersect with embankment repairs approximately 7 CY of material will be placed in order to provide a bench for further steep embankment repairs.

- Station 129+50 to Station 177+00 4,750 LF
- Station 186+00 to Station 220+00 3,350 LF
- Station 191+00 to Station 195+00 450 LF
- Station 200+75 to Station 217+00 1,625 LF
- Station 220+00 to Station 223+00 300 LF

Total linear feet of damage is 10,476 feet. The total cubic yards of material to be used is 56,050 CY. This is divided by .25 for stone and .75 for riprap.

Repairs to the embankment will be made by clearing vegetation, removing the asphalt running path, removing the embankment to below slip conditions or stabilized soil area (approximately the 145 ft elevation), then rebuilding the bank with layered and compacted fill (FA), re-vegetating and resurfacing the asphalt path. Detailed material, labor, and equipment breakdowns are available.

Embankment repair on the west bank, station 122+00 to station 126+00 500 LF  
 Embankment repair on the west bank, station 127+00 to station 129+50 250 LF  
 Embankment repair on the west bank, station 127+00 to station 182+50 580 LF  
 Embankment repair on the west bank, station 186+00 to station 191+00 500 LF  
 Embankment repair on the west bank, station 195+00 to station 199+25 375 LF  
 Embankment repair on the west bank, station 199+25 to station 200+75 100 LF  
 Embankment repair on the west bank, station 217+00 to station 220+50 300 LF  
 Embankment repair on the west bank, station 223+00 to station 220+50 650 LF  
 Embankment repair on the east bank, station 225+00 to station 227+75 275 LF

Total Linear feet of damage is 3,500 feet. The total cubic yards of excavation will be approximately 12,975 CY's figured on @ 10 LF bench cut into the embankment at elevation 145.0 and sloped back with 1 LF vertical and 2 LF horizontal steps to the top of the dike.

Cost Estimate:  
 1. Mobilization, \$167,000.00  
 2. Install rip rap, \$3,669,800.00  
 3. Embankment repair, \$470,500.00  
 4. Demolition, \$54,840.00

Total cost for embankment repair: \$4,232,140.00

Breach repair and removal of the temporary cofferdam: This work will be done in conjunction with the placement of a temporary dam just below the spillway. This will allow for the dewatering of the canal below the spillway and up to the existing cofferdam. Removing the cofferdam will then allow for the careful rebuilding of the dike near the Kipman bridge. Additionally, the existing levee material between the breach area and the washout area will need to be pushed towards the river, creating a barrier to any possibility of backwatering from a possible rise in the river height. Relocation will have to be made of the existing substation located on the levee near the power station and a small building and parking pad at that site. Removing all remaining concrete and stone-work walls from the previously abandoned powerplant, from both the levee and the canal area, will be required in order to begin the cutback of the levee near the powerplant and to step it, in order to be 6:6 levee repair in. The existing power poles and electrical wires running from the powerplant, across the canal and terminating at the Williams Street substation, will need to be relocated or removed for the duration of the construction.

The repair of the breach area will consist of approximately 1,125 LF of levee repair which will require to be in at both ends to the powerplant and the existing levee. An estimated 62,000 CY's of material will be used to construct the new levee with most of the material coming from either the cofferdam or material deposited outside the canal levee at the time of the breach. The material will need to be moved and placed several times as the construction work builds the levee higher by lifts.

Reshaping of the canal bottom surface and the east bank near the Riverbank and where the cofferdam was located will also be required. Excavating, grading, hauling and dumping will be a significant portion of the work to be completed for the embankment repair.

Mobilization, stockpile areas, traffic control and road closures will also be required.

Repairing the west bank slope adjacent to the powerplant will also be accomplished at the same time that the embankment is cut back to facilitate the new construction levee to be.

Repair of the canal embankment between the Kipman bridge and the spillway will be accomplished while that area is dewatered, and then the removal of the temporary dam can be accomplished. The rewatering of the canal will be gradual and controlled. The removal and relocated items, (the parking pad, small building, substation, electrical lines and poles) will be replaced.

Final cleaning and demobilization will occur.

Total cost for breach repair and cofferdam removal is \$20,000,000.00  
 Total cost for this Facility is \$32,232,140.00

Architectural and Engineering costs, estimated at 4% of the repairs for the breach and embankment, \$1,460,727.60  
 Costs from PW 291 contractual and engineering design, \$2,500,920.07  
 Project Management costs, estimated at 5% of the repair costs for the project, \$1,856,844.50

Total project repair costs: \$4,036,050.00 + \$47,700.00 + \$838,460.00 + \$32,232,140.00 + \$3,961,647.67 + \$1,857,717.50 = \$42,863,715.17

PROJECT NOTES  
 - DIRECT ADMINISTRATIVE COSTS: The Subgrantee chooses not to claim costs to manage and administer this project as part of the Public Assistance program's grant award. Declining such costs does not exempt the Subgrantee from maintaining records adequately and documenting the source and application of funds as required in 2 CFR 200.413.  
 - CHANGES TO SCOPE OF WORK DESCRIBED IN THIS PWMSA (SUBGRANT APPLICATION): The Applicant shall comply with all applicable codes and standards in the completion of eligible work to repair or replace damaged public facilities. Any change to the approved scope of work on a Project Worksheet (PWMSA) must be reported and approved before work begins. Failure to report changes may jeopardize Federal and State funding. In the case of a change in scope of work, the applicant shall notify the South Carolina Division of Emergency Management program representative Brittany Kelly, bkelly@emr.dhs.gov prior to starting work.

