



**U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration**

**Natural Gas Distribution Infrastructure Safety and Modernization Grant Program
City of Richmond, VA Tier 2 Site Specific Environmental Assessment
NGDISM-FY22-EA-2023-13**

PHMSA Approval:

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Overview:

The purpose of this Tier 2 Site Specific Environmental Assessment (Tier 2) is to: (1) document the proposed action (the Project) and the need for the action; (2) identify existing conditions; (3) assess the social, economic, and environmental effects using appropriate tools and agency coordination to comply with local, state, and federal environmental laws, regulations, and ordinances; and (4) document applicable mitigation commitments that would avoid, minimize, or mitigate potential effects. This Tier 2 analysis informs the Pipeline and Hazardous Materials Safety Administration's (PHMSA) assessment as to whether the Project is consistent with the impacts described in the Tier 1 Nationwide Environmental Assessment for the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program.¹

As part of this Tier 2, PHMSA is soliciting public comments through a public comment period. This Tier 2 is available on PHMSA's website where comments can be submitted to the contact noted below. PHMSA will accept public comments for 30 days on this Tier 2. PHMSA will consider comments received and incorporate them in the decision-making process. Consultation with appropriate agencies on related processes, regulations, and permits is ongoing. Please submit all comments to: PHMSABILGrantNEPAComments@dot.gov and reference NGDISM-FY22-EA-2023-13 in your response.

At the conclusion of the EA process, PHMSA will either issue a "Finding of No Significant Impact," further supplement this Tier 2 with additional analysis, mitigation measures, or prepare an Environmental Impact Statement.

I. Project Description/Proposed Action

Project Title	City of Richmond Natural Gas Pipeline Replacement
Project Location	City of Richmond; Henrico, and Chesterfield Counties; State of Virginia

Project Description/Proposed Action:

The proposed action includes the replacement of approximately 13.2 miles (69,782 linear feet (LF)) of 2-inch to 12-inch cast iron, ductile iron, steel, and vintage polyethylene (PE) pipes with new polyethylene (PE) gas main to address aging infrastructure, legacy pipe material, and leaks prioritized in the City of Richmond's Distribution Integrity Management Plan (DIMP). The project would enhance safety, improve operations, and reduce methane emissions of natural gas. The project work has been divided into nine areas, referred to in this document as 'work packages' and are located throughout the City of Richmond. The methods of construction would include open cut excavation (trenching) as well as directional drill placement of new pipe, valves, meters, and all appurtenances to make a complete and operable gas system. The Tier 1 EA described that the majority of site-specific projects would utilize the insertion method of pipe replacement. As described in this document, the City of Richmond would utilize open trench construction methods, which generally involves greater soil disturbance and use of heavy equipment, when compared to using the insertion method. Directional drilling construction methods would likely result in similar impacts to insertion construction methods. The new pipes would be placed adjacent to the existing pipes and the existing pipe would be abandoned in place. All disturbed pavement, sod, and landscaping would be restored to original contours and conditions.

¹ <https://www.federalregister.gov/documents/2022/11/09/2022-24378/pipeline-safety-notice-of-availability-of-the-tier-1-nationwide-environmental-assessment-for-the>

The nine different work packages are as follows (see Appendix A, Project Maps):

Work Package: 107991, Henrico County

- Lakeside Avenue (Parkside Avenue to Hilliard Road)- total 2,902 LF

Work Package: 107990, Henrico County

- Lakeside Avenue (Dumbarton Road to Parkside Avenue)- total 3,317 LF

Work Package: 108024, Chesterfield County

- Dalebrook Drive (Applewood Road to Frankmont Road)- total 12,646 LF

Work Package: 108023, Henrico County

- Mechanicsville Turnpike at Byron Street- total 4,366 LF

Work Package: 108020, Henrico County

- Mechanicsville Turnpike and Euclid Road- total 3,104 LF

Work Package: 108061, City of Richmond

- Mosby Street, Fairmont Street, 25th Street, and Venable Street- total 10,998 LF

Work Package: 108062, City of Richmond and Henrico County

- Northampton Street, Williamsburg Road, Parker Street, and Haig Street– total 18,499 LF

Work Package: 107989, City of Richmond and Henrico County

- Phaup Street, 19th Street, and Brauers Lane – total 4,615 LF

Work Package: 108063, City of Richmond

- Union Street, Williamsburg Road, Government Road, – total 9,335 LF

It is noted that in February 2024, The City of Richmond experienced significant and frequent water infiltration into the low-pressure cast iron pipeline system, which includes the gas services to several homes and businesses within the areas of work package 108063. As such, PHMSA was notified of the emergency conditions and completed an expedited review of replacing the failing pipeline in this area with 3,500-4,000 liner feet of 2-inch and 4-inch PE pipeline. This work is located along Waverly Avenue, Malone Street, Thompkins Street, Mt, Erin Drive, Nelwood Drive and Carlisle Avenue. See Appendix B, Emergency Work, for more information. All work identified in work package 108063, including emergency work, is included and assessed in this Tier 2.

No Action:

The No Action alternative, as required under NEPA, serves as a baseline, and is used to compare impacts resulting from the Proposed Action. Under the No Action alternative, PHMSA would not fund this pipeline replacement project. Additionally, PHMSA would not be able to reduce the inventory of methane leaks and reduce safety risks by replacing pipe prone to leakage. Under this alternative, the City of Richmond would continue to use cast iron, ductile iron, steel, vintage PE, and other leak prone pipeline material, and would conduct repairs or replacements in the future using non-federal sources of funding, and potentially on an emergency basis, when a pipeline fails. Impacts and benefits associated with replacing the leak prone pipeline

within the City of Richmond and surrounding areas, with updated material would not be seen in the near term. The safety risks and methane leaks would persist. The replacement pipeline activities would either not be taken or they would be undertaken at a later, uncertain date. Even if pipe replacement were to happen at some point in the future, environmental mitigation measures during such a replacement would be unknown. Furthermore, existing economic losses, and increased risk associated with prolonged gas leaks would continue.

Need for the Project:

The City of Richmond has an annual pipeline repair and replacement program valued currently at \$18,500,000 per year for addressing locations rated as priorities in the DIMP. They are in the 21st year of a 40-year program to replace all cast iron gas mains with high-density polyethylene (HDPE) pipe or coated steel welded pipe. According to the FY2023-FY2027 Adopted Capital Improvement Program (p.73), the City of Richmond anticipates replacing 120,000 feet of main and 2,000 services in FY23.² Due to the success of the program, the number of leaks that occur in the system has decreased. Approximately 1,000-1,300 gas leaks (Classes 1, 2, and 3) are repaired annually; however, an annual backlog of approximately 439 Class 2 leaks has been scheduled for repair. The proposed project would allow the City of Richmond to accelerate their annual program. The overall needs addressed by this project will include: (1) improving upon the safe delivery of energy by reducing the likelihood of incidents, as well as reducing methane leaks; (2) avoiding economic losses caused by pipeline failures; and (3) protecting the environment and reducing climate impacts by remediating aged and failing pipelines and pipes prone to leakage.

Description of the Environmental Setting of the Project Area:

Founded in 1737, the City of Richmond, Virginia, is built on rich history. Located on the James River approximately 100 miles south of Washington DC, the 62.5 square mile City is home to over 230,000 residents. The City of Richmond operates and maintains the gas utility, established in 1851. It is one of only three in the state of Virginia, and the eighth largest in the country. Richmond Gas Works provides natural gas to approximately 118,000 customers in the City and the counties of Chesterfield, Hanover, and Henrico via approximately 1,956 miles of pipeline and 105,049 services.

² <https://rva.gov/sites/default/files/2022-07/FY2023%20-%20FY2027%20Adopted%20Capital%20Improvement%20Plan%20-%20FINAL.pdf>

II. Resource Review

Air Quality and Greenhouse Gases (GHG)	
Question	Information and Justification
Is the project located in an area designated by the EPA as non-attainment or maintenance status for one or more of the National Ambient Air Quality Standards (NAAQS)?	Yes, based on a review of the EPA Greenbook. ³
Will the construction activities produce emissions that exceed de minimis thresholds (tons per year) described in Table 2 of the initial Tier 2 worksheet?	No.
Will mitigation measures be used to capture blowdown ⁴ ?	No.
Does the system have the capability to reduce pressure on the segments to be replaced? If yes, what is the lowest psi your system can reach prior to venting?	No.
Will the City of Richmond commit to reducing pressure on your line to this psi prior to venting? Please calculate venting emissions based on this commitment and also provide comparison figure of venting emissions volume without pressure reduction/drawdown based on the calculation provided in the initial Tier 2 worksheet.	No. The existing system operates at a range of 0.25 pounds per square inch (PSI) to 23 PSI. Based on the various sizes of the existing pipes being replaced, it is estimated that 20.8 thousand cubic feet (MCF) of methane would be vented during construction. ⁵
Using Table 1 in the initial Tier 2 worksheet, estimate the current leak rate per mile based on the type of pipeline material. Based on mileage of replacement and new pipeline material, estimate the total reduction of methane.	The existing leak rate is estimated to be 31,073 kg/year. Replacement would result in a leak rate of approximately 381 kg/year or a reduction of approximately 613,202 kg over a 20-year timeframe. ⁶
Conclusion: The project area is located within the City of Richmond and surrounding areas in Henrico, and Chesterfield Counties in the State of Virginia. Based on EPA's Green Book, the project area is in a maintenance area for ozone. Ozone is one of the six common air pollutants identified in the Clean Air Act. ⁷ The Environmental Protection Agency (EPA) calls these "criteria air pollutants" because their levels in outdoor air need to be limited based on health criteria.	

³ <https://www.epa.gov/green-book/green-book-national-area-and-county-level-multi-pollutant-information>

⁴ Blowdown refers to the venting of natural gas in current facilities, in order to begin rehabilitation, repair, or replacement activities.

⁵ Leak rates are based on Pre-1990 Installation emission factors found in *Table 1 Average methane emission factors for natural gas pipelines (adopted from EPA GHG Inventory, Annex 3.6, Table 3.62)* in the November 9, 2022, PHMSA: Natural Gas Distribution Infrastructure Safety and Modernization Grant Program Programmatic Environmental Assessment, Tier 1 Nationwide Environmental Analysis.

⁶ Leak rates are based on Pre-1990 Installation emission factors found in *Table 1 Average methane emission factors for natural gas pipelines (adopted from EPA GHG Inventory, Annex 3.6, Table 3.62)* in the November 9, 2022, PHMSA: Natural Gas Distribution Infrastructure Safety and Modernization Grant Program Programmatic Environmental Assessment, Tier 1 Nationwide Environmental Analysis.

⁷ <https://www.epa.gov/ground-level-ozone-pollution/ground-level-ozone-basics>

No Action:

Under the No Action alternative, existing and planned pipeline activities, including construction and maintenance activities, would continue unchanged. The project proponent would continue to use the existing cast iron, ductile iron, steel, and vintage PE pipes. The total methane emissions for the pipelines within the project area were extrapolated over 20 years to represent the continuation of methane release under the No Action alternative. Under the No Action alternative, PHMSA estimates that 31,073 kg of methane would be released each year from the existing pipelines within the project area. This amounts to 621,456 kg of methane over a 20-year time frame. See Appendix C, Air Quality, for estimated methane leak rate calculations.

Proposed Action:

The Proposed Action alternative consists of replacing approximately 13.2 miles of cast iron, ductile iron, steel, and vintage PE pipes, which would result in minor air quality impacts associated with exhaust emissions from equipment and other construction activities, including the intentional venting of methane contained in the existing pipelines prior to replacement. PHMSA reviewed information provided by the City of Richmond and estimated the emissions that would likely be produced by the construction equipment that would be used to install pipelines and used information from EPA's MOVES model⁸ to determine if the project would exceed the EPS thresholds for NAAQS.⁹ PHMSA's assessment is that, due to the relatively minor scope of the proposed action, impacts to local air quality resulting from construction activities such as dust and exhaust from construction equipment, would be temporary and considered *de minimis*. Thus, the Proposed Action alternative does not require a General Conformity Analysis under Section 176(c)(4) of the Clean Air Act. See Appendix C, Air Quality, for the emissions calculations.

Pipeline blowdowns include venting residual natural gas within the existing pipes to be abandoned and are typically necessary to ensure that construction and maintenance work can be conducted safely on depressurized natural gas facilities and pipelines. Venting methane is required when service is switched from the existing line to the newly constructed line, but the volume of vented gas can depend on the ability to reduce pressure on the pipe segment or other mitigation actions. Therefore, some methane would be vented into the atmosphere during construction. Based on an operating pressure between 0.25 PSI to 23 PSI and the existing pipe sizes (ranging from two inches to twelve inches in diameter), PHMSA estimates 20.8 MCF of methane (or 640 kg) would be vented into the atmosphere during construction (see Appendix C, Air Quality, for the methane blowdown calculations).

As described in the Tier 1 EA, methane leaks from natural gas distribution pipelines increase with age and are considerably higher for cast iron and steel pipelines, as compared with plastic. Replacing leak prone pipe with newer, more durable materials would reduce leaks and methane emissions. Based on the current leak rate of the existing pipe within the project area, this project is estimated to reduce overall emissions by 30,052 kg in the first year (when considering the methane that would be released from blowdown that would occur during construction) and estimated to reduce 30,692 kg of methane per year thereafter. This amounts to a total reduction in methane emissions of approximately 613,202 kg over a 20-year timeframe. Therefore, it is PHMSA's assessment that the proposed project would provide a net benefit to air quality from the overall reduction of greenhouse gas emissions and that no indirect or cumulative impacts would result from the Proposed Action.

⁸ <https://www.epa.gov/moves>

⁹ <https://www.epa.gov/general-conformity/de-minimis-tables>

Mitigation Measures:

The City of Richmond shall implement the following mitigation measures:

- Efficient use of on-road and non-road vehicles, by minimizing speeds and vehicles;
- Minimizing excavation to the greatest extent practical;
- Use of cleaner, newer, non-road equipment as practicable;
- Minimizing all vehicle idling and at minimum, conforming with local idling regulations;
- Ensuring that all vehicles and equipment are in proper operating condition;
- On-road and non-road engines must meet EPA exhaust emission standards (40 CFR Parts 85, 86, and 89);
- Covering open-bodied trucks while transporting materials;
- Watering, or use of other approved dust suppressants, at construction sites and on unpaved roadways, as necessary;
- Minimizing the area of soil disturbance to those necessary for construction;
- Minimizing construction site traffic by the use of offsite parking and shuttle buses, as necessary.

Water Resources	
Question	Information and Justification
Are there water resources within the project area, such as wetlands, streams, rivers, or floodplains? If so, would the project temporarily or permanently impact wetlands or waterways?	Yes, according to US Fish and Wildlife Service (USFWS) National Wetland Inventory (NWI) ¹⁰ , and Federal Emergency Management Agency (FEMA) National Flood Hazard Layer maps ¹¹ .
Under the Clean Water Act, is a Section 401 State certification potentially required? If yes, describe anticipated permit and how project proponent will ensure permit compliance.	No.
Under the Clean Water Act, is a U.S. Army Corps of Engineers (USACE) Section 404 Permit required for the discharge of dredge and fill material? If yes, describe anticipated permit and how project proponent will ensure permit compliance.	No.
Under the Clean Water Act, is an EPA or State Section 402 permit required for the discharge of pollutants into the waters of the United States? Is a Stormwater Pollution Prevention Plan (SWPPP) required?	Yes, construction activities are anticipated to exceed soil disturbance thresholds and a 402 permit may be required prior to construction.
Will work activities take place within a FEMA designated floodplain? If so, describe any permanent or temporary impacts and the required coordination efforts with state or local floodplain regulatory agencies.	No.

¹⁰ <https://www.arcgis.com/home/webmap/viewer.html?webmap=da9a3343ad4a4dbfaac295501c76406d>

¹¹ <https://hazards-fema.maps.arcgis.com/apps/webappviewer/index.html?id=8b0adb51996444d4879338b5529aa9cd&extent=-78.54627852576945,38.012370839590155,-78.47704177039654,38.04054212981852>

Will the proposed project activities potentially occur within a coastal zone ¹² or affect any coastal use or natural resource of the coastal zone, requiring a Consistency Determination and Certification?	Yes, the project is located within a coastal zone.
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Conclusion:

PHMSA reviewed USFWS maps to assist in identifying aquatic features including wetlands, streams, and other water resources in or near the project area. Based on a review of the NWI maps, and information provided by the City of Richmond, there are two named tributaries within the project area, Trumpet Branch and Shockoe Creek. Trumpet Branch is in work segment 107990, perpendicular to Lakeside Avenue, and flows east into Upham Brook. USFWS's maps classified the tributary as a R5UBH, (riverine, unknown perennial, unconsolidated bottom, permanently flooded). Shockoe Creek is in work segment 108020, located perpendicular to Mechanicsville Turnpike, between Harvie Road and Yeadon Road. Shockoe Creek was classified as R4SBC (riverine, intermittent, streambed, seasonally flooded). There was one additional unnamed tributary located within the project area in work segment 108062. This unnamed tributary is in a wooded area between Campbell Avenue and Parker Street and was also classified as R4SBC.

PHMSA also reviewed FEMA's maps to identify any special flood hazard areas potentially impacted by the project. There were no special flood hazard areas identified within the project areas and all areas were designated as Zone X. Areas designated as Zone X are outside of any designated special flood hazard areas.

Additionally, the project is located within the boundary of a coastal zone management area, subject Virginia's Coastal Zone Management Program¹³.

See Appendix D, Water Resources.

No Action:

Under the No Action alternative, the existing pipeline would remain in the current location and normal maintenance activities would continue. Depending on the location of the activities, the work could be in close proximity to one of the tributaries identified above, where the City of Richmond would need to take precautions to avoid adverse impacts to these sensitive areas.

Proposed Action:

The proposed Action Alternative includes replacing existing pipeline in various developed locations throughout the City of Richmond and surrounding areas, where there are very limited surface water resources present. Because existing gas lines will be abandoned in place, there will be minimal disturbance to the surface associated with installing the new lines. For activities in work segment 107990, the gas main replacement on Lakeside Ave would be installed by open-cut construction methods in the road and the right-of-way and work would not disturb Trumpet Branch. In work segment 108020, along Mechanicsville Turnpike, north of the intersection with Harvie Road, the gas main replacement on Mechanicsville Turnpike would be directionally bored 5 feet underneath the Shockoe Creek bed. There would be relief holes on either side of the creek 100 feet apart and two tie-ins. One tie-in would be located at Euclid Road, approximately 666 feet from the center of Shockoe Creek, and the other would be located at Dill Road approximately 761 feet from the center of Shockoe Creek.

¹² The term "coastal zone" means the coastal waters (including the lands therein and thereunder) and the adjacent shorelands (including the waters therein and thereunder), strongly influenced by each other and in proximity to the shorelines of the several coastal states, and includes islands, transitional and intertidal areas, salt marshes, wetlands, and beaches.)

¹³ [https://www.deq.virginia.gov/our-programs/coastal-zone-management/about-czm/czm-boundaries#1/](https://www.deq.virginia.gov/our-programs/coastal-zone-management/about-czm/czm-boundaries#/)

There would be no direct impacts to Trumpet Branch or Shockoe Creek. The construction activities conducted in work segment 108062 will avoid any impacts to the unnamed tributary located between Campbell Avenue and Salem Street. Additionally, the City of Richmond would adhere to the Richmond Virginia Code of Ordinances, Chapter 14, Floodplain Management, Erosion and Sediment Control and Drainage, utilizing best management practices (BMPs) to prevent impacts to adjacent water resources.

The project does fall within Virginia's Coastal Zone Management Area. However, coordination with Virginia Department of Environmental Quality's Office confirmed that because the project would avoid impacts to wetlands and other water resources, a federal consistence review is not required.

Based on information provided by the City of Richmond and a review of available information, PHMSA's assessment is that due to the avoidance of direct impacts to water resources and the use of best management practices, there would be no permanent impact to water resources located within the project area. Furthermore, the pipeline placement and abandonment of the existing pipeline is not anticipated to cause any reasonably foreseeable indirect effects or cumulative effects to water resources. Therefore, it is PHMSA's assessment that there would be no adverse impacts to water resources.

Mitigation Measures:

The City of Richmond shall adhere to the Richmond Virginia Code of Ordinances, Chapter 14, Floodplain Management, Erosion and Sediment Control and Drainage, and utilize best management practices to control sediment and erosion during construction to prevent any migration of soils into adjacent waterways.

The City of Richmond shall coordinate with the Virginia Department of Environmental Quality to obtain a Clean Water Act, Section 402 stormwater permit, as applicable, prior to construction.

The City of Richmond shall avoid any direct impacts to tributaries and maintain appropriate distances from the edge of any water resources.

Groundwater and Hazardous Materials/Waste	
Question	Information and Justification
Does the project have potential to encounter and impact groundwater? If yes, describe potential impacts from construction activities.	No.
Will the project require boring or directional drilling that may require pits containing mud and inadvertent return fluids? If yes, describe measures that will be taken during construction activities to prevent impacts to groundwater resources.	Yes, all return fluids from boring will be contained in pits and disposed of properly.
Will the project potentially involve a site(s) contaminated by hazardous waste? Is there any indication that the pipeline was ever used to convey coal gas? If yes, PHMSA will work with the project proponent for required studies.	Yes, brownfields sites were identified in the project area.

Does the project have the potential to encounter or disturb lead pipes or asbestos?	No.
Conclusion PHMSA reviewed EPA’s NEPAAssist website to identify any brownfields properties or superfund sites in the project area.¹⁴ In work segment 108061, one brownfields property of concern was identified near the intersection of Venable Street and North 21st Street.¹⁵ This site was formerly a gasoline retail site until around 1963 and later operated as a coal and oil company in the 1973-1978 timeframe. A Phase II Environmental Assessment was conducted for this site in 2015 where petroleum products were identified affecting groundwater and soil. Another brownfields site was identified in work segment 108061 for 1317 N. 24th Street.¹⁶ A Phase I Environmental Assessment was conducted in 2015 for this site, which consisted of residential use prior to 2016, and did not reveal any hazardous materials. No other brownfields sites were identified in other work segments and no superfund sites were identified in any work segment. (See Appendix E, Hazardous Materials). PHMSA obtained a custom soil report for the various project segments from Natural Resources Conservation Service’s (NRCS) Web Soil Survey¹⁷ which indicates that the project area is comprised of various soils, with the majority classified as urban lands or an urban complex. Most of the soils identified in the project area are well-drained soils where the depth to the water table is found somewhere greater than 48 inches. However, there were areas in work segment 108024 where soils were classified as poorly drained or somewhat poorly drained and the water table could be found just below the surface. It is noted that the work segments are all located in built-out urban residential areas where ground disturbance activities have already occurred. It is very likely that outside fill material was brought in during development activities and drainage features have likely altered the normal drainage patterns and water table in the project area. No Action: Under the No Action alternative, the cast iron, ductile iron, steel, and vintage PE pipes would remain in their current location and ongoing and routine maintenance activities would occur. Pipes would be replaced under failed circumstances. While there are no adverse impacts to groundwater anticipated by the No Action alternative, increased methane emissions are likely to occur if the leak prone pipes remain (EPA, PRO Fact Sheet No. 402¹⁸) and the risk of failure is higher among these types of pipes. Therefore, under the no action alternative, PHMSA anticipates an increased risk for the release of methane, both as leaks and during a pipeline failure, which could then result in ground disturbances from construction activities, potentially impacting groundwater. Proposed Action: Under the Proposed Action Alternative, the City of Richmond would replace approximately 13.2 miles of existing pipelines within the existing ROW within the various work segments located in the City of Richmond, and surrounding areas. The existing gas lines will be abandoned, in accordance with PHMSA requirements, and will	

¹⁴ <https://nepassisttool.epa.gov/nepassist/nepamap.aspx>

¹⁵ https://ordspub.epa.gov/ords/cimc/f?p=CIMC:31:::Y,31,0:P31_ID:197821

¹⁶ https://ordspub.epa.gov/ords/cimc/f?p=CIMC:31:::Y,31,0:P31_ID:230321

¹⁷ <https://websoilsurvey.sc.egov.usda.gov/App/WebSoilSurvey.aspx>

¹⁸ [Insert Gas Main Flexible Liners at https://www.epa.gov/sites/default/files/2016-06/documents/insertgasmainflexibleliners.pdf#:~:text=Methane%20emissions%20reductions%20come%20from%20lower%20leakage%20rates,pipe%20and%20external%20corrosion%20in%20unprotected%20steel%20piping.](https://www.epa.gov/sites/default/files/2016-06/documents/insertgasmainflexibleliners.pdf#:~:text=Methane%20emissions%20reductions%20come%20from%20lower%20leakage%20rates,pipe%20and%20external%20corrosion%20in%20unprotected%20steel%20piping.)

be purged of natural gas and sealed on each end. The new gas lines will be installed by either directional drilling or cut and cover (trenching) construction methods, with the majority being installed by directional boring due to the abundance of utilities located within the ROW. All disturbed areas will be re-seeded or paved (as appropriate) and restored to preexisting conditions.

As indicated above, there is one brownfields site located in work segment 108061, near the intersection of Venable Street and North 21st Street where contaminants could potentially be encountered. According to EPA records, petroleum products were found at this location during the Phase II Environmental Assessment and therefore, it is possible that petroleum related products may be encountered during the replacement of the natural gas pipelines in this area. If, during construction activities, environmental liabilities are encountered (i.e. stained soils, sheen on groundwater, petroleum odors in soil and groundwater, etc.), the City of Richmond will follow proper testing and disposal protocols, in accordance with Virginia's Hazardous Waste Management Regulations. The City of Richmond would require all contractors to abide by BMPs to minimize runoff around pit areas and other areas of disturbance. PHMSA will include a mitigative measure to emphasize this commitment.

While the proposed action involves work in mostly well drained soils, there is the possibility that groundwater may be intercepted in areas where poorly drained soils exist. Should groundwater be intercepted by construction activities, dewatering may be required during construction. In these cases, groundwater would be kept to just below the work area so that the proposed work to be completed would not be compromised.

Therefore, while PHMSA has identified known and potentially hazardous materials/waste sites, all project activities will be conducted in existing ROW and mitigation measures have been included to prevent adverse environmental impacts resulting from the inadvertent discovery of potentially hazardous materials during construction. With the inclusion of mitigative measures to assist in the prevention of potential impacts, PHMSA's assessment is that there would be no adverse impacts to groundwater associated with the project and there will be no indirect or cumulative effects to groundwater or hazardous materials.

Mitigation Measures:

The City of Richmond shall develop a Soil Management Plan to address the procedures should contaminated soils be encountered. This plan could include soil screening requirements, the oversight or monitoring of soil moving activities, contingency plans for the handling, removing, temporarily storing, characterizing, disposing of contaminated materials, and measures for containing, treating, and disposing of stormwater that may contact exposed soils.

If groundwater is encountered near the brownfield site near the intersection of Venable Street and North 21st Street, the City of Richmond will follow proper testing and disposal protocols in accordance with Virginia's Hazardous Waste Management Regulations.

In the event of a release of hazardous materials/waste into the environment during construction, the City of Richmond shall notify the appropriate emergency response agencies, potentially impacted residents, and appropriate regulatory agencies.

Soils	
Question	Information and Justification

Will all bare soils be stabilized using methods using methods identified in the initial Tier 2 EA worksheet? Will additional measures be required?	Yes, appropriate measures will be taken to stabilize soils.
Will the project require unique impacts related to soils?	No.
Conclusion: PHMSA obtained a custom soil report for the various segments in the project area from the USDA, NRCS's web soil survey. The following soils were identified as occurring throughout the various work segments. • Atlee-Urban land complex: moderately well drained, depth to water table between 18-30 inches • Chewacla and Riverview soils: somewhat poorly drained/ well drained, depth to water table 18-79 inches • Duplin very fine sandy loam: moderately well drained, depth to water table between 18-30 inches • Bourne fine sandy loam: moderately well drained, depth to water table between 12-30 inches • Varina fine sandy loam: well drained, depth to water table between 48-60 inches • Norfolk fine sandy loam: well drained, depth to water table between 48-72 inches • Turbeville fine sandy loam: well drained, depth to water table between more than 80 inches • Faceville-Gritney gravelly fine sandy loam: well drained, depth to water table between more than 80 inches • Dunbar fine sandy loam: somewhat poorly drained, depth to water table between 12-30 inches • Myatt loam: poorly drained, depth to water table between 0-12 inches • Edgehill very gravelly fine sandy loam: well drained, depth to water table between more than 80 inches • Wateree-Wedowee complex: well drained, depth to water table between more than 80 inches • Applying Wedowee complex: well drained, depth to water table between more than 80 inches • Urban Land It is noted that the project area is an urbanized area where ground disturbance activities have already occurred and there are very few areas, if any, that remain in a natural state. Therefore, while the soils report provides valuable information, the soils in the project area have been disturbed and likely contain some degree of fill material brought in as a suitable base for construction. See Appendix F, Soils Report for more information. No Action: Under the No Action alternative, the existing cast iron, ductile iron, steel, and vintage PE pipelines would remain in their current location and soils would remain in their current state and condition. Normal maintenance activities would occur, and pipes would be replaced under failed circumstances. Some soil disturbance would occur during emergency repairs and the affected areas would be restored upon completion. Under either scenario, no adverse impacts to soils would be anticipated under the No Action alternative. Proposed Action: This project would replace approximately 13.2 miles of cast iron, ductile iron, steel, and vintage PE pipes and associated appurtenances. All work would be contained within the existing ROW and the majority of pipelines would be installed by directional boring construction methods; however, some trenching will be used to install some pipelines. Trenches would be approximately 36 inches deep and all disturbed areas would be re-seeded or paved (as appropriate) and restored to pre-construction conditions. When directional drilling methods are utilized, there would be minimal soil disturbance, mainly at the entrance and exit pits. Best management practices would be employed during construction and all disturbed areas would also be restored to pre-construction contours and conditions. Therefore, PHMSA's assessment is that there would be no adverse impact	

to soils resulting from the Proposed Action alternative and that there would be indirect or cumulative impacts anticipated as the City of Richmond would restore all areas to pre-construction conditions.

Mitigation Measures:

The City of Richmond shall utilize BMPs, as appropriate, to control sediment and erosion during construction which may include silt fencing, check dams, and promptly covering all bare areas. All impacted areas shall be restored to pre-construction conditions.

Biological Resources	
Question	Information and Justification
Based on review of IPaC and NOAA Fisheries database, are there any federally threatened or endangered species and/or critical habitat within the project area? ¹⁹ If no, no further analysis is required.	Yes, based on review of the USFWS's Information for Planning and Consultation (IPaC) and NOAA Fisheries website. Additionally, Virginia state resources were inventoried to identify potential state listed species. ²⁰
Will the project impact any areas in or adjacent to habitat for Federally, listed threatened or endangered species or their critical habitat? If no, provide justification and avoidance measures. If yes, PHMSA will work with the project proponent to conduct necessary consultation with resource agencies.	No.
Conclusion: PHMSA requested a species list through the USFWS's IPaC website. See Appendix G, Biological Resources for a list of protected species. The following were identified as potentially occurring within the geographic area: - Northern long-eared bat (mammal) <i>Myotis septentrionalis</i>- Endangered - Tricolored bat (mammal) <i>Perimyotis subflavus</i>- Proposed Endangered - Monarch butterfly (insect) <i>Danaus plexippus</i> -Candidate Northern long-eared bat is a wide-ranging, federally threatened bat species, found in 37 states and eight provinces in North America.²¹ The species typically overwinters in caves or mines and spends the remainder of the year in forested habitats. As its name suggests, the northern long-eared bat is distinguished by its long ears, particularly as compared to other bats in the genus <i>Myotis</i>. The Tricolored bat is a small insectivorous bat that typically overwinters in caves, abandoned mines and tunnels, and road-associated culverts (southern portion of the range) and spends the rest of the year in forested habitats, typically roosting among live and dead leaf clusters. The tricolored bat is one of the smallest bats native to North America and is found across the eastern and central United States and portions of southern Canada, Mexico and	

²⁰ <https://vanhde.org/species-search>

²¹ <https://ecos.fws.gov/ecp/species/9045>

Central America. The tricolored bat is distinguished by its unique tricolored fur that appears dark at the base, lighter in the middle and dark at the tip.²²

The monarch butterfly is known for its large size, its orange and black wings, and its long annual migrations. They have two sets of wings and a wingspan of three to four inches (7 to 10 centimeters). Their wings are a deep orange with black borders and veins, and white spots along the edges. The underside of the wings is pale orange. Monarch butterflies are found wherever suitable feeding, breeding, and overwintering habitat exists. As caterpillars, monarchs feed exclusively on the leaves of milkweed. As adults, monarchs feed on nectar from a wide range of blooming native plants but can only lay eggs on milkweed plants.²³

Virginia's Department of Conservation and Recreation's website was reviewed to assist in identifying potential species protected by the State of Virginia. A list of state protected species is included in Appendix G, Biological Resources.

No Action:

Under the No Action alternative, existing conditions would remain, and normal maintenance activities would occur. The project area is in a built-out, urban environment and therefore has very limited biological resources present. Additionally, the project area does not contain suitable habitat for listed species and therefore no impacts to biological resources are anticipated to occur under the No Action alternative.

Proposed Action:

The project area is in a built-out, urban environment where the areas of disturbance are within existing transportation corridors. Because these areas are within current ROW that has been previously impacted (pipeline laid in the ground near the location where new pipes would be laid and subsequently paved), the immediate project area has very limited biological resources present and does not contain suitable habitat for either federally listed species. As a result, PHMSA's assessment is that the project is unlikely to have any detrimental effects to federally-listed species or critical habitat and that the project would have no effect to the Northern long-eared bat. Species that are federal proposed threatened, federal candidate species, and state listed species are not subject to Section 7 of the Endangered Species Act. PHMSA's assessment also concluded that the project is unlikely to have any detrimental effects to state listed species or other biological resources and that there are no indirect or cumulative impacts anticipated as a result of the proposed action.

Mitigation Measures:

The City of Richmond is responsible for abiding by all applicable state and local regulations, including those protecting Virginia's Natural Heritage Resources.

Cultural Resources	
Question	Information and Justification
Does the project include any ground disturbing activities, modifications to buildings or structures, or construction or installation of any new aboveground components?	Yes. The project would include ground disturbing activities consisting of installing HDPE pipeline within existing ROW. There will be no modifications to buildings or structures and no construction or

²² [Tricolored Bat \(*Perimyotis subflavus*\) | U.S. Fish & Wildlife Service \(fws.gov\)](#)

²³ <https://www.fws.gov/species/monarch-danaus-plexippus>

	installation of any new aboveground components.
Is the project located within a previously identified local, state, or National Register historic district or adjacent to any locally or nationally recognized historic properties? This information can be gathered from the local government and/or State Historic Preservation Office. ²⁴	Yes. The Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory are NRHP listed historic properties located within the project area.
Does the project or any part of the project take place on tribal lands or land where a tribal cultural interest may exist? ²⁵	Yes, there are federally recognized tribes in the Commonwealth of Virginia. ²⁶
Are there any nearby properties or resources that either appear to be or are documented to have been constructed more than 45 years ago? ²⁷ Does there appear to be a group of properties of similar age, design, or method of construction? Any designed landscapes such as a park or cemetery? Please provide photographs to show the context of the project area and adjacent properties.	Yes, see Appendix H, Cultural Resources.
Has the entire area and depth of construction for the project been previously disturbed by the original installation or other activities? If so, provide any documentation of prior ground disturbances.	Yes.
Will project implementation require removal or disturbance of any stone or brick sidewalk, roadway, or landscape materials or other old or unique features? Please provide photos of the project area that include the roadway and sidewalk materials in the project and staging areas.	Yes.
Conclusion: PHMSA must consider the impact of projects for which they provide funding on historic and archeological properties in accordance with Section 106 of the National Historic Preservation Act (Section 106). Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the Undertaking may directly or indirectly affect historic resources. Based on the proposed scope of work, PHMSA has delineated the APE for this project to encompass the existing ROW, which includes the limits of disturbance. The APE extends to the depth of proposed ground disturbance of up to 42 inches below grade. The Undertaking does not have the potential to cause visual or audible effects after the completion of construction. The existing ROW includes the roadway, parking lanes, sidewalk, light poles, overhead power lines, overhead streetlights, fire hydrants, bike lanes, bus stops, benches, signs, trees, and bushes.	

²⁴ Many SHPOs have an [online system](https://www.nps.gov/subjects/nationalregister/state-historic-preservation-offices.htm) at <https://www.nps.gov/subjects/nationalregister/state-historic-preservation-offices.htm> that can tell you previously identified historic properties in your project area. The [National Register list](https://www.nps.gov/subjects/nationalregister/database-research.htm) at <https://www.nps.gov/subjects/nationalregister/database-research.htm> can also be accessed online.

²⁵ The SHPO may have information on areas of tribal interest, or a good source is the [HUD TDAT website](https://egis.hud.gov/TDAT/) at <https://egis.hud.gov/TDAT/>.

²⁶ <https://www.bia.gov/service/tribal-leaders-directory/federally-recognized-tribes>

²⁷ Local tax and property records or historic maps may indicate dates of construction.

No Action:

Under the No Action alternative, existing conditions would remain, and normal maintenance activities would occur. These activities could result in ground disturbance that might affect historic resources. However, no federal funding would be applied and therefore Section 106 would not be required.

Proposed Action:

PHMSA identified properties based on available information on previously identified historic properties in the APE, including the National Register of Historic Places (NRHP) database and data received from the Virginia Division of Historical Resources. PHMSA also conducted research to determine if there are any previously unidentified properties within the APE that are 45 years of age or older and may be eligible for the NRHP. The Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory are NRHP-listed historic properties located within the APE. A review of the APE found no additional above-ground resources that have the potential to be affected by the Undertaking.

Background research revealed two archeological surveys and no archeological sites within the APE. No known historic cemeteries are located within the APE, and no archeologically significant NRHP districts intersect the APE. Historic development of Richmond indicates a high probability for archeological deposits to exist within the APE. However, since the APE segments are in urban or suburban parts of Richmond that have experienced moderate to heavy development, construction of roads, sidewalks, and underground utility corridors have likely disturbed any archeological deposits located within the APE. The Undertaking will occur entirely within the existing ROW near or within previous road construction and utility installation corridors that lack soil integrity. Due to the limited scope of work and likelihood of disturbed context within the APE, an archeological survey is not recommended at this time.

PHMSA's assessment is that there are three historic properties as defined in 36 CFR 800.16(l) within the APE: the NRHP-listed Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory. The Undertaking will not alter any of the characteristics or contributing features of these historic properties that qualify them for inclusion in the NRHP in a manner that would diminish their integrity. The replacement of pipelines within the existing ROW and utility easements would take place under paved surfaces and would not result in lasting physical, visual, or audible effects to historic properties. No character-defining materials or features of any of these historic properties would be removed or altered as a result of the Undertaking. The Undertaking also does not include land acquisition, nor would it limit access to or change the use of any of the historic properties. Project work is limited to areas that demonstrate a low probability for intact significant archaeological resources. Therefore, PHMSA's assessment concludes that the Undertaking does not have the potential to adversely affect any of the identified historic properties. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) would be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts. Based on this assessment, in accordance with 36 CFR Part 800.5, PHMSA's conclusion is that the Undertaking would have No Adverse Effect on historic properties.

A letter was sent on March 14, 2024, to the Virginia Department of Historic Resources State Historic Preservation Officer (SHPO) and potential consulting parties outlining the Section 106 process, including a description of the undertaking, delineation and justification of the APE, identification of historic properties and an evaluation and proposed finding of effects. PHMSA has requested comments on the Section 106 process, identification of historic properties, and proposed finding within 30 days of receipt of the letter. See Appendix H, Cultural

Resources, for additional information.

PHMSA also sent letters on March 14, 2024, to the following federally recognized tribes, inviting them to participate in consultation:

- Catawba Indian Nation
- Chickahominy Indian Tribe
- Chickahominy Indian Tribe - Eastern Division
- Delaware Nation
- Pamunkey Indian Tribe
- Upper Mattaponi Tribe

The letter to the tribes initiated Section 106 consultation to determine if there were any historic properties of cultural or religious significance to the tribes, to determine if the tribes would like to be consulting parties, to notify the tribes of PHMSA's assessment, and to request concurrence with PHMSA's determination of effect.

Mitigation Measures:

If, during project implementation, a previously undiscovered archaeological or cultural resource that is or could reasonably be a historic property is encountered or a previously known historic property will be affected in an unanticipated manner, all project activities in the vicinity of the discovery will cease and the City of Richmond will immediately notify PHMSA. This may include discovery of cultural features (e.g., foundations, water wells, trash pits, etc.) and/or artifacts (e.g., pottery, stone tools and flakes, animal bones, etc.) or damage to a historic property that was not anticipated. PHMSA will notify the State Historic Preservation Office and participating federally recognized tribes and conduct consultation as appropriate in accordance with 36 CFR § 800.13. Construction in the area of the discovery must not resume until PHMSA provides further direction.

In the event that unmarked human remains are encountered during permitted activities, all work shall halt, and the City of Richmond shall immediately contact PHMSA as well as the proper authorities in accordance with applicable state statutes to determine if the discovery is subject to a criminal investigation, of Native American origin, or associated with a potential archaeological resource. At all times human remains must be treated with the utmost dignity and respect. Human remains and associated artifacts will be left in place and not disturbed. No skeletal remains or materials associated with the remains will be photographed, collected, or removed until PHMSA has conducted the appropriate consultation and developed a plan of action. Project activities shall not resume until PHMSA provides further direction.

All work, material, equipment, and staging to remain within the road's existing right-of-way or utility easement or other staging areas as identified in the environmental documentation. If the scope of work changes in any way that may alter the effects to historic properties as described herein, the grant recipient must notify PHMSA, and consultation may be reopened under Section 106.

Staging areas for the Undertaking are currently unknown. Staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect archaeological features and artifacts.