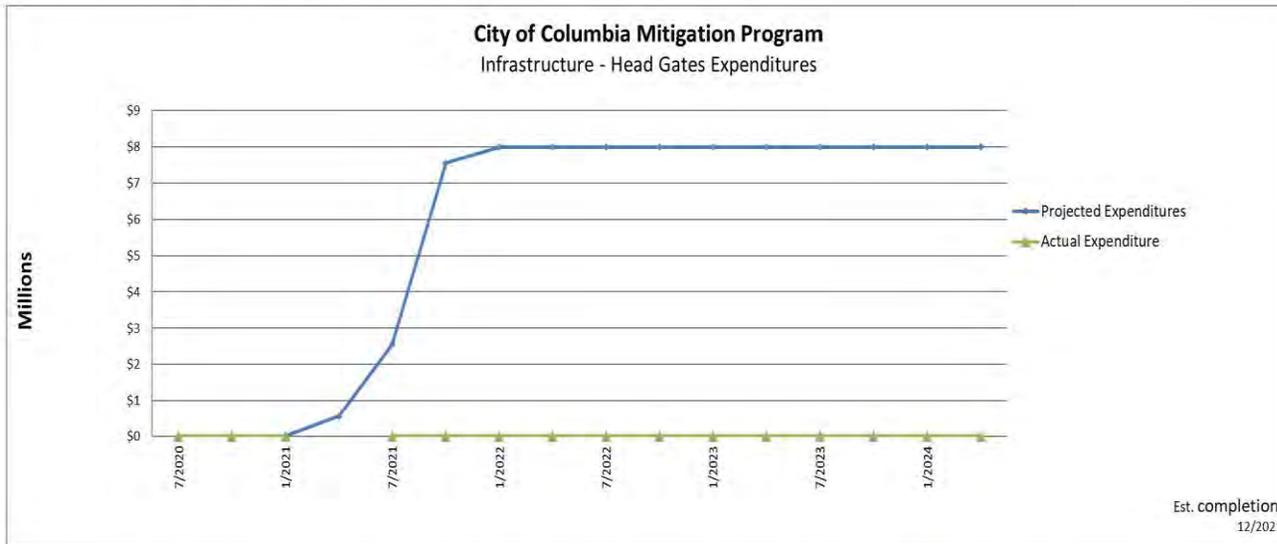
Does the Scope of Work change the pre-disaster conditions at the site?  Yes  No  
 Special Considerations included?  Yes  No  
 Hazard Mitigation proposal included?  Yes  No  
 Is there insurance coverage on the facility?  Yes  No

PROJECT COST					
ITEM	CODE	NARRATIVE	QUANTITY/UNIT	UNIT PRICE	COST
*** Version 0 ***					
Work To Be Completed					
1	9880	Site 1 Columbia Canal Hydroelectric Plant Work To Be Completed	1A S	\$ 4,036,050.00	\$ 4,036,050.00
2	9888	Site 2 Canal Spillway and Tailwater Gates Work To Be Completed	1A S	\$ 47,700.00	\$ 47,700.00
3	9888	Site 3 Head Gates Work To Be Completed	1A S	\$ 838,460.00	\$ 838,460.00
4	9888	Site 4 Canal and Dike Work To Be Completed	1A S	\$ 38,039,332.17	\$ 38,039,332.17
5	0000	Insurance Adjustments - 5900/5901	0A S	\$ 0.00	\$ 0.00
*** Version 0 ***					
6	5900	Deduct Actual Insurance Proceeds	1A S	\$ -993,588.67	\$ -993,588.67
7	5900	Deduct Actual Insurance Proceeds	1A S	\$ -151,889.70	\$ -151,889.70
8	5901	Deduct Anticipated Insurance Proceeds	1A S	\$ -1,354,541.63	\$ -1,354,541.63
9	0909	Hazard Mitigation Proposal	1A S	\$ 142,801.50	\$ 142,801.50
<b>TOTAL COST</b>					<b>\$ 40,604,343.67</b>

PREPARED BY Greg R Morley TITLE Dep. City Supervisor SIGNATURE  
 APPLICANT REP: Teresa B Wilson TITLE: City Manager SIGNATURE

## 8.6 Projections for Expenditures and Performance Outcomes

Infrastructure – Head Gates



Infrastructure - Head Gates	7/2020	10/2020	1/2021	4/2021	7/2021	10/2021	1/2022	4/2022
Projected Expenditures	\$0	\$0	\$0	\$550,000	\$2,550,000	\$7,550,000	\$8,000,000	\$8,000,000
Quarterly Projection	\$0			\$550,000	\$2,000,000	\$5,000,000	\$450,000	\$0
Actual Expenditure	\$0	\$0	\$0		\$0	\$0	\$0	\$0
Actual Quarterly Expend (from QPRs)	\$0							









## 8.7 CDBG-MIT Certifications

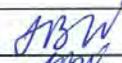
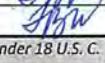
Required Certifications