Section 4(f)	
Question	Information and Justification
Are there Section 4(f) properties within or immediately adjacent to the project area? If yes, provide a list of properties or as an attachment.	Yes. Powhatan's Hill Park is adjacent to work segment 108063 and 108062.
Will any construction activities occur within the property boundaries of a Section 4(f) property? If so, please detail these activities and indicate if these are temporary or permanent uses of the Section 4(f) property. Further coordination with PHMSA is required for all projects that might impact a Section 4(f) property.	No.
Conclusion: Section 4(f) of the US Department of Transportation (USDOT) Act of 1966 as amended (Section 4(f)) (49 U.S.C. § 303(c)); is a federal law that applies to transportation projects that require funding or other approvals by the USDOT. Section 4(f) prohibits the Secretary of Transportation from approving any program or project which requires the use of any publicly owned land from a public park, recreation area, or wildlife and waterfowl refuge of national, state, or local significance, or any land from an historic site of national, state, or local significance unless: • There is no feasible and prudent alternative to the use of the land; • The program or project includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site, resulting from such use. PHMSA conducted a review of properties that are located within the Project Area to identify properties that may possibly qualify as Section 4(f). Powhatan's Hill Park is adjacent to work segments 108063 and 108062 and is located adjacent to Williamsburg Avenue and Goddin Street. No other areas were identified in the area. No Action: Under the No Action alternative, there would be no change to existing pipeline infrastructure pursuant to federal funding provided by the Program. Therefore, there would be no use of Section 4(f) property under the No Action alternative. Proposed Action: Under the Proposed Action alternative, there would be no impact on Powhatan's Hill Park as access to the park would remain open and unencumbered and there would be no land disturbances to the park. Additionally, no staging, laydown or any disturbance would occur within the park. PHMSA would include mitigative measures to emphasize the City of Richmond's commitments to prohibit laydown and staging with the park and to ensure access remains unencumbered. Therefore, under the Proposed Action alternative, PHMSA's assessment is that there would be no use of Section 4(f) resources.	

Mitigation Measures:

The City of Richmond shall ensure that full public access to and use Powhatan's Hill Park is maintained during construction.

The City of Richmond shall prohibit laydown and staging activities within Powhatan's Hill Park.

Land Use and Transportation	
Question	Information and Justification
Will the full extent of the project boundaries remain within the existing right-of-way or easements? If no, please describe any right-of-way acquisitions or additional easements needed.	Yes.
Will the project result in detours, transportation restrictions, or other impacts to normal traffic flow or to existing transportation facilities during construction? Will there be any permanent change to existing transportation facilities? If so, what are the changes, and how would changes affect the public?	Yes. All detours and impacts to normal traffic flow will be minimized to the fullest extent possible.
Will the project interrupt or impede emergency response services from fire, police, ambulance or any other emergency or safety response providers? If so, describe any coordination that will occur with emergency response providers?	No.
Conclusion: The project is in the City of Richmond and surrounding areas, consisting of commercial and residential areas. No Action: Under the No Action alternative, existing cast iron, ductile iron, steel, and vintage PE pipes would remain in their current location and no changes to land use would occur. Normal maintenance activities would occur, and pipes would be replaced under failed circumstances. Proposed Action: The City of Richmond is proposing to replace pipeline infrastructure within existing ROW and would not include adding pipeline to serve new areas. Construction activities have been broken up into work segments, with restoration occurring as the work advances. The City of Richmond anticipates minimizing detours and maintaining normal traffic patterns as much as possible. Where detours are required to avoid active work areas, traffic would be rerouted in a manner that minimizes length of detour and impact to vehicle traffic. Detours for a particular section of road would likely last for less than four months. Therefore, during construction, there may be short-term impacts to adjacent residences as traffic would be routed to avoid construction areas for the safety of contractors and residents. Other potential impacts include an increase in noise, dust, and transportation accessibility, as a result of construction and construction staging. Local and state regulations	

guide the transport of machinery, equipment, and automobiles around the construction areas. Temporary traffic impacts on the local road network and adjacent pedestrian routes would be minimal and temporary. Consideration of emergency response vehicles, travel restrictions, and other impacts to local transportation are anticipated to be temporary and would only last for the duration of construction. Minor disruptions to on-street parking may occur, but access to existing residences would not be restricted.

PHMSA will add a mitigative measure to ensure that the City of Richmond coordinates with the appropriate local and state agencies regarding interruptions to traffic and detours and notifies emergency services of the scheduled work and traffic implications. Normal traffic flow should be maintained to the extent possible, and the City of Richmond should notify any potentially impacted residents and businesses of traffic disruptions. Therefore, because the work consists of the replacement of existing pipeline, would not convert any new areas into a different use and impacts would only occur during construction, PHMSA's assessment is that there would be no permanent impact to land use.

PHMSA considered the cumulative effects of this action with ongoing and planned transportation related construction projects that could cumulatively impact land use and transportation. Like many municipalities, various maintenance and improvement projects could occur within or near the project area. All municipalities and businesses must abide by the same requirements and coordinate with state and local agencies on any disruptions to normal traffic patterns. Through this coordination, the overall cumulative effects of other potential projects occurring would be minimized by planning and scheduling efforts with the responsible agency's oversight. Land use changes are not anticipated as the projects are occurring in an urbanized area that is built out and therefore would not change the existing use.

Mitigation Measures:

The City of Richmond shall maintain traffic flows to the extent possible and use traffic control measures to assist traffic negotiating through construction areas, as needed.

The City of Richmond shall coordinate with state and local agencies regarding parking restrictions, detours and/or routing adjustments that will occur during construction and will notify all potentially impacted residents and/or business owners in advance of potential impacts to parking and traffic.

Noise and Vibration	
Question	Information and Justification
Will the project construction occur for longer than a month at a single project location?	Yes. Construction is anticipated to take approximately 4 months for each segment.
Will the project location be in proximity (less than 50-ft.) to noise sensitive receivers (residences, schools, houses of worship, etc.)? If so, what measures will be taken to reduce noise and vibration impacts to sensitive receptors?	Yes. The City of Richmond would abide by local noise ordinances.
Will the project require high-noise and vibration inducing construction methods? If so, please specify.	No.

Will the project comply with state and local ordinances? If so, identify applicable ordinances and limitations on noise/vibration times or sound levels.	Yes, Richmond, VA Code of Ordinances-Chapter 11-Environment-Article II-Sound Control Sec. 11.
Will construction activities require large bulldozers, hoe ram, or other vibratory equipment within 20 feet of a structure?	No.
Conclusion: The project is located in the City of Richmond and surrounding areas where the ambient noise in the project area consists of a combination of environmental noise from road traffic, construction, industry, the built environment, population density and other sources. There are several sensitive noise receptors (residences, schools, etc.) located adjacent to the streets where work would occur. No Action: Under the No Action, the project would not move forward and the pipelines along the designated streets in the project area would not be replaced at this time, and likely would not be replaced all at once. Current legacy pipelines would likely be repaired or replaced under emergency conditions. If replacement or repairs occur under emergency conditions, noise from construction equipment would add to that of the current ambient noise and would be of a shorter duration. Proposed Action: Excavators, dump trucks, skid steers, rollers, pavers, and other similar construction equipment would be used to excavate a trench, lay pipe, compact soils and re-pave the affected areas. Pipeline may be installed in some areas via directional bore methods where drill rigs, excavators, reamers, and similar equipment would be used to install pipeline by horizontal directional drilling. The City of Richmond would adhere to the Richmond, VA Code of Ordinances-Chapter 11-Environment-Article II-Sound Control Sec. 11. While there would be a temporary increase in noise due to construction equipment, PHMSA's assessment is that these impacts would be minor and temporary. PHMSA considered the cumulative effects of this action with ongoing and planned transportation related construction projects that could cumulatively have an impact on the noise and vibration impacts within the City of Richmond. Urban areas often have paving, drainage improvement, and other construction or maintenance projects on going which could occur within or near the project area which would contribute to increased noise. These construction and maintenance projects could occur at the same time as the Proposed Action alternative and would contribute to an increase in cumulative noise effects during construction. However, adhering to state and local noise ordinances would ensure the project does not cause cumulatively more than minor adverse noise or vibration impacts.	
Mitigation Measures: The City of Richmond shall adhere to Richmond, VA Code of Ordinances, Chapter 11-Environment-Article II-Sound Control.	

Environmental Justice	
Question	Information and Justification
Using the EPA EJScreen or census data ²⁸ , is the project located in an area of minority and/or low-income individuals as defined by USDOT Order 5610.2(c)? If so, provide demographic data for minority and/or low-income individuals within ½ mile from the project area as a percentage of the total population.	Based on review of socioeconomic data using the EPAs EJScreen ²⁹ , the population residing within the general project area for the City of Springfield contains 46 percent low income and 16 percent minority populations.
Will the project displace existing residents or workers from their homes and communities? If so, what is the expected duration?	No.
Will the project require service disruptions to homes and communities? If so, what is the expected communication and outreach plan to the residents and the duration of the outages?	Yes. Service disruptions would last no more than one hour.
Are there populations with Limited English Proficiency located in the project area? If so, what measures will be taken to provide communications in other languages?	Yes, all written notifications would be provided in both English and Spanish
Conclusion: Executive Order (E.O.) 14096—"Revitalizing Our Nation's Commitment to Environmental Justice for All" was enacted on April 21, 2023. E.O. 14096 on environmental justice does not rescind E.O. 12898 – "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," which has been in effect since February 11, 1994, and is currently implemented through DOT Order 5610.2C. This implementation would continue until further guidance is provided regarding the implementation of the new E.O. 14096 on environmental justice. PHMSA reviewed socioeconomic data using the EPAs EJScreen and found that the population residing within the various work segments as follows: • Work Segment: 107989 – Phaup Street, 19th Street, and Brauers Lane in the City of Richmond contains 65 percent low income and 95 percent minority populations. • Work Segment: 107990 – Lakeside Avenue from Dumbarton Road to Parkside Avenue in Henrico County consists of 33 percent low income and 37 percent minority populations. • Work Segment: 107991 – Lakeside Avenue from Parkside Avenue to Hilliard Road, Henrico County consists of 26 percent low income and 24 percent minority populations. • Work Segment: 108020 – Mechanicsville Turnpike and Euclid Road in Henrico County consists of 39 percent low income and 91 percent minority populations. • Work Segment: 108023 – Mechanicsville Turnpike and Byron Street in Henrico County consists of 34 percent low income and 92 percent minority populations. • Work Segment: 108024 – Dalebrook Road (Applewood Road to– Frankmont Road) in Chesterfield County	

²⁸ <https://www.census.gov/quickfacts/fact/table/US/PST045222>

²⁹ <https://ejscreen.epa.gov/mapper/>

consists of 38 percent low income and 92 percent minority populations.

- Work Segment: 108061 – Mosby Street, Fairmont Avenue to Venable Street, N 20th Street to N 25th Street in the City of Richmond consists of 35 percent low income and 69 percent minority populations.
- Work Segment: 108062 – North Hampton Street, Williamsburg Road, Parker Street, and Haig Street in the City of Richmond consists of 58 percent low income and 80 percent minority populations.
- Work Package: 108063 – Union Street, Williamsburg Road, Government Road, and Nelwood Drive in the City of Richmond consists of 53 percent low income and 79 percent minority populations.

The City of Richmond consists of 38 percent low income and 59 percent minority populations.

Chesterfield County consists of 18 percent low income and 40 percent minority populations.

Henrico County consists of 22 percent low income and 49 percent minority populations.

See Appendix I, Environmental Justice, for socioeconomic data for the County, and all individual segments of the project area.

No Action:

Under the No Action alternative, existing and planned pipeline activities, including construction and maintenance activities, would continue unchanged. The City of Richmond would continue to use leak prone pipe material that could lead to safety incidents and service disruptions. Additionally, if a pipeline segment is not repaired or replaced prior to failure, it is likely to be associated with even more emissions under the No Action alternative. Thus, emissions benefits to the community associated with repairing or replacing existing pipelines with updated material would not be achieved and the incident risks and leaks would remain. There may be some degree of air pollution associated with construction activities for maintenance and repairs of existing pipelines under the No Action alternative, either through planned repair or replacement efforts or unplanned, emergency repairs or replacements.

Proposed Action:

Construction activities would result in minor temporary air quality impacts, including the intentional venting of existing distribution lines prior to replacement. Minor disruptions to services would occur during construction activities. The City of Richmond's contractors would place door hangers along the route of construction three days before entering the area to begin construction. Door hangers would include the contractor's contact information. If door hangers are not placed before starting the project, the City of Richmond will require all construction to stop until proper notification is given. The City of Richmond may also require contractors to install project signs in the areas where construction will take place. A notification will be provided, at least forty-eight hours in advance of an interruption in a customer's gas service for necessary shutdowns. The average duration for service is anticipated to last no more than one hour. The City of Richmond personnel, or their contractors would communicate with limited English speakers, by having all written communications to include door hangers translated in both English and Spanish.

The Proposed Action alternative would result in an overall reduction in GHG emissions. Noise impacts associated with construction are anticipated to be minor. Traffic impacts would be temporary and only minor disruptions or delays would occur. While there would be minor temporary impacts during construction, the removal of leak prone pipe from the natural gas system would permanently reduce leaks and lower the potential for incidents, resulting in an increase in pipeline safety across the system, while also improving operation and reliability of the overall gas utility system. Therefore, consistent with Executive Order 12898 and DOT Order 5610.2(c), PHMSA's assessment is that the project would not result in disproportionately high and adverse effects on minority or low-

income populations, or other underserved and disadvantaged communities. PHMSA's assessment concluded that the project would have an overall beneficial effect on environmental justice populations and would not result in indirect or cumulative impacts.

Mitigation Measures:

The City of Richmond shall provide advanced notification of service disruptions and construction schedule to all affected parties including residents and businesses adjacent to the project area.

Safety	
Question	Information and Justification
Has a risk profile been developed to describe the condition of the current infrastructure and potential safety concerns?	Yes, as described in the Distribution Integrity Management Program (DIMP).
Has a public awareness program been developed and implemented that follows the guidance provided by the American Petroleum Institute (API) Recommended Practice (RP) 1162?	Yes.
Does the project area include pipes prone to leakage?	Yes; leaks are identified and tracked utilizing the City of Richmond's DIMP and are prioritized accordingly.
Will construction safety methods and procedures to protect human health and prevent/minimize hazardous materials releases during construction, including personal protection, workplace monitoring and site-specific health and safety plans, be utilized? If yes, document measures and reference appropriate safety plans.	Yes. General Safety Precautions Policy is included in the City of Richmond's natural gas procedures manual.
Has an assessment of the project been performed to analyze the risk and benefits of implementation?	Yes.
Conclusion: The proposed project would replace the existing cast iron, ductile iron, steel, and vintage PE pipelines located in various segments throughout the City of Richmond. Pipelines that are known to leak based on the material include cast iron, bare steel, wrought iron, and historic plastics with known issues (PIPES Act of 2020). PHMSA establishes safety regulations for all pipelines (49 CFR Parts 190-199). In 2011, following major natural gas pipeline incidents, DOT and PHMSA issued a Call to Action to accelerate the repair, rehabilitation, and replacement of the highest-risk pipeline infrastructure. Among other factors, pipeline age and material are significant risk indicators. Pipelines constructed of cast and wrought iron, as well as bare steel, are among the pipelines that pose the highest risk. PHMSA continues to encourage vintage pipeline repair or replacement to increase the safety of these segments of the gas distribution systems. Pipeline incidents can result in death, injury, property damage, and environmental damage. The City of Richmond utilizes its Distribution Integrity Management Plan (DIMP) to enhance safety and identify risks in the natural gas distribution system. The program consists of different elements such as knowledge-	

gathering, threat identification, and assessing and ranking risk.

No Action:

Under the No Action alternative, the vintage plastic pipes would remain in their current location, state, and condition. Normal maintenance activities would occur, and pipes would be replaced under failed circumstances. Safety risks resulting from existing leak prone pipes remaining in place would persist until the existing leak-prone pipes are replaced.

Proposed Action:

The proposed project is necessary to replace leak prone pipes. This replacement is in alignment with City of Richmond's DIMP plan, increasing the overall safety of the community. The project would reduce the risk profile of existing pipeline systems prone to methane leakage and would also benefit disadvantaged rural and urban communities with the safe provision of natural gas. The project responds to the need to address the potentially unsafe condition of the natural gas distribution system of pipelines. The repair, rehabilitation, or replacement of pipelines would be constructed in accordance with industry best practices and would comply with all local, state, and federal regulations, including those for safety.

The abandonment of the existing pipeline would be conducted in accordance with PHMSA requirements found in 49 CFR 192.727 and 195.402(c)(10). These requirements include disconnecting pipelines from all sources and supplies of gas, purging all combustibles and sealing the facilities left in place. These requirements for purging and sealing abandoned pipelines would ensure that the abandoned pipelines are properly purged and cleaned and pose no risk to safety in their abandoned state. Therefore, PHMSA's assessment is that this replacement project would improve the overall safety of the City of Richmond's infrastructure.

Mitigation Measures:

The City of Richmond shall ensure their DIMP procedures are updated as necessary, the work is constructed in accordance with industry best practices and the project will comply with all local, state, and federal regulations, including those for safety.

The City of Richmond shall use standard construction safety methods and procedures; and conduct regular safety audits of crews performing work in the field and subsequent follow-up reporting and/or training, as required.

III. Public Involvement

On November 9, 2022, PHMSA published a Federal Register notice (87 FR 67748) with a 30-day comment period soliciting comments on the "Tier 1 Nationwide Environmental Assessment for the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program." During the 30-day comment period, PHMSA received one comment letter from the APGA on various aspects of the program and air quality related analysis in the EA on December 9, 2022. This APGA letter is available for public review at the Docket No: PHMSA-2022-0123³⁰. PHMSA reviewed the comment letter and determined the comments were not substantial and did not warrant further analysis. One comment provided by the APGA indicated that the majority of construction methods used for pipe replacements would be replacement by open trenching and that some may want to abandon the existing pipe

³⁰ <https://www.regulations.gov/document/PHMSA-2022-0123-0002/comment>

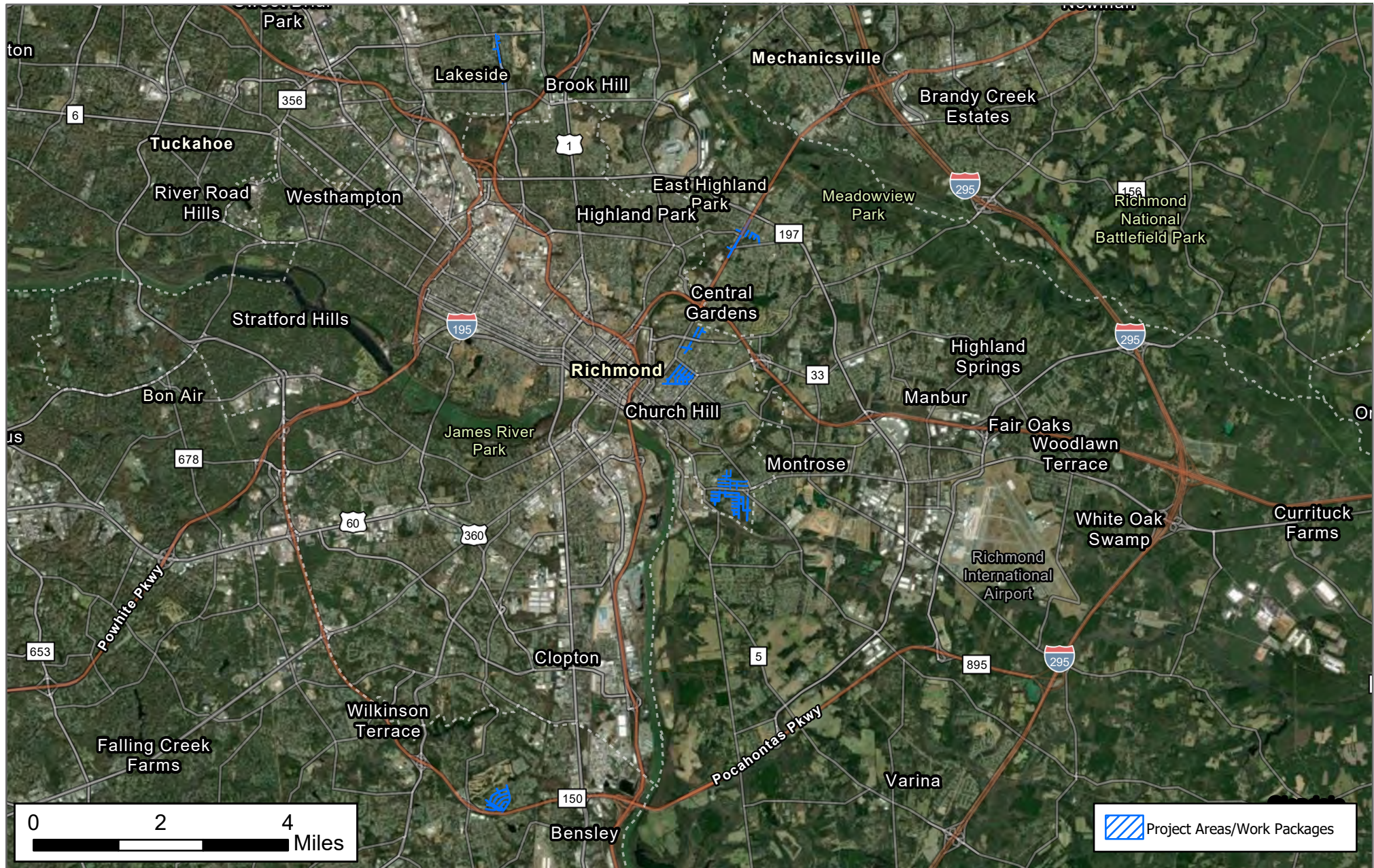
rather than removing it for replacement. Any departures from methods described in the Tier 1 EA will require additional documentation from the project proponent, as reflected in this Tier 2.

As part of this Tier 2 EA, PHMSA is soliciting public comments through a public comment period. This Tier 2 EA is available on PHMSA's website where comments can be submitted to the contact noted below. PHMSA will accept public comments for 30 days on this Tier 2 EA. PHMSA will consider comments received and incorporate them in the decision-making process. Consultation with appropriate agencies on related processes, regulations, and permits is ongoing. Please submit all comments to: PHMSABILgrantNEPAcomments@dot.gov and reference NGDISM-FY22-EA-2023-13 in your response.

Appendix A

Project Maps

Overall Project Map



Name: Richmond, Virginia Gas Line Replacement
Scale: 130,000
Total Acreage: 77.3
Richmond, VA, Richmond City County



Service Layer Credits: Earthstar Geographics, City of Richmond, County of Henrico, VGIN, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

Project Map



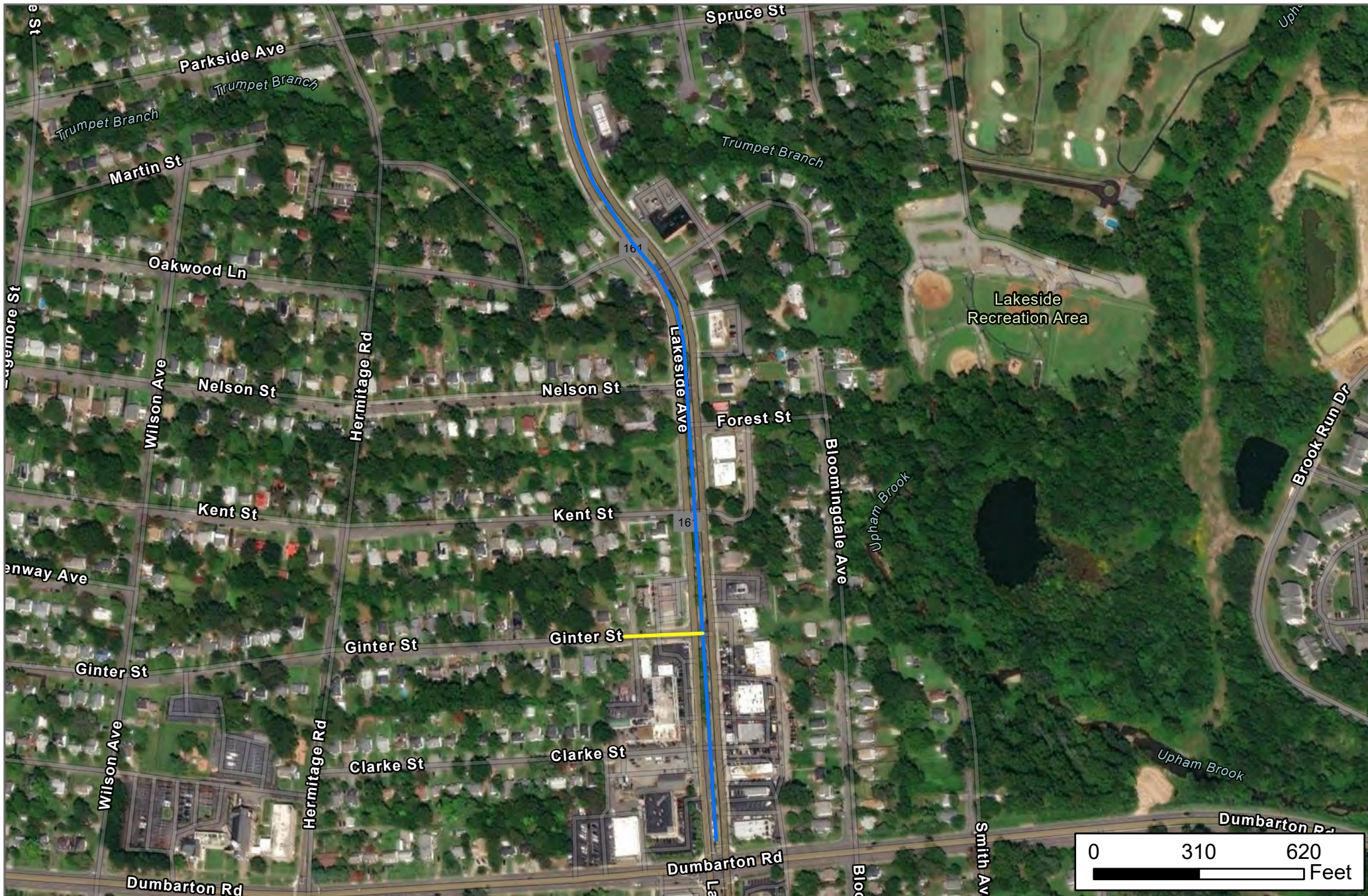
Name: Richmond, VA
Area 107989 Natural Gas Pipeline Replacement
Scale: 4,000

— 2" PE
— 4" PE



Service Layer Credits: Esri Community Maps Contributors, City of Richmond, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Maxar

Project Map



Name: Richmond, VA
Area 107990 Natural Gas Pipeline Replacement
Scale: 4,500
— 2" PE
— 6" PE

Service Layer Credits: Maxar, Microsoft, Esri Community Maps Contributors, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Project Map



Name: Richmond, VA
Area 107991 Natural Gas Pipeline Replacement
Scale: 4,000
— 2" PE
— 6" PE



Service Layer Credits: Maxar, Microsoft, Esri Community Maps Contributors, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Project Map



Name: Richmond, VA
Area 108020 Natural Gas Pipeline Replacement
Scale: 4,000



Service Layer Credits: Maxar, Microsoft, Esri Community Maps Contributors, City of Richmond, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Project Map



Name: Richmond, VA
Area 108023 Natural Gas Pipeline Replacement
Scale: 4,000

2" PE 6" PE
4" PE 8" PE 12" Steel



Service Layer Credits: Esri Community Maps Contributors, City of Richmond, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Maxar

Project Map



Name: Richmond, VA
Area 108024 Natural Gas Pipeline Replacement
Scale: 4,000
2" PE
8" PE



Service Layer Credits: Maxar, Microsoft, Esri Community Maps Contributors, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Project Map



Name: Richmond, VA
 Area 108061 Natural Gas Pipeline Replacement
 Scale: 5,000



Service Layer Credits: Maxar, Microsoft, Esri Community Maps Contributors, City of Richmond, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Project Map



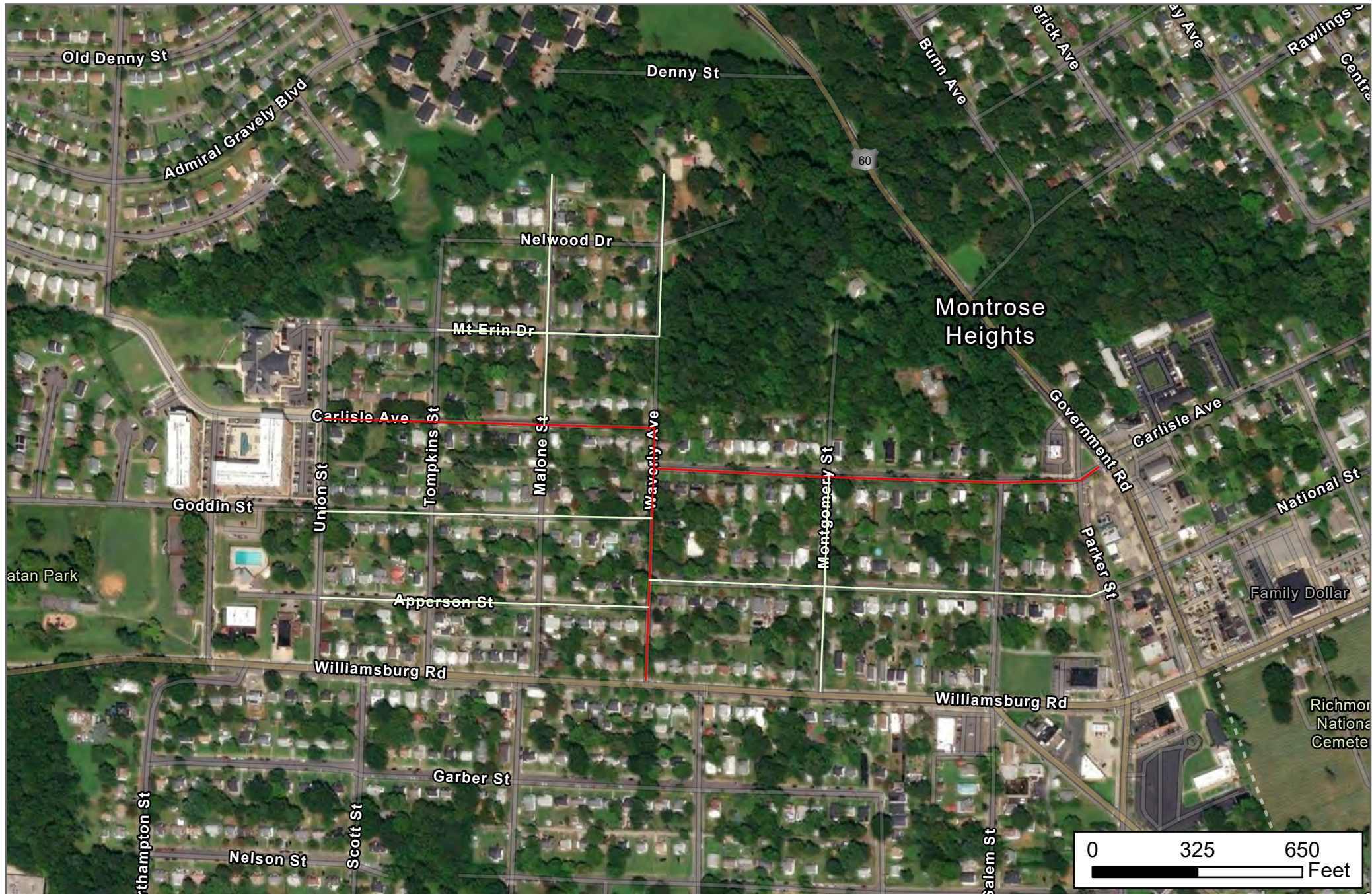
Name: Richmond, VA
 Area 108062 Natural Gas Pipeline Replacement
 Scale: 7,000

— 2" PE
 — 4" PE



Service Layer Credits: Esri Community Maps Contributors, City of Richmond, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, Maxar

Project Map



Name: Richmond, VA
Area 108063 Natural Gas Pipeline Replacement
Scale: 4,000
2" PE
4" PE



Service Layer Credits: Maxar, Microsoft, Esri Community Maps Contributors, City of Richmond, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA

Appendix B

Emergency Work



**U.S. Department of Transportation
Pipeline and Hazardous Materials Safety Administration**

Memorandum for Record

Date: February 20, 2024

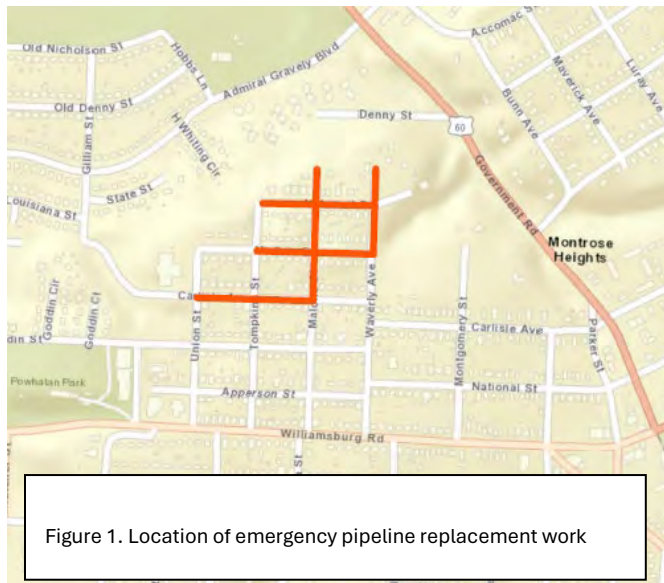
Subject: Emergency Pipeline Replacement Work for the City of Richmond, VA
Subject to the Natural Gas Distribution Infrastructure Safety and Modernization
Grant Program, Tier 2 Site Specific Environmental Assessment NGDISM-FY22-EA-
2023-13

Approved:

The purpose of this memo is to document emergency circumstances pertaining to Richmond Gas Works' need to complete work in the City of Richmond, VA subject to an ongoing Tier 2 Site Specific Environmental Assessment, NGDISM-FY22-EA-2023-13 and to document compliance with NEPA in accordance with CEQ's *CEQ-NEPA-2020-01 September 14, 2020, Memorandum for Heads of Federal Departments and Agencies*.

Richmond Gas Works submitted a project as a part of the 2022 PHMSA Natural Gas Distribution Infrastructure Safety and Modernization Grant Program (NGDISM) to replace approximately 13.2 miles of vintage gas pipeline in various areas throughout the City of Richmond. This proposal included 13 different work segments, including work segment 108063, located in the Montrose Heights area of Richmond, which includes the replacement of approximately 9,335 linear feet of pipeline. Richmond Gas Works anticipated this segment would be the first to go to construction. However, due to the wet seasonal weather, there has been significant and frequent water infiltration into the low-pressure cast iron pipeline system, which includes the gas services to several homes and businesses. Richmond Gas Works has been pumping water out of the low-pressure mains and services on a weekly and, oftentimes, daily basis in order to keep customers in service. This is of particular concern in the cold winter months, particularly due to customers being without heat for prolonged periods of time, as well as the risk of freeze-off at the gas meter, which presents a separate set of risks and challenges. Richmond Gas Works considers this an emergency due to the water infiltration interrupting the gas flow to this neighborhood, which, due to its age, could have homes and businesses with standing pilot light appliances. The consequences of the gas flow being interrupted and then reinstated to the home or business (if the water in the service or main was to shift around) can have catastrophic consequences, as well as the water infiltration problem becoming more frequent. The estimated length of the emergency work consists of replacing/installing 3,500' – 4,000' of 2" and 4" high density polyethylene pipes (HDPE) along

Waverly Avenue, Malone Street, Thompkins Street, Mt. Erin Drive, Nelwood Drive, and Carlisle Avenue.



Purpose and Need for the Proposed Emergency Work

The purpose of the work is to respond to the immediate need to repair an existing gas line that has significant and frequent water infiltration into the low-pressure cast iron pipeline system. PHMSA's assessment is that immediate actions are necessary to secure and protect the existing gas infrastructure system and ensure citizens have reliable gas services, especially during the current cold winter months. The immediate need for the project is to replace the existing pipeline in order to stop the water infiltration from occurring and provide homes and businesses with reliable gas services. The overall and long-term needs addressed by this project will include: (1) repair and improving upon the safe delivery of energy; (2) avoiding further economic losses caused by pipeline failure. The area where the gas pipelines will be replaced is identified in the attached map. The area consists of residential and commercial areas.

Alternatives

The project consists of replacing existing failing natural gas pipelines; therefore, there are limited alternatives available. These consist of the no action alternative and the proposed action of replacing the existing pipeline. The no action alternative results in eventual complete water infiltration and complete failure of the gas pipeline. Water infiltration can have a larger impact and cause system failure if water backs up into the gas lines. Replacing the failing pipeline includes abandoning the existing cast iron and vintage polyethylene pipelines and replacing them with approximately 3,500-4,000 feet of new 2-inch and 4-inch HDPE pipeline. Construction is anticipated to begin in Mid-February 2024 (likely sometime between 2/11/24-2/24/24) and is expected to last 40 to 60 days.

Environmental Impacts

PHMSA developed a Tier 1 programmatic environmental Nationwide Analysis (Tier 1), published on November 9, 2022, which was used to describe the effects of implementing the NGDISM grant program and to ensure that implementation at any specific project site complies with environmental laws and does not result in a significant environmental impact. The Tier 1 did not identify any significant adverse impact on human health or the environment that would result from implementation of the proposed action. Furthermore, PHMSA has reviewed the proposed emergency work and has determined that all potential impacts of the emergency work are consistent with that identified in the Tier 1. The Tier 1 EA described that the majority of site-specific projects would utilize the insertion method of pipe replacement. The City of Richmond is planning to utilize both open trench and directional boring construction methods. Open trench construction methods generally involve greater soil disturbance and potentially greater impacts, when compared to using the insertion method and directional drilling construction methods would likely result in similar impacts when compared to insertion construction methods. However, all work will be located solely in the roadway, within the existing right-of-way. As such, previous ground disturbance activities have occurred and the right-of-way contains water distribution lines, underground telephone lines, sewer lines and storm drains.

A review of EPA's NEPAassist database¹ does not indicate there are any hazardous waste sites, superfund or brownfield sites and there are no wetlands, streams or floodplains identified in the project area potentially impacted. The project does occur in a maintenance area for ozone; however, construction equipment and resultant emissions would not exceed EPA's thresholds for NAAQS. Because activities are limited to work in the actual roadway, there are no biological resources that could be potentially affected by the work. No 4(f) properties would be impacted by the emergency work and no land use changes would occur. The work is being conducted to replace an existing failing natural gas pipeline and as such, environmental conditions are anticipated to improve upon completion of the work. Air quality would improve as leak-prone pipeline is being replaced and the current water infiltration occurring on the existing gas line would be eliminated, improving the safety and reliability of the existing gas infrastructure. As this emergency pipeline replacement is considered an immediate threat to life and property. Under the No Action Alternative, the water infiltration may interrupt gas flow to homes and residents could lose heat for prolonged periods of time. The water infiltration could also cause larger problem in the gas system resulting in major economic damages, potential leaks, etc.

The emergency work was also reviewed in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The area of potential effects (APE) was identified and no NRHP-eligible or NRHP-listed above-ground resources were identified within the APE. Additionally, a search of the Virginia Cultural Resources Information System (VCRIS) found no known potentially significant above-ground resources within the APE. VCRIS was examined to identify the presence of previously recorded archeological sites and previously conducted archeological surveys within the APE and within a quarter of a mile from the APE. As a result, no previous surveys and no previously recorded archeological sites were identified. As a result, PHMSA found that there are no historic properties as defined in 36 CFR 800.16(l) within the APE and therefore, in accordance with 36 CFR Part

¹ <https://nepassisttool.epa.gov/nepassist/nepamap.aspx>

800.4(d)(1), PHMSA's assessment is that the Undertaking would result in No Historic Properties Affected. While the exact staging areas are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) would be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Agencies Consulted

PHMSA solicited comments via a 30-day comment period on the Tier 1 EA, published on November 9, 2022, in Federal Register notice 87 FR 67748. During the 30-day comment period, PHMSA received one comment letter from the American Public Gas Association (APGA) on various aspects of the program and air quality related analysis in the EA on December 9, 2022. The APGA letter is available for public review at the Docket No: PHMSA-2022-0123.² PHMSA reviewed the comment letter and determined the comments were not substantial and did not warrant further analysis. One comment provided by the APGA indicated that the majority of construction methods used for pipeline replacement work would be by open trenching and that some entities may want to abandon the existing pipeline rather than removing it for replacement. The emergency work in Richmond will be conducted by directional boring and open trenching methods and the existing pipeline would be abandoned in place. Neither of these is a concern that would cause significant adverse impact on human health or the environment as the pipelines would be abandoned in accordance with PHMSA guidelines and the construction would all occur within paved ROW.

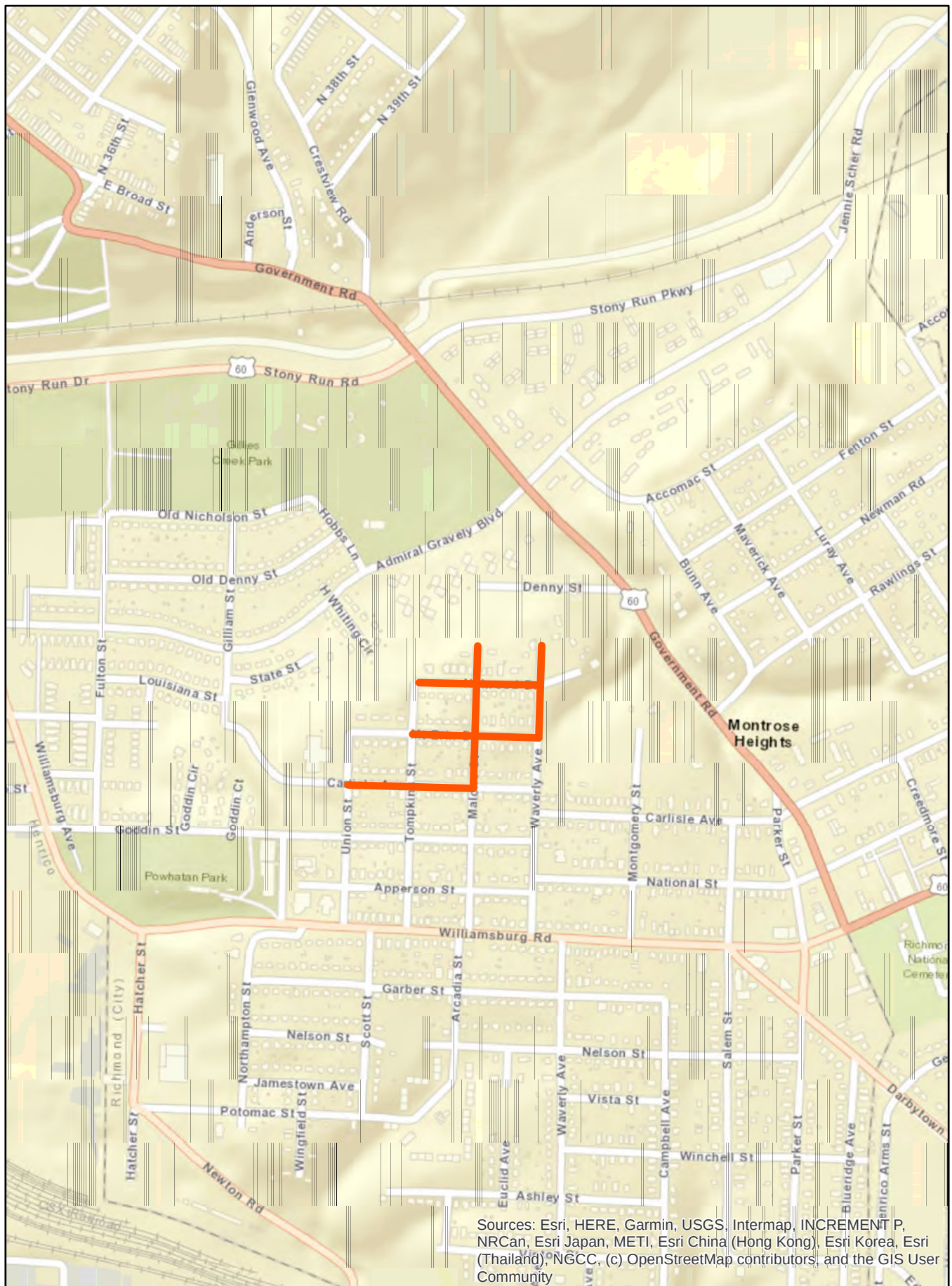
After a review of the site-specific emergency work for Richmond, PHMSA initiated consultation with the Virginia Department of Historic Resources (DHR) in accordance with 36 CFR Part 800.12(b)(2) by email and letter dated February 9, 2024, and requested an expedited seven-day review. PHMSA also invited the Catawba Indian Nation, the Delaware Nation, and the Pamunkey Indian Tribe to participate in consultation by separate letters sent also on February 9, 2024. On February 9, 2024, the DHR responded via email concurring with PHMSA's assessment that the emergency work would have no effect to Historic Properties, noting that if the undertaking could not be completed, as described in the information submitted to DHR, reinitiation of consultation under Section 106 would be needed. No responses were received from the tribes.