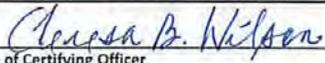
Certifications Checklist CDBG-MIT Grants under Public Laws 115-123	
Each State or UGLG receiving a direct allocation in the Notice must make the following certifications (all information about the Action Plan certifications can be found at 84 FR 45869):	Initials of Certifying Officer
a. The grantee certifies that it has in effect and is following a residential anti-displacement and relocation assistance plan in connection with any activity assisted with funding under the CDBG program.	JBN
b. The grantee certifies its compliance with restrictions on lobbying required by 24 CFR part 87, together with disclosure forms, if required by part 87.	JBN
c. The grantee certifies that the Action Plan is authorized under State and local law (as applicable) and that the grantee, and any entity or entities designated by the grantee, possess(es) the legal authority to carry out the program for which it is seeking funding, in accordance with applicable HUD regulations and this Notice. The grantee certifies that activities to be administered with funds under this Notice are consistent with its Action Plan.	JBN
d. The grantee certifies that it will comply with the acquisition and relocation requirements of the URA, as amended, and implementing regulations at 49 CFR part 24, except where waivers or alternative requirements are provided for in this Notice.	JBN
e. The grantee certifies that it will comply with section 3 of the Housing and Urban Development Act of 1968 (12 U.S.C. 1701u), and implementing regulations at 24 CFR part 135.	JBN
f. The grantee certifies that it is following a detailed citizen participation plan that satisfies the requirements of 24 CFR 91.105 or 91.115, as applicable (except as provided for in notices providing waivers and alternative requirements for this grant). Also, each local government receiving assistance from a State grantee must follow a detailed citizen participation plan that satisfies the requirements of 24 CFR 570.486 (except as provided for in notices providing waivers and alternative requirements for this grant).	JBN 3/26/2020
g. The grantee certifies that it has consulted with affected local governments in counties designated in covered major disaster declarations in the non-entitlement, entitlement, and tribal areas of the State in determining the uses of funds, including method of distribution of funding, or activities carried out directly by the State.	JBN
h. The grantee certifies that it is complying with each of the following criteria:	
(1) Funds will be used solely for necessary expenses related to disaster relief, long-term mitigation, restoration of infrastructure and housing, and economic revitalization in the most impacted and distressed areas for which the President declared a major disaster in 2017 pursuant to the Robert T. Stafford Disaster Relief and emergency Assistance Act of 1974 (42 U.S.C. 5121 et seq.).	JBN
(2) With respect to activities expected to be assisted with CDBG-DR funds, the Action Plan has been developed so as to give the maximum feasible priority to activities that will benefit low- and moderate-income families.	JBN
(3) The aggregate use of CDBG-DR funds shall principally benefit low- and moderate-income families in a manner that ensures that at least 70 percent of the grant amount is expended for activities that benefit such persons.	JBN

Required Certifications

<b>Certifications Checklist</b> CDBG-MIT Grants under Public Laws 115-123	
Each State or UGLG receiving a direct allocation in the Notice must make the following certifications (all information about the Action Plan certifications can be found at 84 FR 45869):	Initials of Certifying Officer
(4) The grantee will not attempt to recover any capital costs of public improvements assisted with CDBG-DR grant funds, by assessing any amount against properties owned and occupied by persons of low- and moderate-income, including any fee charged or assessment made as a condition of obtaining access to such public improvements, unless: (a) disaster mitigation grant funds are used to pay the proportion of such fee or assessment that relates to the capital costs of such public improvements that are financed from revenue sources other than under this title; or (b) for purposes of assessing any amount against properties owned and occupied by persons of moderate income, the grantee certifies to the Secretary that it lacks sufficient CDBG funds (in any form) to comply with the requirements of clause (a).	JBN
i. The grantee certifies that it grant will conduct and carry out the grant in conformity with title VI of the Civil Rights Act of 1964 (42 U.S.C. 2000d) and the Fair Housing Act (42 U.S.C. 3601-3619) and implementing regulations, and that it will affirmatively further fair housing.	JBN
j. The grantee certifies that it has adopted and is enforcing the following policies. In addition, States receiving a direct award must certify that they will require UGLGs that receive grant funds to certify that they have adopted and are enforcing: (1) A policy prohibiting the use of excessive force by law enforcement agencies within its jurisdiction against any individuals engaged in nonviolent civil rights demonstrations; and (2) A policy of enforcing applicable State and local laws against physically barring entrance to or exit from a facility or location that is the subject of such nonviolent civil rights demonstrations within its jurisdiction.	JBN JBN
k. The grantee certifies that it (and any subrecipient or administering entity ) currently has or will develop and maintain the capacity to carry out disaster mitigation activities in a timely manner and that the grantee has reviewed the requirements of this notice. The grantee certifies to the accuracy of its Public Law 115-56 Financial Management and Grant Compliance certification checklist, or other recent certification submission, if approved by HUD, and related supporting documentation referenced at A.1.a under Section VI and its Implementation Plan and Capacity Assessment and related submission to HUD referenced at A.1.b under Section VI.	JBN
l. The grantee certifies that it considered the following resources in the preparation of its action plan, as appropriate: FEMA Local Mitigation Planning Handbook: <a href="https://www.fema.gov/media-library-data/20130726-1910-25045-9160/fema_local_mitigation_handbook.pdf">https://www.fema.gov/media-library-data/20130726-1910-25045-9160/fema_local_mitigation_handbook.pdf</a> ; DHS Office of Infrastructure Protection: <a href="https://www.dhs.gov/sites/default/files/publications/ip-fact-sheet-508.pdf">https://www.dhs.gov/sites/default/files/publications/ip-fact-sheet-508.pdf</a> ; National Association of Counties, Improving Lifelines (2014): <a href="https://www.naco.org/sites/default/files/documents/NACo_ResilientCounties_Lifelines_Nov2014.pdf">https://www.naco.org/sites/default/files/documents/NACo_ResilientCounties_Lifelines_Nov2014.pdf</a> ; the National Interagency Coordination Center (NICC) for coordinating the mobilization of resources for wildland fire: <a href="https://www.nifc.gov/nicc/">https://www.nifc.gov/nicc/</a> ; the U.S. Forest Service's resources around wildland fire ( <a href="https://www.fs.fed.us/managing-land/fire/">https://www.fs.fed.us/managing-land/fire/</a> ); and HUD's CPD Mapping tool: <a href="https://egis.hud.gov/cpdmaps/">https://egis.hud.gov/cpdmaps/</a> .	JBN