Conclusion

Based on a review of potential impacts resulting from the emergency work described herein, PHMSA's assessment is that the emergency actions will not cause significant environmental impacts and are consistent with the Tier 1 EA. Furthermore, should Richmond Gas Works not take prompt action the water infiltration could result in catastrophic consequences to the natural gas system and have detrimental effects to the health and safety of the impacted residents resulting from no gas service in freezing conditions. It is noted that this emergency work will also be included as part of the Tier 2 EA for the larger natural gas replacement project which was awarded grant funds under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program.

² <https://www.regulations.gov/document/PHMSA-2022-0123-0002/comment>

City of Richmond, Emergency Natural Gas Pipeline Replacement



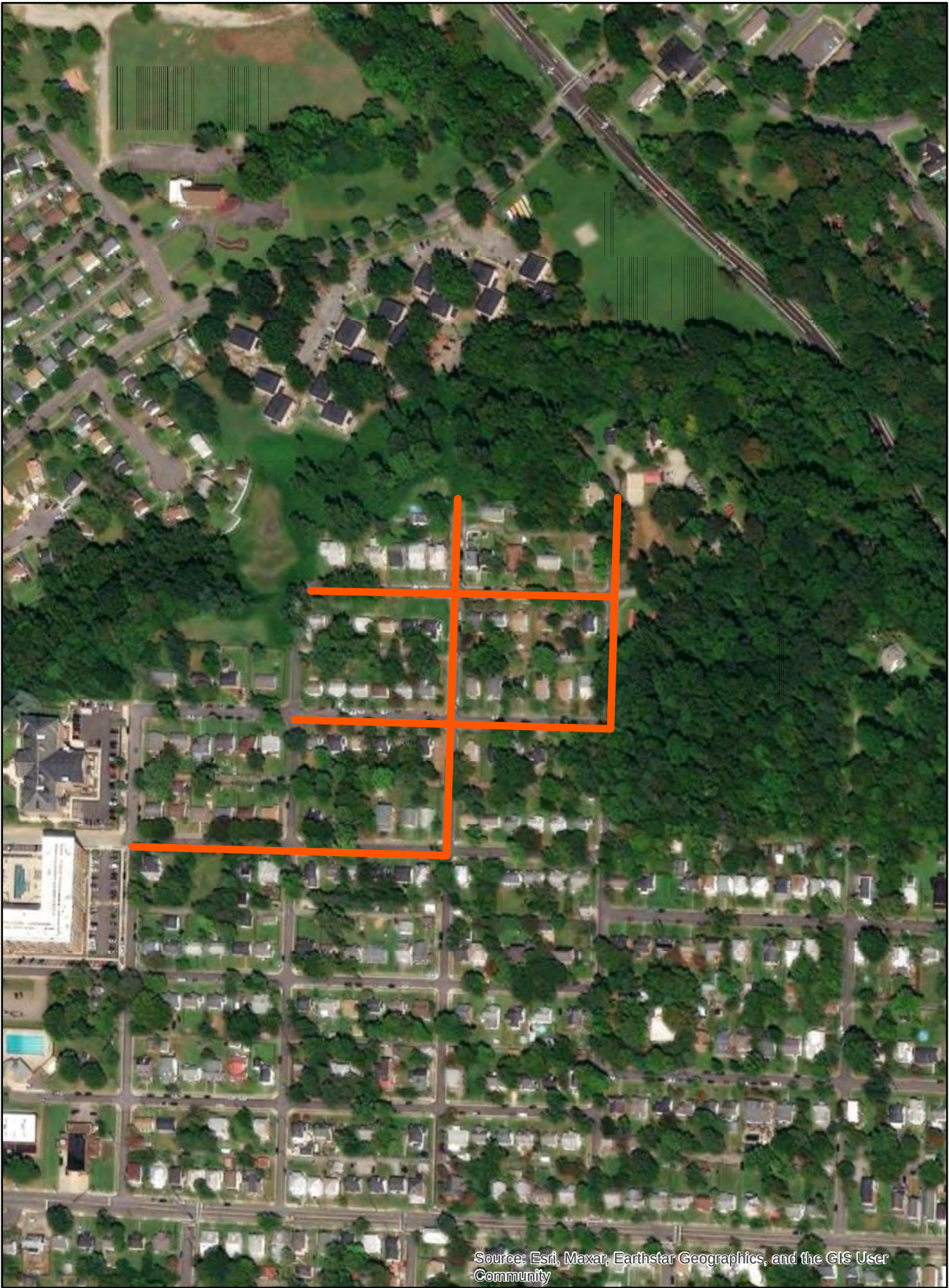
Legend

 Emergency Pipeline Work

250 125 0 250 Meters



City of Richmond, Emergency Natural Gas Pipeline Replacement



Legend

Emergency Pipeline Work

100 50 0 100 Meters



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

February 8, 2024

Dr. Wenonah G. Haire
Tribal Historic Preservation Officer
Catawba Indian Nation
1536 Tom Steven Road
Rock Hill, SC – 29730

Section 106 Consultation: Emergency PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear Dr. Haire:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) for the emergency replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The Grant Recipient is proposing a larger Natural Gas Pipeline Replacement Project throughout the city; however, the emergency replacement of this portion of pipeline is being expedited to **respond to an immediate threat to life or property**. Therefore, PHMSA requests an **expedited seven-day review** per 36 CFR Part 800.12(b)(2). Consultation for the larger project will be submitted to your office in the coming weeks.

The purpose of this letter is to determine if there are historic properties of cultural or religious significance to your Tribe/Nation that may be affected by the Undertaking, to determine if you want to be a consulting party for this Undertaking and/or the larger project, and to notify your Tribe/Nation of PHMSA's intention to make a finding of No Historic Properties Affected.

Project Description/Background

The Grant Recipient is considering the replacement of this segment of natural gas pipeline an emergency due to wet seasonal weather causing significant and frequent water infiltration into the low-pressure cast iron pipeline system that provides gas services to several homes and businesses. Water infiltration is considered an emergency, particularly during the cold winter months, because meters may freeze and residents may lose heat for prolonged periods of time. Additionally, water infiltration may interrupt gas flow to homes and businesses that have standing pilot light appliances, which is also a threat to life and property.

The emergency work proposed in this Undertaking will replace 3,500 to 4,000 LF of 2-inch and 4-inch failing natural gas pipe north of Carlisle Street in Richmond, Virginia. All emergency work will take place within the City of Richmond's existing, paved, right-of-way (ROW) and will not require new ROW or

easements. The new pipes will be placed adjacent to the existing pipes and the existing pipe will be abandoned in place. Abandonment of the existing pipeline (versus excavation and removal) will minimize ground disturbance. It is anticipated that ground disturbance will be limited to the roadway/sidewalk. All emergency gas main replacements proposed are within moderately developed urban areas that are primarily residential. The entire roadway has been previously disturbed by pipeline work and several utilities. The expected maximum depth of excavation for this Undertaking is 42 inches below grade by 18 inches wide.

The staging areas for the project have not been identified. Project location maps are enclosed in **Attachment A**. Photographs showing the overall character of the project areas are included in **Attachment B**.

Area of Potential Effects (APE)

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the Undertaking may directly or indirectly affect historic resources. Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, PHMSA has delineated the APE for this Undertaking to encompass the existing ROW, which includes the limits of disturbance. The APE extends to the depth of proposed ground disturbance of up to 42 inches below grade. The Undertaking does not have the potential to cause visual or audible effects after the completion of construction. The existing ROW includes the roadway, parking lanes, sidewalk, light poles, overhead power lines, overhead streetlights, fire hydrants, bike lanes, bus stops, benches, signs, trees, and bushes. The APE is shown on the maps in **Attachment A**.

Identification and Evaluation

To identify historic properties in the APE, individuals who meet the Secretary of the Interior's (SOI) Professional Qualification Standards reviewed available information on previously identified historic properties in the APE, including the National Register of Historic Places (NRHP) database and data gathered from the Virginia Cultural Resources Information System (VCRIS) database and the USDA Web Soil Survey. Historic topographic maps and historic aerial photographs were also examined. SOI-qualified individuals conducted research to determine if there are any previously unidentified properties within the APE that are 45 years of age or older and may be eligible for listing in the NRHP.

Historic Architecture

There are no NRHP-eligible or NRHP-listed above-ground resources within the APE. Additionally, a search of VCRIS found no known potentially significant above-ground resources within the APE.

Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, the identification effort for previously unidentified above-ground historic properties focused on identifying properties that could experience diminished integrity as a result of the Undertaking. A review of the APE found no additional above-ground resources that have the potential to be affected by the Undertaking.

Archeology

VCRIS was examined to identify the presence of previously recorded archeological sites and previously conducted archeological surveys within the APE and within a quarter of a mile from the APE. As a result, no previous surveys and no previously recorded archeological sites were identified as intersecting the APE or within a quarter of a mile of the APE.

An examination of USDA Web Soil Survey data within the APE revealed two soil classes including Turbeville-Urban land complex, which encompasses approximately 97% of the APE. Well drained and moderately well drained soils can be indicative of human habitation during both the pre-contact and historic periods. Both soil types within the APE are considered well drained soils. However, typically slopes greater than 15 percent are not suitable for human occupation, and soil type Wateree-Wedowee complex, which is the other 3 percent within the APE has a slope of 20-45 percent. The APE is comprised mostly of urban land with impervious surfaces such as buildings and pavement and is largely part of a built environment.

Historic topographic maps from 1895, 1934 and 1974 and historic aerial photographs from 1952 and 1968 were examined for archeological resource potential within the APE. The presence of structures on historic maps and aerial photography may indicate the likelihood of historic period archeological deposits associated with the occupation of these structures. The APE is comprised of a residential neighborhood initially developed in the late nineteenth century. The earliest available historic topographic map from 1895 shows the APE located in the already developed neighborhood, which by this time had well-established roads. The 1934 topographic map reveals more detail than previous maps, showing several buildings such as several churches a quarter of a mile east of the APE and numerous buildings and neighborhoods to the west. Aerial photographs from 1952 and 1968 align with the historic topographic maps reviewed; the APE contains a well-established residential neighborhood in a dense urban area.

Background research revealed no archeological sites and no surveys within the APE or a quarter of a mile from the APE. Most of the soils are urban land type and an examination of the APE indicates no suitable conditions for pre-contact and historic period human habitation, as evident by the scarcity of archeological sites noted near the APE. Additionally, the entire roadway has been previously disturbed by pipeline work and several utilities including water distribution lines, underground telephone lines, sewer, and storm drains. The emergency project work for this Undertaking is limited to the replacement of existing pipelines in areas that demonstrate a low probability for intact significant archaeological resources.

Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are no historic properties as defined in 36 CFR 800.16(l) within the APE. Therefore, in accordance with 36 CFR Part 800.4(d)(1), PHMSA has determined the Undertaking will result in No Historic Properties Affected. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Request for Section 106 Concurrence

PHMSA requests that you provide any information you have regarding historic properties of religious or cultural significance to your Tribe/Nation that may be present in the APE and affected by the Undertaking. If your Tribe/Nation is unaware of any historic properties beyond what we have identified to date, PHMSA is notifying your Tribe/Nation of our intention to make a finding of No Historic Properties Affected. PHMSA is submitting this Undertaking to your office for your review and comment. PHMSA requests an expedited review and concurrence with our finding within **seven calendar days** from the date on this letter per 36 CFR Part 800.12(b)(2). We appreciate prompt notification of any concerns regarding this Undertaking. Construction for this project is expected to begin the week of February 12 or February 19, 2024, and is expected to last 40 to 60 days. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,

A handwritten signature in black ink, appearing to read "Matt Fuller". The signature is written in a cursive, slightly slanted style.

Matt Fuller
Senior Environmental Protection Specialist

ME/kg

cc: Caitlin Rogers, Cultural Division Program Manager

Enclosures:

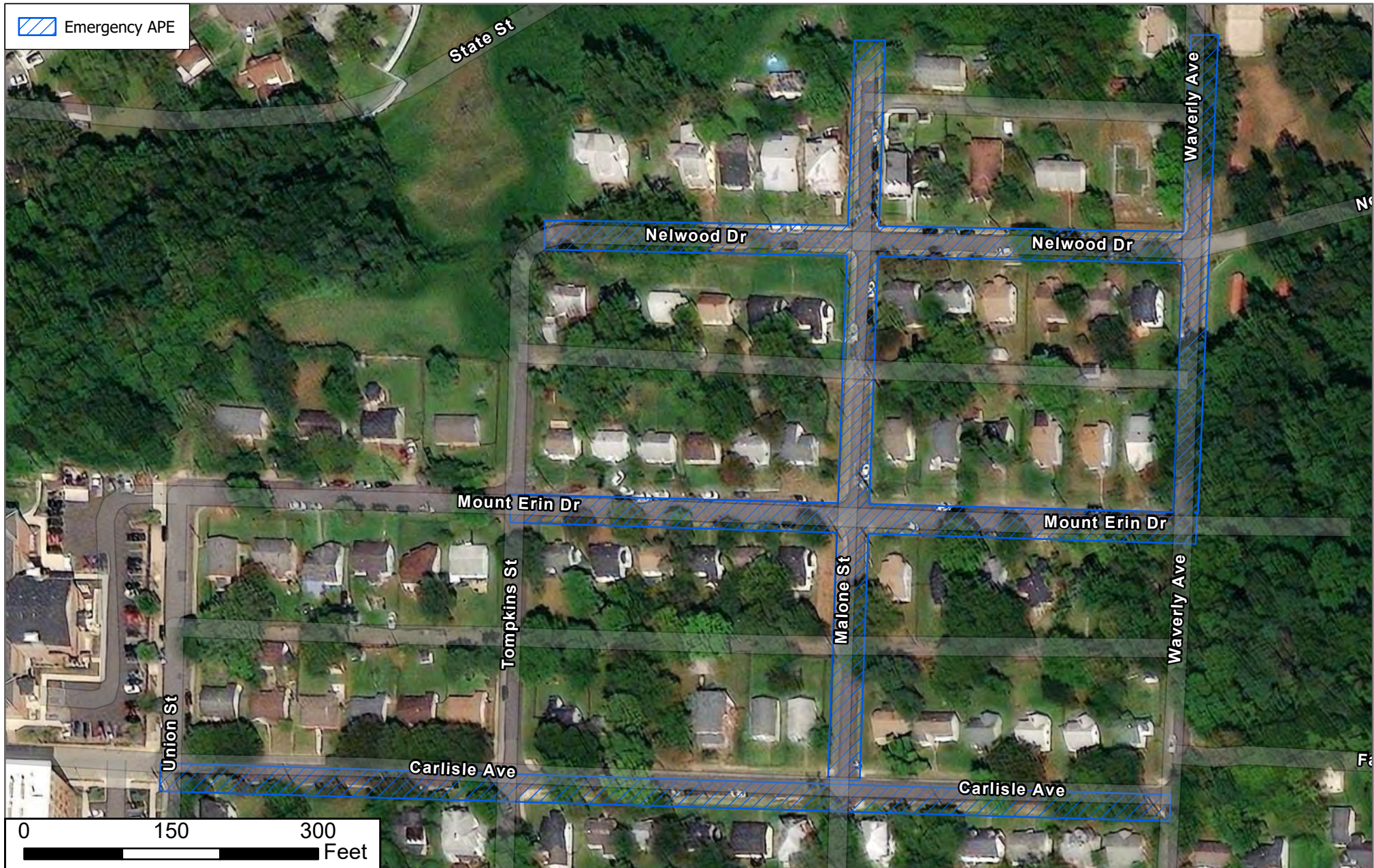
Attachment A: Project Location and APE Maps

Attachment B: Project Area Photographs

ATTACHMENT A

Project Location and APE Maps

Emergency Work APE



Name: Richmond, Virginia Gas Line Replacement
Scale: 1,600
Total Acreage: 2.41
Richmond, VA, Richmond City County



Service Layer Credits: Maxar, Microsoft, Esri Community Maps Contributors, City of Richmond, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS

ATTACHMENT B

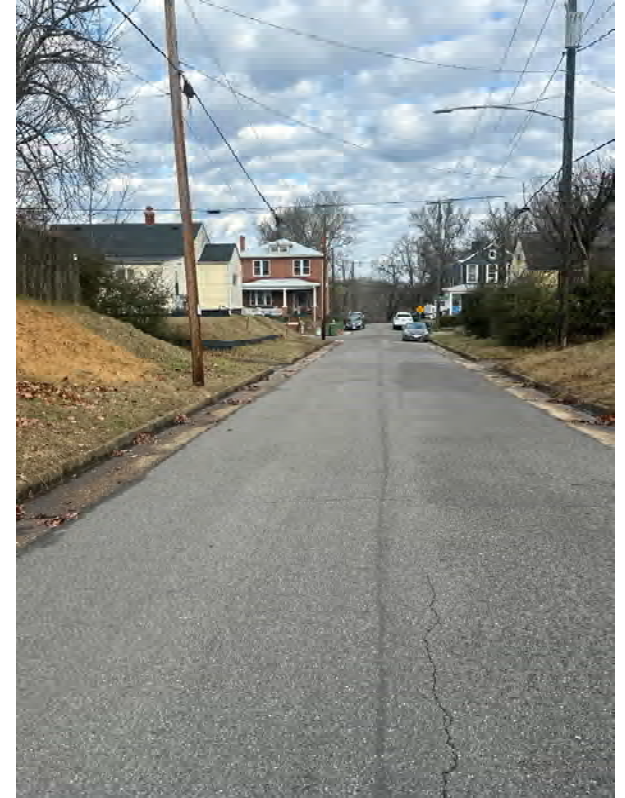
Project Area Photographs



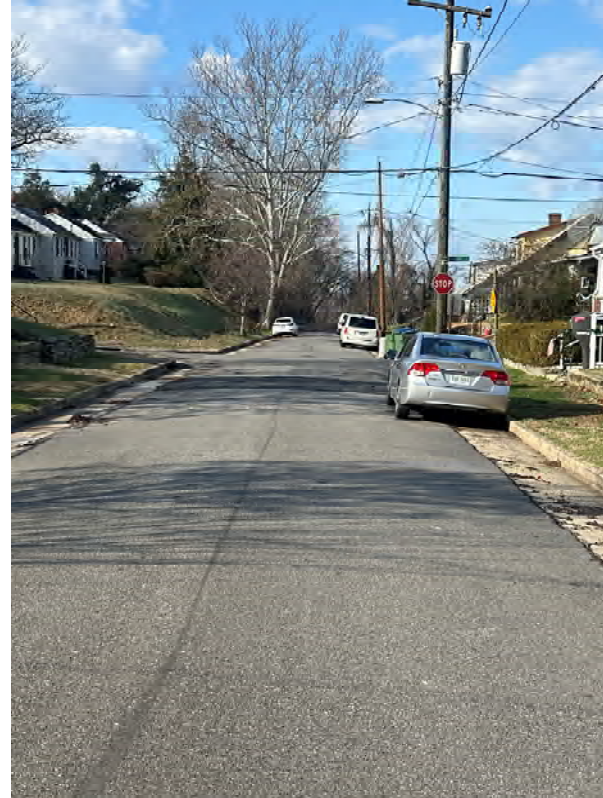
Carlisle Avenue looking West. Single family homes on either side of roadway.