Required Certifications

<b>Certifications Checklist</b> CDBG-MIT Grants under Public Laws 115-123	
Each State or UGLG receiving a direct allocation in the Notice must make the following certifications (all information about the Action Plan certifications can be found at 84 FR 45869):	Initials of Certifying Officer
m. The grantee will not use grant funds for any activity in an area identified as flood prone for land use or hazard mitigation planning purposes by the State, local, or tribal government or delineated as a special flood hazard area (or 100-year floodplain) in FEMA's most recent flood advisory maps, unless it also ensures that the action is designed or modified to minimize harm to or within the floodplain, in accordance with Executive Order 11988 and 24 CFR part 55. The relevant data source for this provision is the State, local and tribal government land use regulations and hazard mitigation plan and the latest issued FEMA data or guidance, which includes advisory data (such as Advisory Base Flood Elevations) or preliminary and final Flood Insurance Rate Maps.	
n. The grantee certifies that its activities concerning lead-based paint will comply with the requirements of 24 CFR part 35, subparts A, B, J, K, and R.	
o. The grantee certifies that it will comply with environmental requirements at 24 CFR Part 58.	
p. The grantee certifies that it will comply with applicable laws.	
Warning: Any person who knowingly makes a false claim or statement to HUD may be subject to civil or criminal penalties under 18 U.S.C. 287, 1001 and 31 U.S.C. 3729.	
This checklist is part of the administrative record of the Department's review of a disaster mitigation Action Plan submitted pursuant to The Supplemental Appropriations for Disaster Relief Requirements, approved September 8, 2017 (Pub. L. 115-56) and Further Additional Supplemental Appropriations for Disaster Relief Requirements Act, 2018 (Division B, Subdivision 1 of the Bipartisan Budget Act of 2018), approved February 9, 2018 (Pub. L. 115-123) and the Federal Register Notices published February 9, 2018 (83 FR 5844) and August 14, 2018 (83 FR 40314). In using the checklist, reviewers are reminded that each of the criterion as stated on the checklist is necessarily an abbreviated and generalized summary of the more detailed requirements outlined in the Federal Register Notice for each criterion. Reviewer answers to each question on the checklist must be informed by applying the requirements of each criterion as outlined in the Federal Register Notice to each element of the Action Plan. Use of the checklist does not substitute comparison of the Action Plan submission against the requirements of the applicable Notices and making a determination based on the Standard of Review set forth in 24 CFR 91.500, as augmented by the applicable Notices.	


3/23/2020  
 Signature of Certifying Officer Date  


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 Teresa Wilson, City Manager  
 Name and Title of Certifying Officer