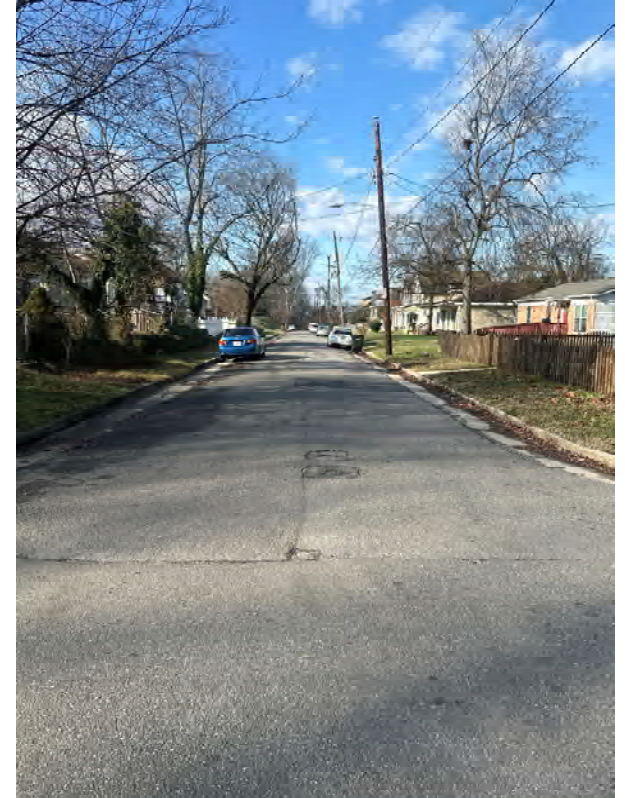
Looking east on Mt. Erin Drive. Single family homes on either side of roadway.



Looking north on Malone Street. Single family homes on either side of roadway.



Looking west on Nelwood Drive. Single family homes on either side of roadway.



Looking north on Waverly Avenue. Single family homes on either side of roadway.



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

February 8, 2024

Deborah Dotson
President
Delaware Nation, Oklahoma
31064 State Highway 281, Building 100
Anadarko, OK – 73005

Section 106 Consultation: Emergency PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear President Dotson:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) for the emergency replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The Grant Recipient is proposing a larger Natural Gas Pipeline Replacement Project throughout the city; however, the emergency replacement of this portion of pipeline is being expedited to **respond to an immediate threat to life or property**. Therefore, PHMSA requests an **expedited seven-day review** per 36 CFR Part 800.12(b)(2). Consultation for the larger project will be submitted to your office in the coming weeks.

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Project Description/Background

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The emergency work proposed in this Undertaking will replace 3,500 to 4,000 LF of 2-inch and 4-inch failing natural gas pipe north of Carlisle Street in Richmond, Virginia. All emergency work will take place within the City of Richmond's existing, paved, right-of-way (ROW) and will not require new ROW or

easements. The new pipes will be placed adjacent to the existing pipes and the existing pipe will be abandoned in place. Abandonment of the existing pipeline (versus excavation and removal) will minimize ground disturbance. It is anticipated that ground disturbance will be limited to the roadway/sidewalk. All emergency gas main replacements proposed are within moderately developed urban areas that are primarily residential. The entire roadway has been previously disturbed by pipeline work and several utilities. The expected maximum depth of excavation for this Undertaking is 42 inches below grade by 18 inches wide.

The staging areas for the project have not been identified. Project location maps are enclosed in **Attachment A**. Photographs showing the overall character of the project areas are included in **Attachment B**.

Area of Potential Effects (APE)

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Identification and Evaluation

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There are no NRHP-eligible or NRHP-listed above-ground resources within the APE. Additionally, a search of VCRIS found no known potentially significant above-ground resources within the APE.

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Background research revealed no archeological sites and no surveys within the APE or a quarter of a mile from the APE. Most of the soils are urban land type and an examination of the APE indicates no suitable conditions for pre-contact and historic period human habitation, as evident by the scarcity of archeological sites noted near the APE. Additionally, the entire roadway has been previously disturbed by pipeline work and several utilities including water distribution lines, underground telephone lines, sewer, and storm drains. The emergency project work for this Undertaking is limited to the replacement of existing pipelines in areas that demonstrate a low probability for intact significant archaeological resources.

Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are no historic properties as defined in 36 CFR 800.16(l) within the APE. Therefore, in accordance with 36 CFR Part 800.4(d)(1), PHMSA has determined the Undertaking will result in No Historic Properties Affected. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Request for Section 106 Concurrence

PHMSA requests that you provide any information you have regarding historic properties of religious or cultural significance to your Tribe/Nation that may be present in the APE and affected by the Undertaking. If your Tribe/Nation is unaware of any historic properties beyond what we have identified to date, PHMSA is notifying your Tribe/Nation of our intention to make a finding of No Historic Properties Affected. PHMSA is submitting this Undertaking to your office for your review and comment. PHMSA requests an expedited review and concurrence with our finding within **seven calendar days** from the date on this letter per 36 CFR Part 800.12(b)(2). We appreciate prompt notification of any concerns regarding this Undertaking. Construction for this project is expected to begin the week of February 12 or February 19, 2024, and is expected to last 40 to 60 days. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,

A handwritten signature in black ink, appearing to read "Matt Fuller". The signature is written in a cursive, flowing style.

Matt Fuller
Senior Environmental Protection Specialist

ME/kg

cc: Katelyn Lucas, Tribal Historic Preservation Officer

Enclosures:

- Attachment A: Project Location and APE Maps
- Attachment B: Project Area Photographs



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

February 8, 2024

Robert Gray
Chief
Pamunkey Indian Tribe
1 054 Pocahontas Trail
King William, VA - 23086

Section 106 Consultation: Emergency PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear Chief Gray:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) for the emergency replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The Grant Recipient is proposing a larger Natural Gas Pipeline Replacement Project throughout the city; however, the emergency replacement of this portion of pipeline is being expedited to **respond to an immediate threat to life or property**. Therefore, PHMSA requests an **expedited seven-day review** per 36 CFR Part 800.12(b)(2). Consultation for the larger project will be submitted to your office in the coming weeks.

The purpose of this letter is to determine if there are historic properties of cultural or religious significance to your Tribe/Nation that may be affected by the Undertaking, to determine if you want to be a consulting party for this Undertaking and/or the larger project, and to notify your Tribe/Nation of PHMSA's intention to make a finding of No Historic Properties Affected.

Project Description/Background

The Grant Recipient is considering the replacement of this segment of natural gas pipeline an emergency due to wet seasonal weather causing significant and frequent water infiltration into the low-pressure cast iron pipeline system that provides gas services to several homes and businesses. Water infiltration is considered an emergency, particularly during the cold winter months, because meters may freeze and residents may lose heat for prolonged periods of time. Additionally, water infiltration may interrupt gas flow to homes and businesses that have standing pilot light appliances, which is also a threat to life and property.

The emergency work proposed in this Undertaking will replace 3,500 to 4,000 LF of 2-inch and 4-inch failing natural gas pipe north of Carlisle Street in Richmond, Virginia. All emergency work will take place within the City of Richmond's existing, paved, right-of-way (ROW) and will not require new ROW or

easements. The new pipes will be placed adjacent to the existing pipes and the existing pipe will be abandoned in place. Abandonment of the existing pipeline (versus excavation and removal) will minimize ground disturbance. It is anticipated that ground disturbance will be limited to the roadway/sidewalk. All emergency gas main replacements proposed are within moderately developed urban areas that are primarily residential. The entire roadway has been previously disturbed by pipeline work and several utilities. The expected maximum depth of excavation for this Undertaking is 42 inches below grade by 18 inches wide.

The staging areas for the project have not been identified. Project location maps are enclosed in **Attachment A**. Photographs showing the overall character of the project areas are included in **Attachment B**.

Area of Potential Effects (APE)

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the Undertaking may directly or indirectly affect historic resources. Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, PHMSA has delineated the APE for this Undertaking to encompass the existing ROW, which includes the limits of disturbance. The APE extends to the depth of proposed ground disturbance of up to 42 inches below grade. The Undertaking does not have the potential to cause visual or audible effects after the completion of construction. The existing ROW includes the roadway, parking lanes, sidewalk, light poles, overhead power lines, overhead streetlights, fire hydrants, bike lanes, bus stops, benches, signs, trees, and bushes. The APE is shown on the maps in **Attachment A**.

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Historic Architecture

There are no NRHP-eligible or NRHP-listed above-ground resources within the APE. Additionally, a search of VCRIS found no known potentially significant above-ground resources within the APE.

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An examination of USDA Web Soil Survey data within the APE revealed two soil classes including Turbeville-Urban land complex, which encompasses approximately 97% of the APE. Well drained and moderately well drained soils can be indicative of human habitation during both the pre-contact and historic periods. Both soil types within the APE are considered well drained soils. However, typically slopes greater than 15 percent are not suitable for human occupation, and soil type Wateree-Wedowee complex, which is the other 3 percent within the APE has a slope of 20-45 percent. The APE is comprised mostly of urban land with impervious surfaces such as buildings and pavement and is largely part of a built environment.

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Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are no historic properties as defined in 36 CFR 800.16(l) within the APE. Therefore, in accordance with 36 CFR Part 800.4(d)(1), PHMSA has determined the Undertaking will result in No Historic Properties Affected. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

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Sincerely,

A handwritten signature in black ink, appearing to read "Matt Fuller". The signature is written in a cursive, flowing style.

Matt Fuller
Senior Environmental Protection Specialist

ME/kg

Enclosures:

Attachment A: Project Location and APE Maps

Attachment B: Project Area Photographs



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

February 9, 2024

Roger Kirchen
Review and Compliance Division Manager
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, VA 23221

Section 106 Consultation: Emergency PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear Roger Kirchen:

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Consulting Party Outreach

PHMSA identified parties that may be interested in the Undertaking and its effects on historic properties. PHMSA invites the individuals/organizations copied on this letter to participate as Section 106 consulting parties. Invited parties should indicate their willingness to participate as a consulting party and provide comments on the enclosed form (**Attachment C**). Note that a non-response is considered to be a declination to participate; however, interested parties can request to join consultation at any time in the process. If any invited party expresses concern about the Undertaking's potential effects to historic properties, PHMSA will consult with the party to resolve those concerns prior to project implementation.

PHMSA will also invite the following federally recognized tribes to participate in consultation by separate letter:

- Catawba Indian Nation
- Delaware Nation
- Pamunkey Indian Tribe

Request for Section 106 Concurrence

Based on the information presented above, PHMSA has determined that the Undertaking will result in No Historic Properties Affected. PHMSA is submitting this Undertaking to your office for your review and comment. PHMSA requests an expedited review and concurrence with our finding within **seven calendar days** from the date on this letter per 36 CFR Part 800.12(b)(2). We appreciate prompt notification of any concerns regarding this Undertaking. Construction for this project is expected to begin the week of February 12 or February 19, 2024, and is expected to last 40 to 60 days. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,



Matt Fuller
Senior Environmental Protection Specialist

MF/kg

cc: Elizabeth Williams, Environmental Protection Specialist, USDOT Volpe Center
Renee Taylor, PHMSA Grant Specialist
Christian Chirico, City of Richmond Natural Gas Pipeline Replacement
Historic Richmond

Enclosures:

Attachment A: Project Location and APE Maps
Attachment B: Project Area Photographs
Attachment C: Consulting Party Response Form

From: [Jennifer Greentree](#)
To: [Giraldo, Kathering \(Volpe\)](#)
Cc: [Roger Kirchen](#)
Subject: Emergency PHMSA Pipeline Replacement Project in the City of Richmond (DHR File No. 2024-3320) | e-Mail #04860
Date: Friday, February 9, 2024 3:12:00 PM

CAUTION: This email originated from outside of the Department of Transportation (DOT). Do not click on links or open attachments unless you recognize the sender and know the content is safe.

Dear Ms. Giraldo,

Thank you for requesting comments from the Department of Historic Resources (DHR) on the referenced project. Based upon the documentation provided, it is our opinion that no historic properties will be affected by the proposed undertaking.

Implementation of the undertaking in accordance with the finding of *No Historic Properties Affected* as documented fulfills the Federal agency's responsibilities under Section 106 of the National Historic Preservation Act. If the scope of the undertaking changes or if the undertaking cannot be completed as proposed in the application submitted and reviewed by DHR, please contact our office for guidance on reinitiating consultation under Section 106.

If you have any questions or require any further assistance at this time, please contact me.

Sincerely,

Jennifer Greentree, Architectural Historian
Office of Review and Compliance
Division of Resource Services and Review
Phone: (804) 482-6090
Jennifer.Greentree@dhr.virginia.gov

Appendix C

Air Quality

Table 1. Average methane emission factors for natural gas pipelines (adapted from EPA GHG Inventory, Annex 3.6, Table 3.6-2)

Pipeline Material	Pre-1990 Installation (kg/mile)	1990-2020 Installation (kg/mile)	Average Rate (kg/mile/year)
Cast Iron	4,597.40	1,157.30	2,877.35
Unprotected steel	2,122.30	861.3	1,491.80
Protected steel	59.1	96.7	77.90
Plastic	190.9	28.8	109.85

Table 2. No Action Leak Rate

Pipeline Material Type	Average Rate (kg/mile/year)	Miles	Current Methane Leak Rate (kg/year)
Cast Iron (includes 0.3 mi of DI)	2,877.35	10.73	30,873
Unprotected steel	2,122.30	0.00	0
Protected steel	77.9	2.29	178
Plastic	109.98	0.20	22
Total Annual Methane Leak Rate (existing)			31,073
20-year Methane Emissions			621,456

Table 3. Proposed Action Leak Rate

Pipeline Material Type	Average Rate (kg/mile/year)	Miles	New Methane Leak Rate (kg/year)
Plastic	28.8	13.22	381
Year 1 Methane Reduction			30,052
Annual Methane Reduction			30,692
20-year Methane Reduction			613,202

Methane Blowdown

Equation 1 was used to estimate blowdown emissions in MCF, assuming a pipeline diameter (d) and pressure (P) described in Table 3.

$$E_{blowdown} = V \times \frac{P_{pipe} + P_{atm}}{P_{atm}} \quad (1)$$

Where the pipeline volume (V) is calculated by multiplying the cross-sectional area of the pipe by the length of pipeline (L):

$$V = \pi \times \frac{d^2}{4} \times L \quad (2)$$

Table 4. Proposed Action - Methane Blowdown

Inputs	Segment								
	Mechanicsville Turnpike & Euclid Rd	Dalebrook Drive	Lakeside (Hillard)	Lakeside (Dumbarton)	Mechanicsville @ Byron	Phaup St.	Mosby St & Fairmount St.	Northampton St	Union St
Diameter (inches)	2-12	2-8	1.25-6	2-6	2-12	4-12	3-12	3-8	4-8
Blowdown Pressure (PSI)	23	23	23	23	23	0.25	0.25	0.25	0.25
Length of Blowdown (feet)	3104.26	12645.65	3316.80	2901.87	4366.33	4615.16	10997.64	18499.42	9335.01
Blowdown (MCF)	5.18	2.8	1.15	1.34	3.06	0.65	2.73	2.64	1.29
Blowdown (kg)	159.07	85.98	35.32	41.15	93.97	19.96	83.84	81.07	39.61

Table 5. Emissions by Equipment Type¹

	CO	NOx	VOC	PM10	PM2.5	CO2	CH4
Backhoe/Excavator	69.4153	430.999	36.3418	20.0732	19.47099	2083595	1.38697
Tractor	0	0	0	0	0	0	0
Paver/Screed	0	0	0	0	0	0	0
Roller	0	0	0	0	0	0	0
Dump Truck	69.4153	430.999	36.3418	20.0732	19.47099	2083595	1.38697

Table 6. Total Project Emissions

	CO	NOx	VOC	PM10	PM2.5	CO2	CH4
kg	138.831	861.997	72.6836	40.1464	38.94199	4167189	2.77394
short tons	0.15303	0.95019	0.08012	0.04425	0.042926	4593.53	0.00306

Table 7. De Minimis rates for Maintenance Areas (tons/year); source: <https://www.epa.gov/general-conformity/de-minimis-tables>

40 CFR 93.153(b)(2) - For purposes of paragraph (b) of this section the following rates apply in maintenance areas:	
	Tons/year
Ozone (NOx), SO ₂ or NO ₂ :	
All maintenance areas	100
Ozone (VOC's)	
Maintenance areas inside an ozone transport region	50
Maintenance areas outside an ozone transport region	100
Carbon monoxide: All maintenance areas	100
PM ₁₀ : All maintenance areas	100
PM _{2.5} (direct emissions, SO ₂ , NOx, VOC, and Ammonia)	100
All maintenance areas	100
Pb: All maintenance areas	25

¹ Based on information provided by the City of Richmond

Appendix D

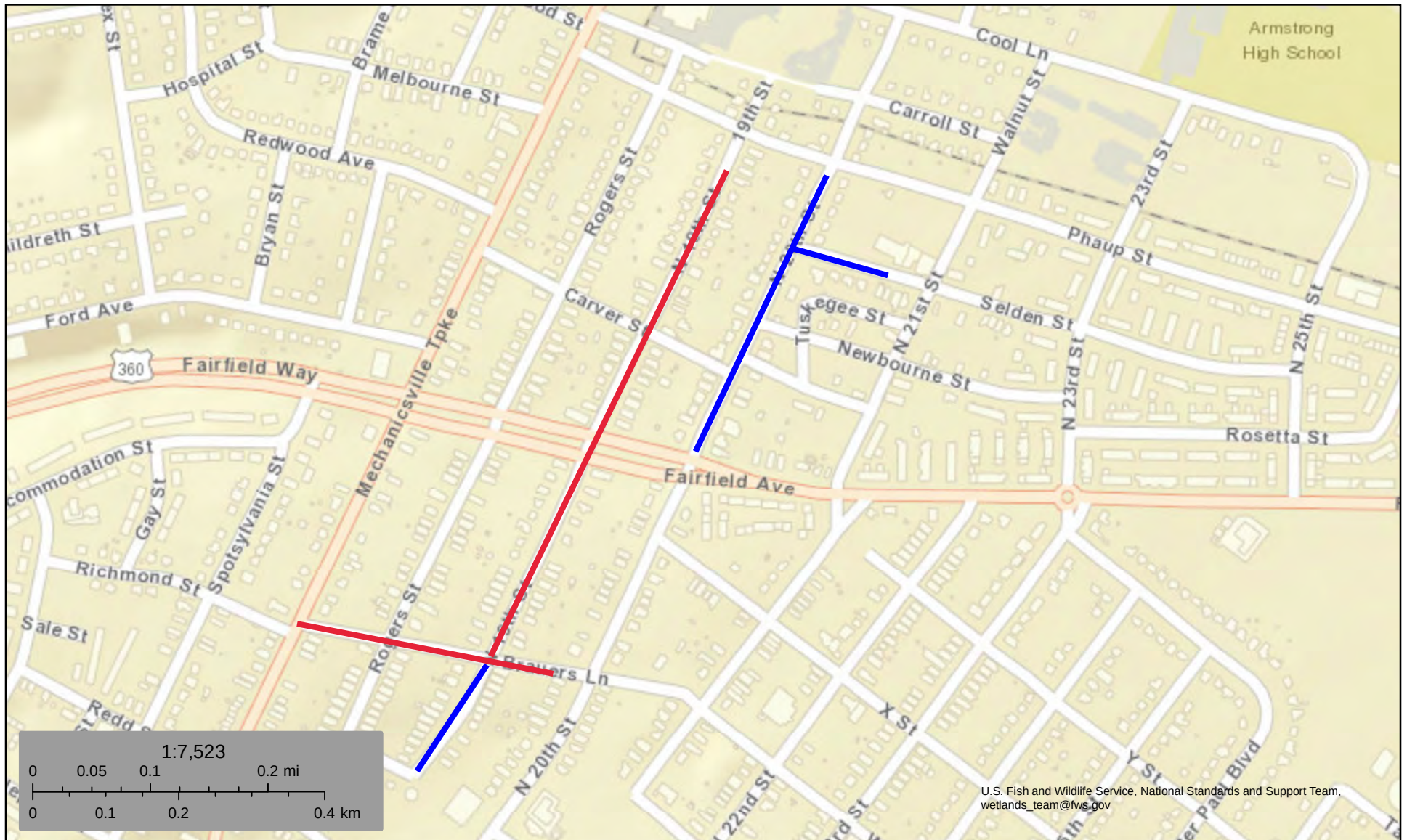
Water Resources



U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package: 107989- N 19th St.-Phaup St. to Brauers Ln.