## 8.8 CDBG-MIT Action Plan Checklist

Community Development Block Grant Mitigation (CDBG-MIT) Further Additional Supplemental Appropriations for Disaster Relief Requirements Act, 2018 (Division B, Subdivision 1 of the Bipartisan Budget Initial Action Plan Review			
Grantee:	State of South Carolina-Columbia	Date Plan Submitted:	5/2/2020
Entity Designated to Administer the Funds:	Columbia Dept. of Community Development	Date Plan Reviewed:	
Amount of Funds Allocated in Plan:	\$18,585,000	Submitted on the Extension Date provided by South Carolina Field Office	5/2/2020
Reviewer/Title:			
Criteria:	Yes <i>(provide page # or section as reference)</i>	No <i>(provide justification)</i>	
<b>A. Mitigation Needs Assessment and Consultations</b>			
Does the Mitigation Action Plan identify the proposed use(s) of grantee's allocation, specifically:			
1 Mitigation Needs Assessment	Does the Action Plan include a risk-based Mitigation Needs Assessment (MNA) that identifies and analyzes all significant current and future disaster risks? (84 FR 45840)	Section 2.0	
	Did the Grantees use the most recent risk assessment completed or currently being updated through the FEMA HMP process to inform the use of CDBG-MIT funds? (84 FR 45840)	Section 2.3	
	(a) At minimum, does the grantee address the risks included in its jurisdiction's HMP?	Section 2.4 (Central Midlands HMP covers Columbia. The City does not do their own HMP.)	
	(b) If a jurisdiction is currently updating an expired HMP, did the grantee administering the CDBG-MIT funds consult with the agency administering the HMP update to identify the risks that will be included in the Mitigation Needs Assessment? (84 FR 45840)	Sections 2.0, 4.0	
	Does the Action Plan describe the impacts of the use of CDBG-MIT funds geographical by type at the lowest level practicable (e.g., county level, zip code, or lower if available)? (84 FR 45846)	Sections 2.1, 2.4, 2.5, 3.3, 3.4, 8.3	
	Does the grantee cite data sources throughout the Action Plan? (84 FR 45847)	p. iv-v, Section 2.3, and elsewhere in Footnotes throughout Action Plan	
	Does the grantee identify how the proposed projects will effectively address risks to indispensable services that enable continuous operations of critical business and government functions and are critical to human health and safety or economic security (i.e. the community lifelines)? (84 FR 45847)	Sections 2.4, 2.5, 2.6, 3.3, 3.4, 3.5	
2 Coordination and Citizen Participation	Has the grantee incorporated some quantitative assessments to demonstrate the significant potential impacts and risks of hazards affecting the seven critical service areas or community lifelines? (Safety and Security, Communications, Food/Water/Sheltering, Transportation, Health and Medical, Hazardous Material (Management) and Energy (Power and Fuel))? (84 FR 45847)	Section 2.4, 2.5	
	Does the grantee document how they have met the required number of public hearings, as defined in 84 FR 45838?	Section 5.2	
	In preparation of the MNA, did the grantee consult with other jurisdictions; the private sector; and other government agencies, including State and local emergency management agencies that have primary responsibility for the administration of FEMA mitigation funds, including the State Mitigation Officer (SMO) for HMGP alignment? (84 FR 45840)	Sections 2.3, 4.0	
Does the grantee describe the actions that they have taken to align their planned CDBG-MIT activities with other federal, state, and local mitigation projects and planning processes? Including coordinating and aligning with other mitigation projects funded by FEMA, the U.S. Army Corps of Engineers (USACE), the U.S. Forest Service, and other agencies as appropriate? (84 FR 45840)	Section 3.3, 3.4, 3.7, 4.0		

Criteria:		Yes <i>(provide page # or section as reference)</i>	No <i>(provide justification)</i>
	Does the grantee describe how it plans to promote local and regional long-term planning and implementation informed by its MNA? (84 FR 45847) including a-c below:	Section 3.5	
	a.) through the development and enforcement of building codes and standards (such as wildland urban interface; and flood and all hazards, including ASCE-24 and ASCE-7, as may be applicable), vertical flood elevation protection, and revised land use and zoning policies.	Sections 3.5, 3.7	
	b.) coordinate with other planning efforts by local and regional entities to ensure alignment of CDBG-MIT activities with those plans;	Sections 2.0, 4.0	
	c.) support actions to promote an increase in hazard insurance coverage.	Section 3.7	
	If the grantee is pursuing flood mitigation efforts: Did it consider high wind and continued sea level rise and ensure responsible floodplain and wetland management based on the history of flood mitigation efforts and the frequency and intensity of precipitation events? (84 FR 45847)	NA	
	If the grantee is pursuing wildfire mitigation efforts: Did it consider land-use plans that address density and quantity of development, as well as emergency access, landscaping, and water supply considerations? (84 FR 45847)	NA	
	If the grantee is pursuing tornado mitigation efforts: Did it consider promoting the construction and use of safe rooms and require or encourage wind engineering measures and construction techniques into building codes? (84 FR 45847)	NA	
	Does the Action Plan describe how the grantee's activities will affect members of protected classes under fair housing and civil rights laws, racially and ethnically concentrated areas, as well as concentrated areas of poverty, and will promote more resilient affordable housing and fair housing choice, and will respond to natural hazard related impacts? (84 FR 45847)	Sections 3.3, 3.4, 6.2	
	Does the grantee describe how the proposed mitigation programs or projects will (a) advance long-term resilience, (b) align with other planned capital improvements, and (c) promote community-level and regional planning for current and future disaster recovery efforts and additional mitigation investments? (84 FR 45847)	Sections 3.3, 3.4, 6.2	
	Does the grantee describe how it will leverage CDBG-MIT funds with other funding provided through public-private partnerships and by other federal, state, local, private and nonprofit sources to generate more effective and comprehensive mitigation outcomes? (84 FR 45848)	Section 3.3, 3.4	
	<b>Does the grantee document the following:</b>		
	(a) Did the grantee provide at least 45 days for citizen comment and ongoing citizen access to information about the use of grant funds? (84 FR 45852)	Sections 5.1, 5.2, 5.3	
	(b) Did the manner of publication including prominent posting on the grantee's official website (with topic of disaster mitigation navigable from the homepage of the grantee or relevant agency) and afford citizens, affected local governments and other interested parties a reasonable opportunity to examine the Plan and provide comments? (84 FR 45852)	Sections 5.1, 5.2, 5.3, 5.8	
	(c) Was the Plan available in a form accessible to all, including persons with disabilities and non-English-speaking persons? (State which disabilities and which languages.) (84 FR 45852)	Yes (posted in Spanish and with 508 compliant posting in English)	
<b>B. Projects and Activities</b>			
For grantees, the action plan shall describe the method of distribution of funds and/or descriptions of specific programs or activities the grantee will carry out directly.			
3	Projects and Activities	Does the Action Plan describe that the grantee will ensure that all CDBG-MIT activities must (84 FR 45840) :	
		(1) Meet the definition of mitigation activities;	Sections 3.3, 3.4, 3.5
		(2) Address the current and future risks as identified in the grantee's Mitigation Needs Assessment of most impacted and distressed areas;	Sections 3.3, 3.4, 3.5
		(3) CDBG-eligible activities under title I of the Housing and Community Development Act of 1974 (HCDA) or otherwise eligible pursuant to a waiver or alternative requirement; and	Sections 3.3, 3.4, 3.5
		(4) Meet a national objective, including additional criteria for mitigation activities and Covered Projects?	Sections 3.3, 3.4, 3.5

Criteria:		Yes <i>(provide page # or section as reference)</i>	No <i>(provide justification)</i>	
4	<b>Basis for Allocations</b>	Does each grantee describe in its action plan how it will prioritize programs and projects that will protect LMI persons in order to meet the overall benefit requirement? (84 FR 45847)	Sections 3.3, 3.4, 8.3	
		Does the Action Plan provide a substantive basis for the activities proposed? Does the grantee identify how the programs proposed mitigate specific current and future risks identified in the MNA? (84 FR 45840) (84 FR 45847)	Sections 2.6, 3.1, 3.3, 3.4, 3.5	
		Does the Plan include a chart or table that illustrates, at the most practical level, how all funds are budgeted (e.g., by program, subrecipient, grantee-administered activity, or other category)? (84 FR 45850)	Sections 1.0, 3.2	
		Do the amounts for all the activities in the Plan add correctly? Are the combined activities equal to or less than the total CDBG-MIT amount available? Are the amounts consistent throughout the plan?	Sections 1.0, 3.2	
5	<b>Budget</b>	Has the grantee requested to add other areas to HUD-identified MID? If so:	NA	
		(a) Does the request include a data-driven analysis that illustrates the basis for designating the additional area as most impacted and distressed as a result of the qualifying disaster?	NA	
		(b) Has the grantee amended its HUD-identified MID area for its corresponding 2015, 2016, or 2017 CDBG-DR grant?	NA	
		At least 50 percent of the funds provided under the Notice must mitigate risks within the "most impacted and distressed" counties identified in Table 1 of the Notice. (84 FR 45841)	NA	
		Has the grantee requested to add other areas to HUD-identified MID? If so:	NA	
		(a) Does the request include a data-driven analysis that illustrates the basis for designating the additional area as most impacted and distressed as a result of the qualifying disaster?	NA	
		(b) Has the grantee amended its HUD-identified MID area for its corresponding 2015, 2016, or 2017 CDBG-DR grant?	NA	
	Does the budget allocate not less than 50% (the total award minus any funds budgeted for administration and planning) of the aggregate of CDBG-MIT program funds be used to support activities benefiting low- and moderate-income persons (overall benefit requirement)? (84 FR 45856)	Sections 3.2, 3.3, 3.4, 8.3		
6	<b>Flood Mitigation Efforts</b>	If the grantee is pursuing flood mitigation efforts: Did it consider high wind and continued sea level rise and ensure responsible floodplain and wetland management based on the history of flood mitigation efforts and the frequency and intensity of precipitation events? (84 FR 45847)	NA	
7	<b>Wildfire Mitigation Efforts</b>	If the grantee is pursuing wildfire mitigation efforts: Did it consider land-use plans that address density and quantity of development, as well as emergency access, landscaping, and water supply considerations? (84 FR 45847)	NA	
8	<b>Tornado Mitigation Efforts</b>	If the grantee is pursuing tornado mitigation efforts: Did it consider promoting the construction and use of safe rooms and require or encourage wind engineering measures and construction techniques into building codes? (84 FR 45847)	NA	
<b>C. State Only- Method of Distribution Requirements</b>				
<i>Note: This section is not applicable for non-state grantees</i>				
9	<b>For funds awarded to a State (MOD or Programs/Activities)</b>	Does the Action Plan describe the method of distribution of funds to local governments and/or descriptions of specific programs or activities the state will carry out directly? (84 FR 45849)	NA	
		For each program or activity carried out by the state (84 FR 45849):		
		(a) Are threshold factors and grant size limits applied?	NA	
		(b) Are the projected uses of the CDBG-MIT funds, by responsible organization, activity, and geographic area included?	NA	
		(c) Demonstrate how the projected use will meet CDBG eligibility criteria and associated national objective(s), including additional criteria?	NA	
		(d) When subgranted to local governments or Indian tribes, is the criteria and relative importance of each criterion to distribute the funds provided?	NA	
	(e) Is the criteria and relative importance of each criterion when selecting applications for funding included within the plan?	NA		
<b>D. Infrastructure Activities Only</b>				
10	<b>Covered Projects (Only applicable if the grantee is</b>	Do any proposed projects meet the following definition of a "Covered Project": <i>If yes, please continue to the Covered Projects tab.</i>	NA	