July 19, 2023

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland

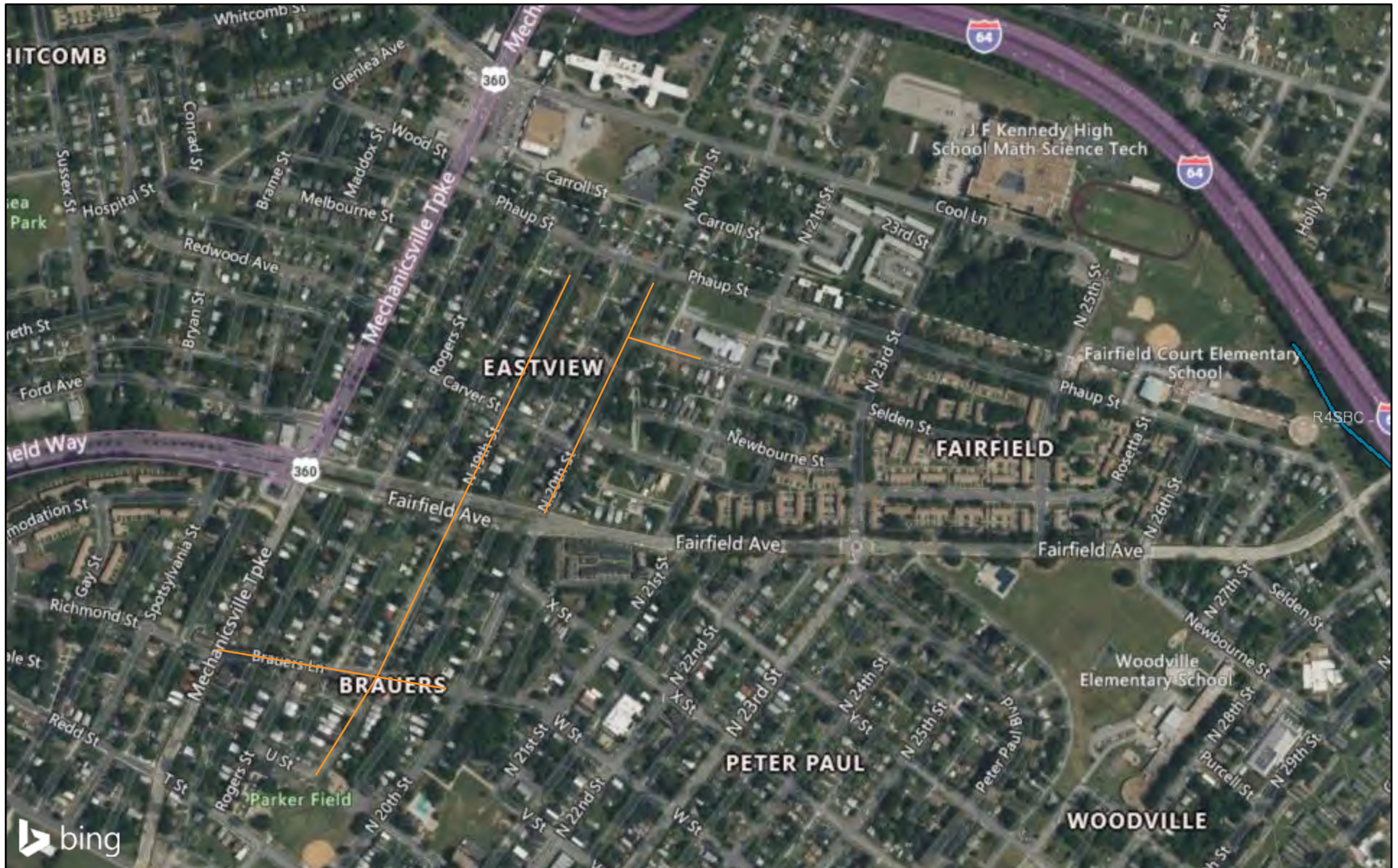
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

- Lake
- Other
- Riverine

Gas Lines

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

107989

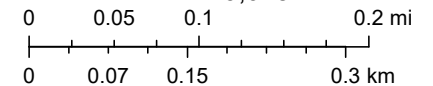


November 15, 2023

Wetlands



1:9,028



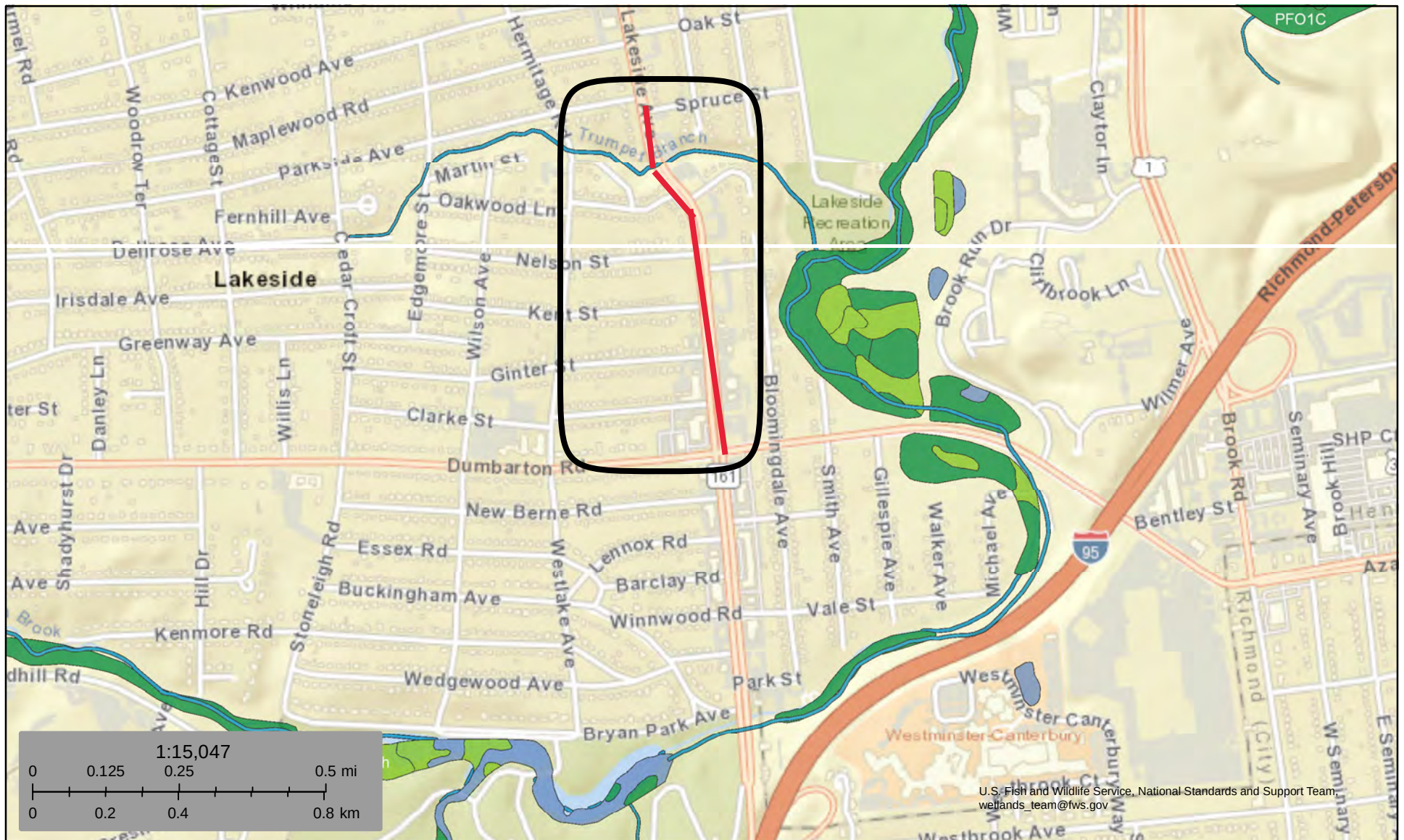
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U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package: 107990 Lakeside Ave.- Dumbarton Rd.



July 18, 2023

Wetlands

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

- Lake
- Other
- Riverine

Gas Lines

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

107990



November 15, 2023

107990

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine

1:9,028

0 0.05 0.1 0.2 mi

0 0.07 0.15 0.3 km

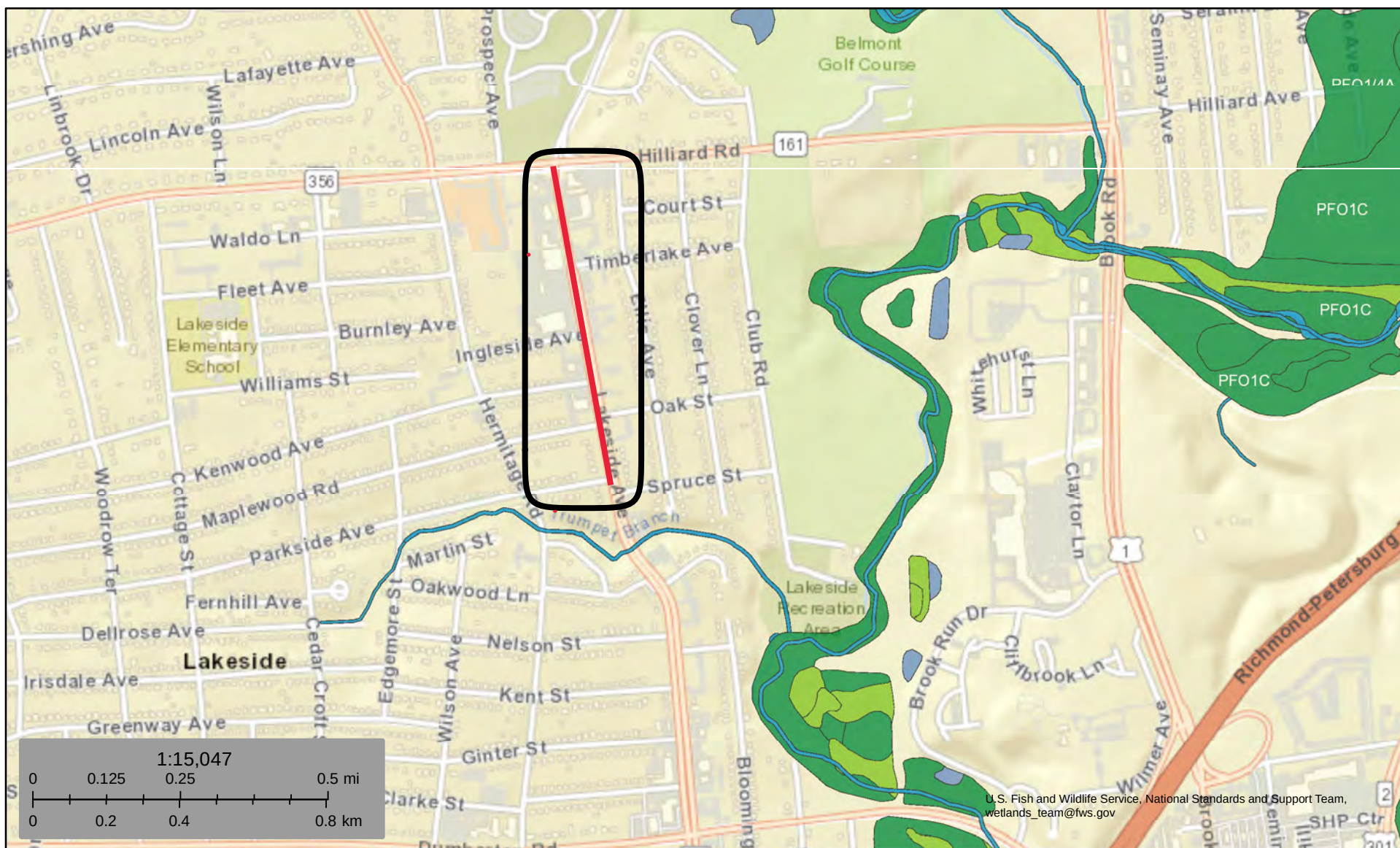
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U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package 107991- Lakeside Ave- Parkside Ave to Hilliard Rd.



July 18, 2023

Wetlands

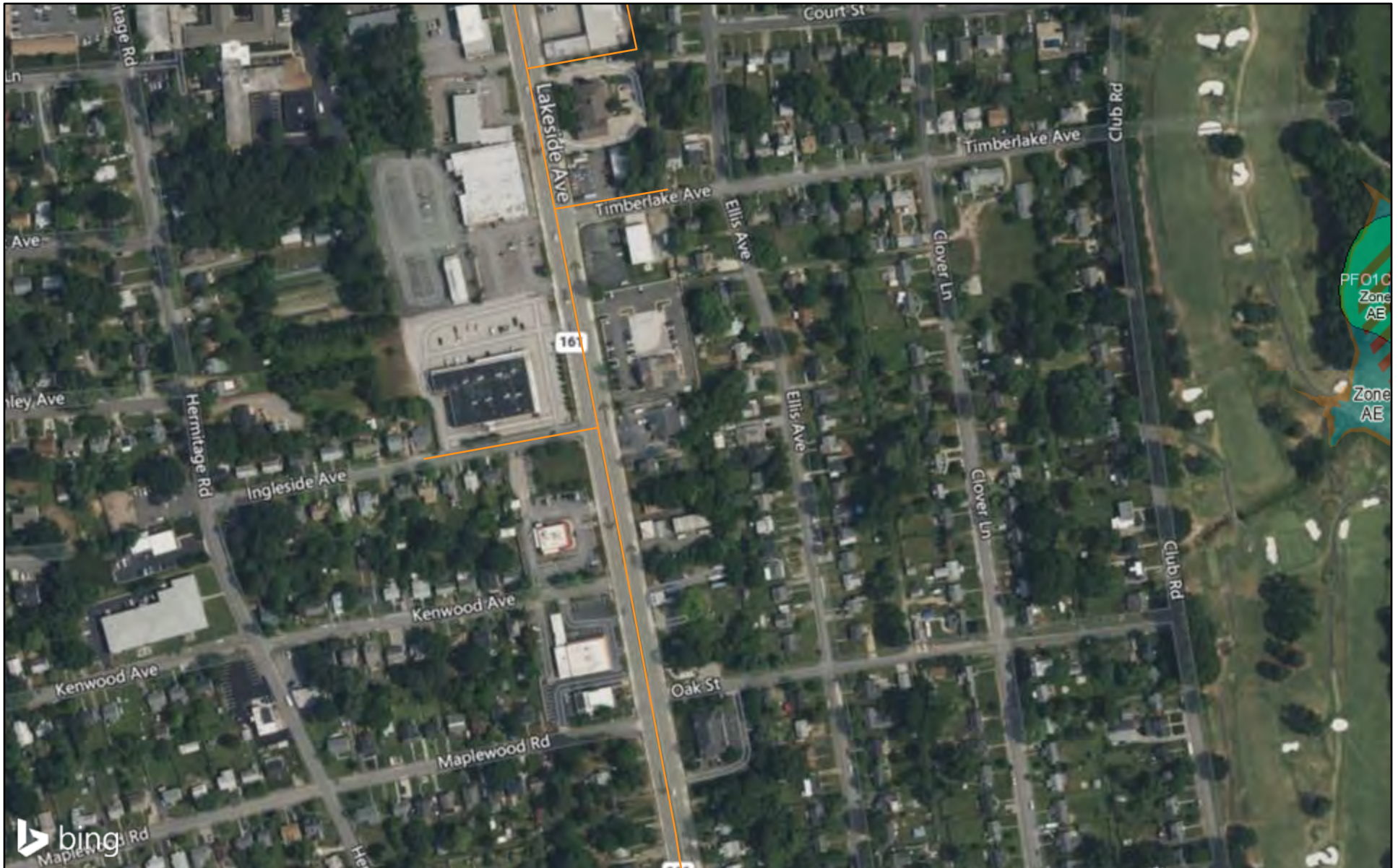
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Gas Lines

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond

- Lake
- Other
- Riverine

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107991



November 15, 2023

107991

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

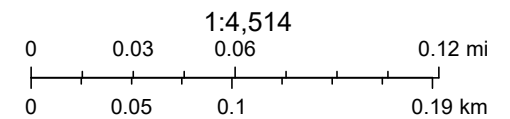
Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine



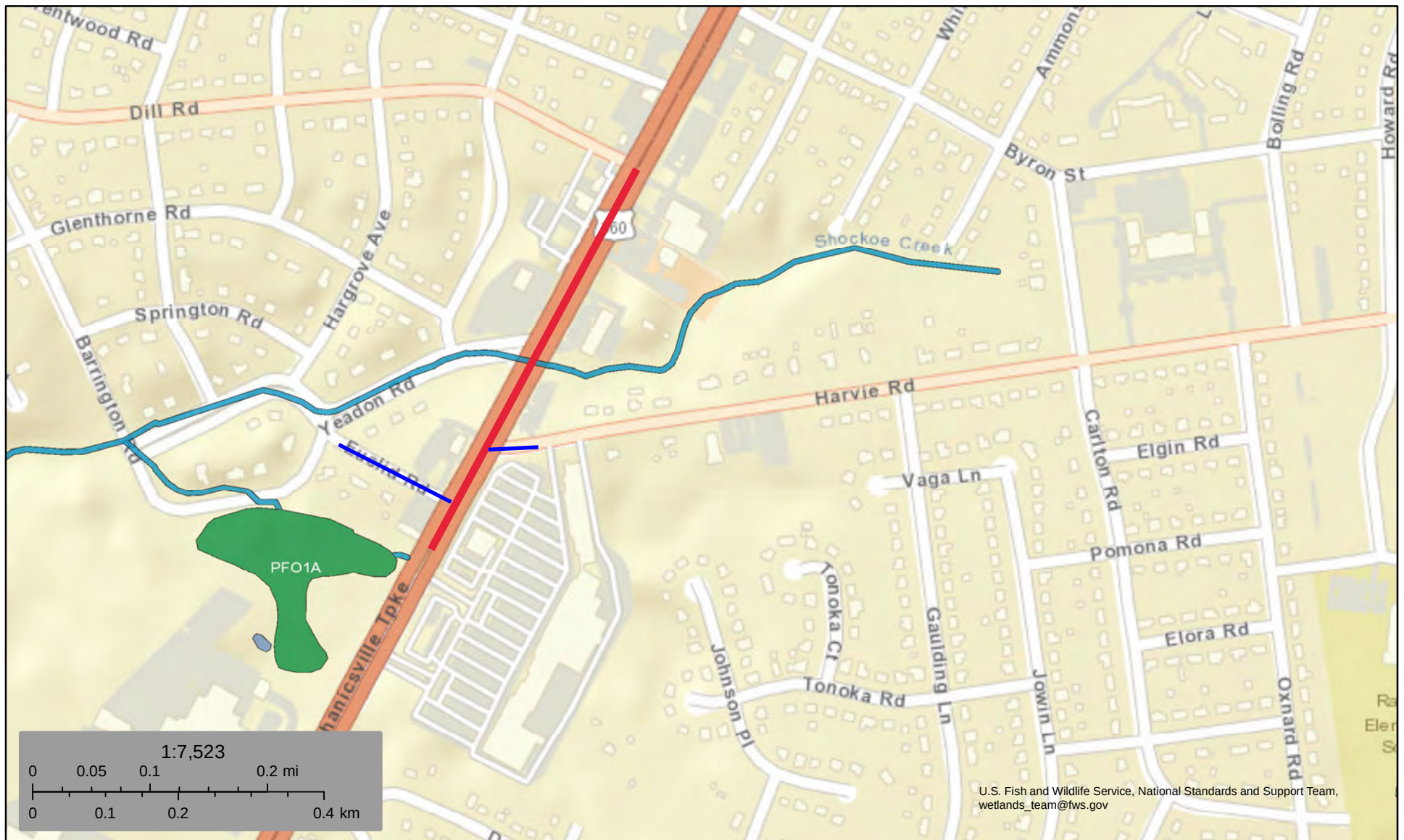
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U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package 108020: Mechanicsville TPKE & Euclid Rd.



U.S. Fish and Wildlife Service, National Standards and Support Team,
wetlands_team@fws.gov

July 19, 2023

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Gas Lines

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine

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108020



November 15, 2023

108020

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

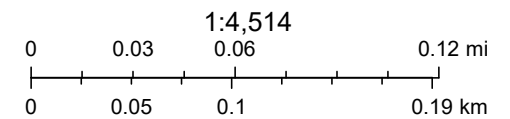
Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine



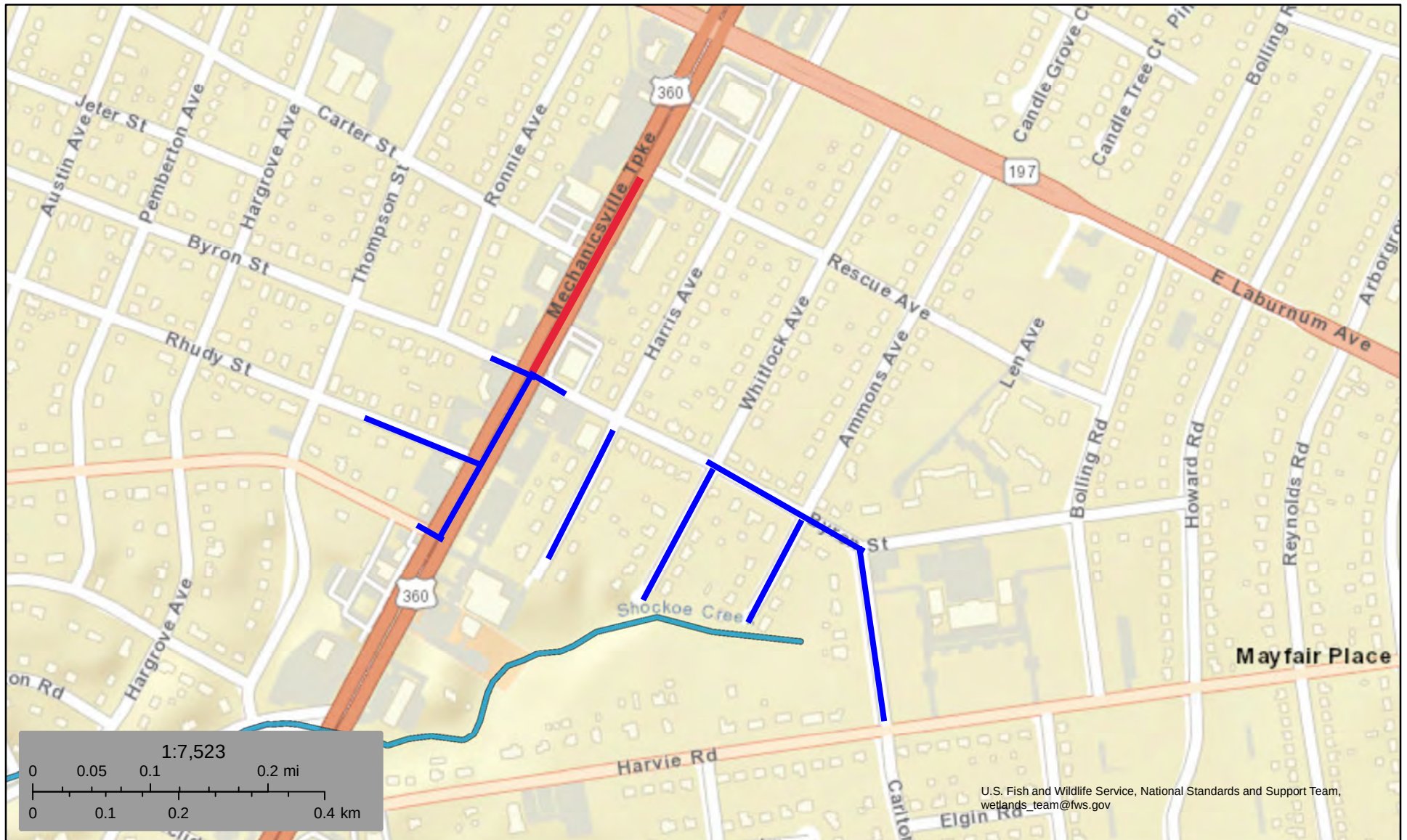
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U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package: 108023- Mechanicsville TPKE & Byron St.