Criteria:		Yes <i>(provide page # or section as reference)</i>	No <i>(provide justification)</i>
funding infrastructure projects)	An infrastructure project having a total project cost of a \$100 million or more with at least \$50 million of CDBG funds (regardless of source (CDBG-DR, CDBG National Disaster Resilience (NDR), CDBG Mitigation, or CDBG)) (84 FR 45850)	NA	
	For grantees that are considered by HUD to be high-risk, including the U.S. Virgin Islands, a Covered Project will be defined as an infrastructure project having a total project cost of \$50 million or more, with at least \$25 million of CDBG-MIT funds. (84 FR 45850 and 84 FR 47530)	NA	
<b>E: General Action Plan Requirements</b>			
11	<b>Application Status</b>	Does the Grantee provide multiple methods of communication, such as websites, toll-free numbers, or other means that provide applicants with timely information to determine the status of their application? (84 FR 45853)	Sections 5.1, 5.3 (Grantee is not proposing any direct beneficiary activities at this time, but intends to keep public advised of project status via CDBG-MIT website)
12	<b>Substantial Amendment</b>	Does the Action Plan define what constitutes as a substantial amendment to the Plan? (84 FR 45850)	Section 5.6
		At minimum does the Action Plan include the addition of a CDBG-MIT Covered Project, change in program benefit or eligibility criteria, the addition or deletion of an activity, or the allocation or reallocation of a monetary threshold specified by the grantee as a substantial amendment? (84 FR 45850)	Section 5.6
13	<b>Promote housing for vulnerable populations</b>	Does the grantee's programs or project increase the resiliency of housing? If so, has the grantee described the following:  How the programs or projects increase the resiliency for housing that serves vulnerable populations, including transitional housing, permanent supportive housing, permanent housing serving individuals and families that are homeless and at-risk of homelessness and public housing developments? (84 FR 45847)	Sections 3.7, 6.2
14	<b>Minimize or Address Displacement</b>	How the grantee plans to minimize displacement of persons or entities and to assist any persons or entities displaced through its mitigation activities (except for mitigation through voluntary buyout activities that are designed to move households out of harm's way)? (84 FR 45848)	Section 6.3
15	<b>Maximum Assistance and Cost Reasonable Assessment</b>	Does the Action Plan include a description of the maximum amount of assistance available to a beneficiary under each of the grantee's mitigation programs? (84 FR 45848)	Section 3.2, 6.4
		(a) Does the Action plan describe the process the grantee will use to make exceptions to the maximum award amounts? (84 FR 45848)	NA
16	<b>Elevation Standards</b>	Does the grantee indicate that it will apply the elevation standards for new construction, repair of substantially damaged structures, or substantial improvements to residential structures in flood hazard areas, such that the lowest floor is at least 2 feet above the 1 percent annual floodplain elevation (or ABFE +2)? (84 FR 45864)	Section 6.5
		If not, did the grantee choose to adopt the design flood elevation standards of ASCE-24 if it results in an elevation higher than two feet above base flood elevation? (84 FR 45864)	Section 6.5
17	<b>Construction Standards</b>	Does the Action Plan describe how the grantee will (84 FR 45838):	
		(a) Reduce the risk of loss of life and property from future disasters and yield community development benefits? (84 FR 45839)	Section 6.5
		(b) Emphasize quality, durability, energy efficiency, sustainability, and mold resistance, as applicable? (84 FR 45848)	Section 6.5
		(b) consider application of Green Building Standards? (84 FR 45848)	Section 6.5
		(c) adhere to the advanced elevation requirements? (84 FR 45848)	Section 6.5
		(d) support adoption and enforcement of modern and/or resilient building codes and mitigation of hazard risk, including possible sea level rise, high winds, storm surge, and flooding? (84 FR 45848-45849)	Section 3.7, 6.5
(e) Encouraged to meet the Green Building Standard for the following activities:	Proposing public infrastructure only, which will meet construction standards referenced above.		

Criteria:		Yes <i>(provide page # or section as reference)</i>	No <i>(provide justification)</i>
25	<b>Complete and Compliant</b>	Based on the reviewer's responses to the above questions, is the Action Plan complete and in compliance with the Federal Register Notice and Public Law 115-123?	
26	<b>Approved</b>	Is the Plan approved?	
27	<b>Reason(s) for Resubmittal</b>	If the Plan needs to be re-submitted, please indicate the reasons.	
<p><i>This checklist is part of the administrative record of the Department's review of a disaster recovery Action Plan submitted pursuant Further Additional Supplemental Appropriations for Disaster Relief Requirements Act, 2018 (Division B, Subdivision I of the Bipartisan Budget Act of 2018), approved February 9, 2018 (Pub. L. 115-123) and the Federal Register Notices published August 30, 2019 (84 FR 45838) and September 30, 2019 (84 FR 47528). In using the checklist, reviewers are reminded that each of the criterion as stated on the checklist is necessarily an abbreviated and generalized summary of the more detailed requirements outlined in the Federal Register Notice for each criterion. Reviewer answers to each question on the checklist must be informed by applying the requirements of each criterion as outlined in the Federal Register Notice to each element of the Action Plan. Use of the checklist does not substitute comparison of the Action Plan submission against the requirements of the applicable Notices and making a determination based on the Standard of Review set forth in 24 CFR 91.500, as augmented by the applicable Notices.</i></p>			

8.9 SF-424

OMB Number: 4040-0004  
 Expiration Date: 10/31/2019

Application for Federal Assistance SF-424		
* 1. Type of Submission:	* 2. Type of Application:	* If Revision, select appropriate letter(s):
<input type="checkbox"/> Preapplication <input checked="" type="checkbox"/> Application <input type="checkbox"/> Changed/Corrected Application	<input checked="" type="checkbox"/> New <input type="checkbox"/> Continuation <input type="checkbox"/> Revision	<input type="text"/> * Other (Specify): <input type="text"/>
* 3. Date Received:	4. Applicant Identifier:	
<input type="text"/>	B-16-MH-45-001	
5a. Federal Entity Identifier:	5b. Federal Award Identifier:	
<input type="text"/>	<input type="text"/>	
State Use Only:		
6. Date Received by State:	7. State Application Identifier:	
<input type="text"/>	<input type="text"/>	
8. APPLICANT INFORMATION:		
* a. Legal Name: City of Columbia		
* b. Employer/Taxpayer Identification Number (EIN/TIN):	* c. Organizational DUNS:	
57-6000229	0737073660000	
d. Address:		
* Street1:	1225 Lady Street	
Street2:	P.O. Box 147	
* City:	Columbia	
County/Parish:	Richland	
* State:	SC: South Carolina	
Province:	<input type="text"/>	
* Country:	USA: UNITED STATES	
* Zip / Postal Code:	29217	
e. Organizational Unit:		
Department Name:	Division Name:	
Community Development	Community Development	
f. Name and contact information of person to be contacted on matters involving this application:		
Prefix:	Ms.	* First Name: Gloria
Middle Name:	<input type="text"/>	
* Last Name:	Saeed	
Suffix:	<input type="text"/>	
Title:	Director	
Organizational Affiliation:		
<input type="text"/>		
* Telephone Number:	803-545-3766	Fax Number: 803-545-8912
* Email:	Gloria.Saeed@columbiasc.gov	

Application for Federal Assistance SF-424	
<p><b>* 9. Type of Applicant 1: Select Applicant Type:</b></p> <p>C: City or Township Government</p> <p>Type of Applicant 2: Select Applicant Type:</p> <p>Type of Applicant 3: Select Applicant Type:</p> <p>* Other (specify):</p>	
<p><b>* 10. Name of Federal Agency:</b></p> <p>Department of Housing and Urban Development</p>	
<p><b>11. Catalog of Federal Domestic Assistance Number:</b></p> <p>14.218</p> <p>CFDA Title:</p> <p>Community Development Block Grant - Mitigation (CDBG-MIT)</p>	
<p><b>* 12. Funding Opportunity Number:</b></p> <p>ER-6109-N-02</p> <p>* Title:</p> <p>Allocations, Common Application, Waivers and Alternative Requirements for Community Development Block Grant Mitigation Grantees</p>	
<p><b>13. Competition Identification Number:</b></p> <p>Title:</p>	
<p><b>14. Areas Affected by Project (Cities, Counties, States, etc.):</b></p> <p>Add Attachment Delete Attachment View Attachment</p>	
<p><b>* 15. Descriptive Title of Applicant's Project:</b></p> <p>City of Columbia, South Carolina Community Development Block Grant Mitigation Program (CDBG-MIT)</p>	
<p>Attach supporting documents as specified in agency instructions.</p> <p>Add Attachments Delete Attachments View Attachments</p>	

Application for Federal Assistance SF-424	
<b>16. Congressional Districts Of:</b>	
* a. Applicant	SC-002
* b. Program/Project	SC-002
Attach an additional list of Program/Project Congressional Districts if needed.	
<input type="text"/> <input type="button" value="Add Attachment"/> <input type="button" value="Delete Attachment"/> <input type="button" value="View Attachment"/>	
<b>17. Proposed Project:</b>	
* a. Start Date:	7/1/2020
* b. End Date:	6/30/2032
<b>18. Estimated Funding (\$):</b>	
* a. Federal	18,585,000
* b. Applicant	
* c. State	
* d. Local	
* e. Other	
* f. Program Income	
* g. TOTAL	
<b>* 19. Is Application Subject to Review By State Under Executive Order 12372 Process?</b>	
<input type="checkbox"/> a. This application was made available to the State under the Executive Order 12372 Process for review on <input type="text"/> .	
<input type="checkbox"/> b. Program is subject to E.O. 12372 but has not been selected by the State for review.	
<input checked="" type="checkbox"/> c. Program is not covered by E.O. 12372.	
<b>* 20. Is the Applicant Delinquent On Any Federal Debt? (If "Yes," provide explanation in attachment.)</b>	
<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
If "Yes", provide explanation and attach	
<input type="text"/> <input type="button" value="Add Attachment"/> <input type="button" value="Delete Attachment"/> <input type="button" value="View Attachment"/>	
21. *By signing this application, I certify (1) to the statements contained in the list of certifications** and (2) that the statements herein are true, complete and accurate to the best of my knowledge. I also provide the required assurances** and agree to comply with any resulting terms if I accept an award. I am aware that any false, fictitious, or fraudulent statements or claims may subject me to criminal, civil, or administrative penalties. (U.S. Code, Title 218, Section 1001)	
<input checked="" type="checkbox"/> ** I AGREE	
** The list of certifications and assurances, or an internet site where you may obtain this list, is contained in the announcement or agency specific instructions.	
<b>Authorized Representative:</b>	
Prefix:	Ms. <input type="text"/> * First Name: Teresa
Middle Name:	B. <input type="text"/>
* Last Name:	Wilson
Suffix:	<input type="text"/>
* Title:	City Manager
* Telephone Number:	803-545-3026    Fax Number: 803-545-3051
* Email:	Teresa.Wilson@columbiasc.gov
* Signature of Authorized Representative:	 * Date Signed: 3/23/2020