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wetlands_team@fws.gov

July 19, 2023

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Gas Lines

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

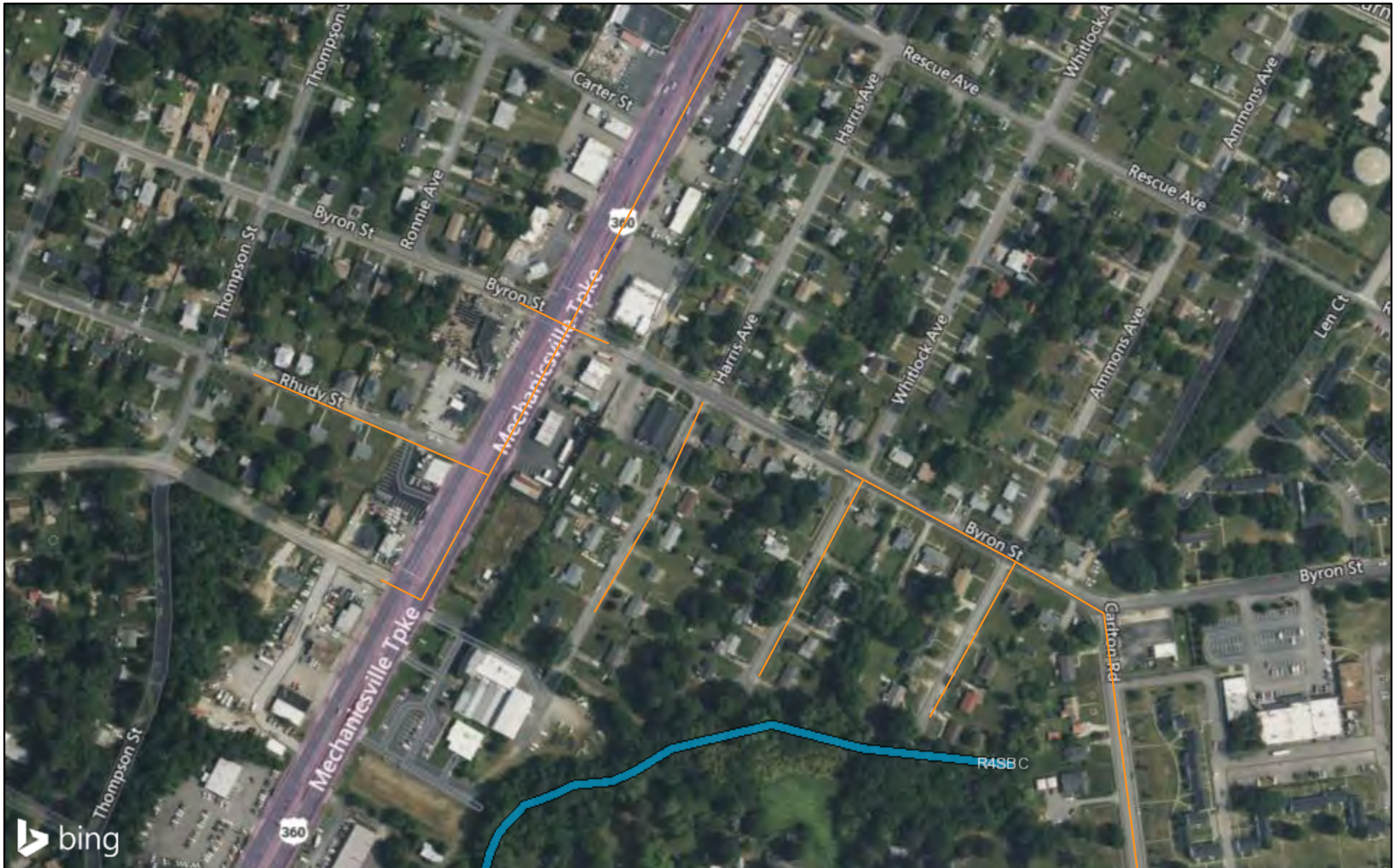
Lake

Other

Riverine

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108023



November 15, 2023

108023

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

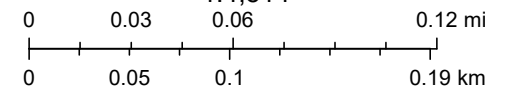
Freshwater Pond

Lake

Other

Riverine

1:4,514



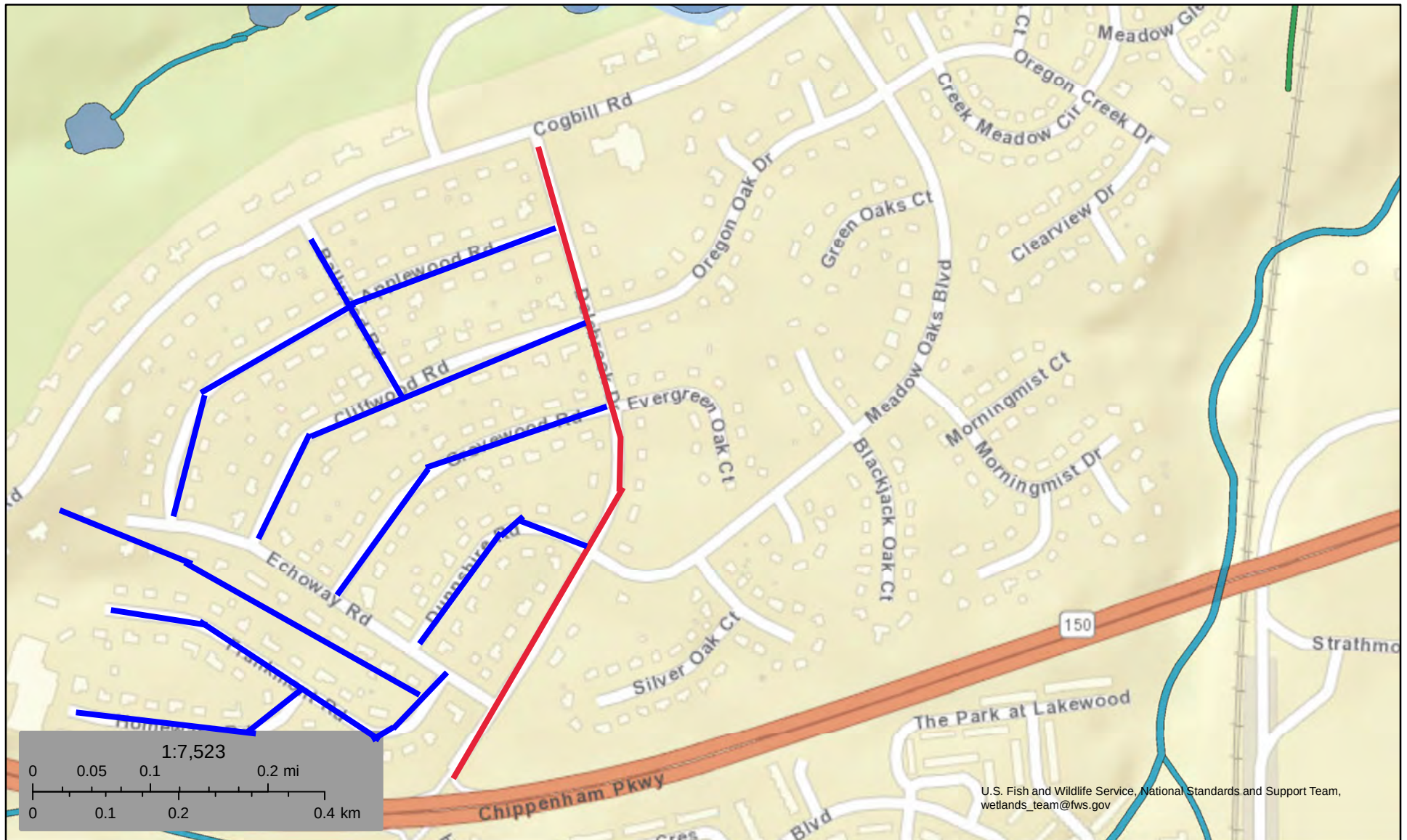
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U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package 108024: Dalebrook RD. (Applewood to Frankmont)



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wetlands_team@fws.gov

July 19, 2023

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Gas Lines

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

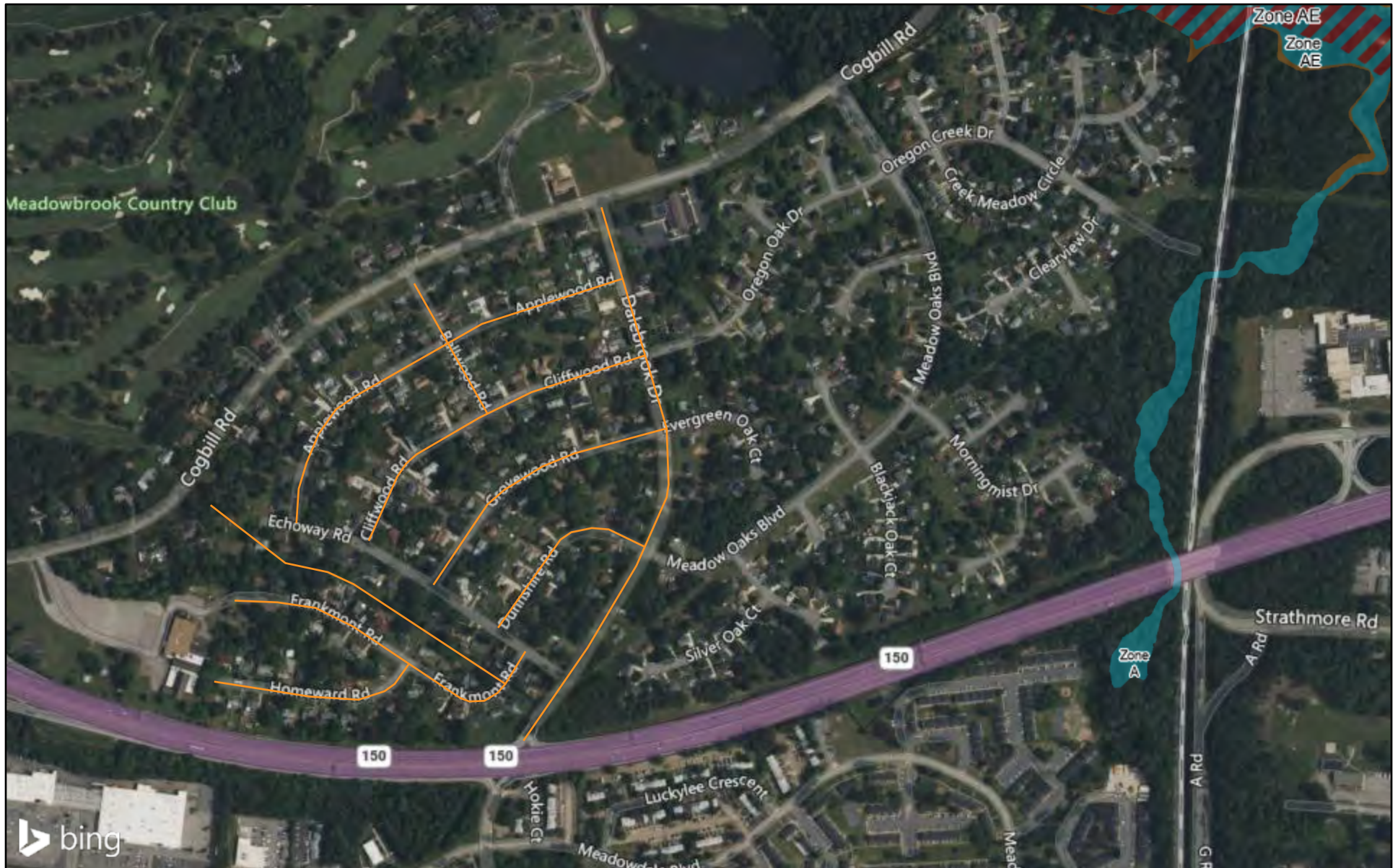
Lake

Other

Riverine

This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.

108024



November 15, 2023

108024

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Freshwater Emergent Wetland

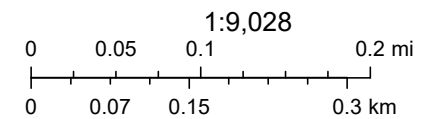
Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine



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U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package 108061- (Fairmount Ave to Venable St.)
(N 20th St. to N 25th St.)



July 19, 2023

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Gas Lines

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

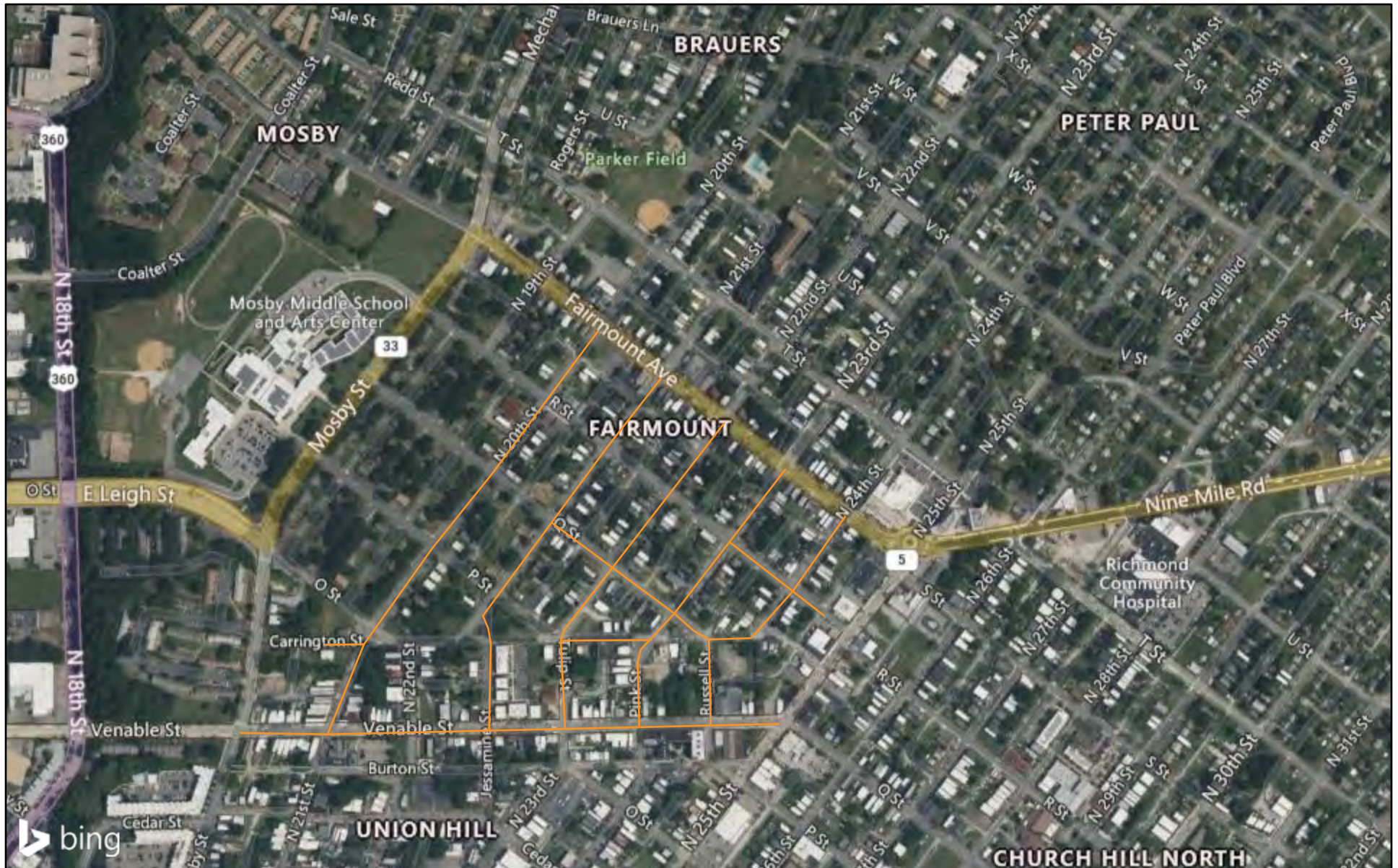
Lake

Other

Riverine

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108061



November 15, 2023

108061

Flood Hazard Zones

1% Annual Chance Flood Hazard

Regulatory Floodway

Special Floodway

Area of Undetermined Flood Hazard

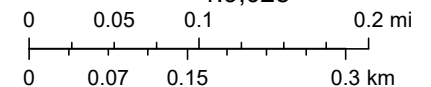
0.2% Annual Chance Flood Hazard

Future Conditions 1% Annual Chance Flood Hazard

Area with Reduced Risk Due to Levee

Area with Risk Due to Levee

1:9,028



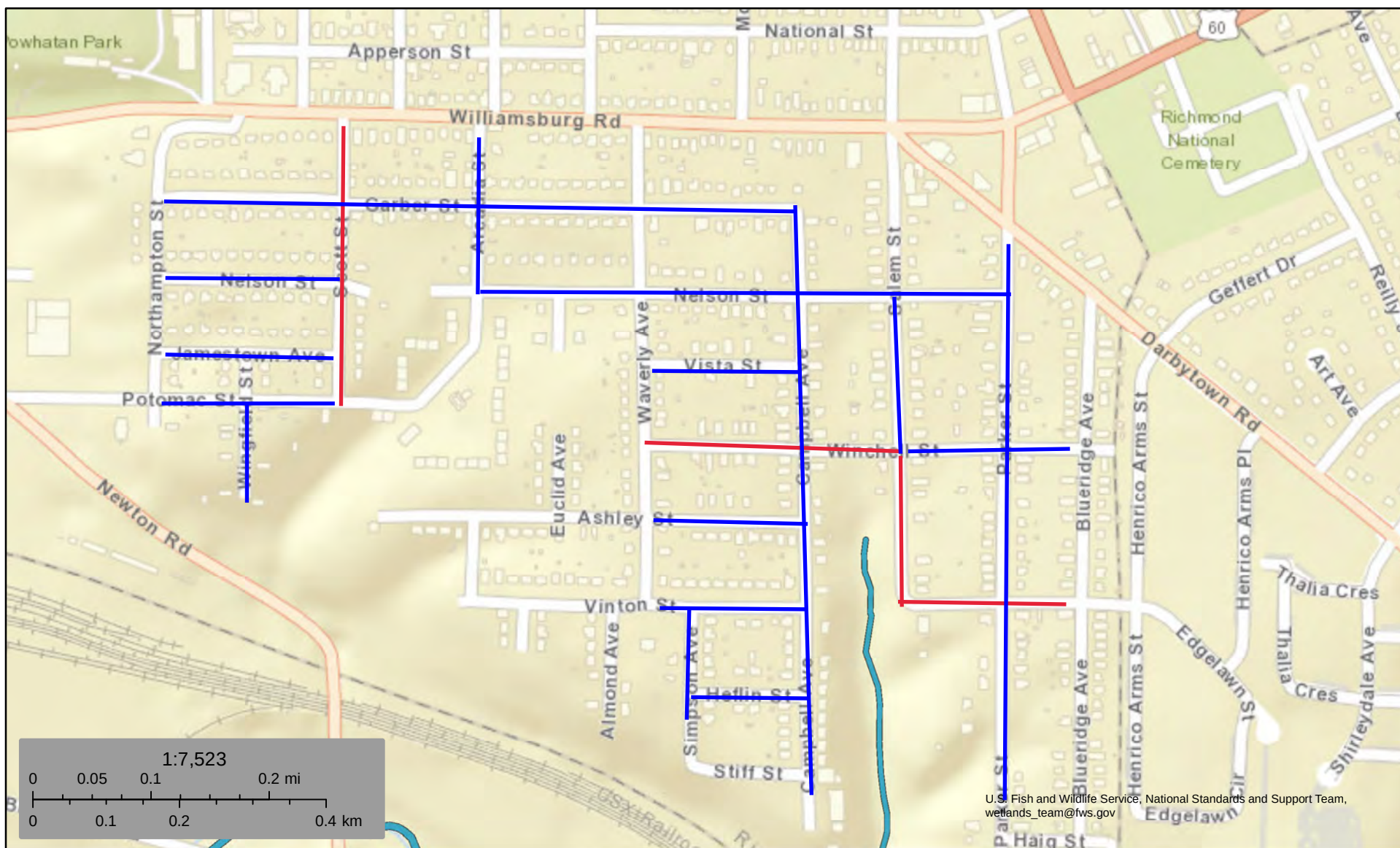
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U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package 108062: North
Hampton, Williamsburg, Parker, Haig



U.S. Fish and Wildlife Service, National Standards and Support Team,
wetlands_team@fws.gov

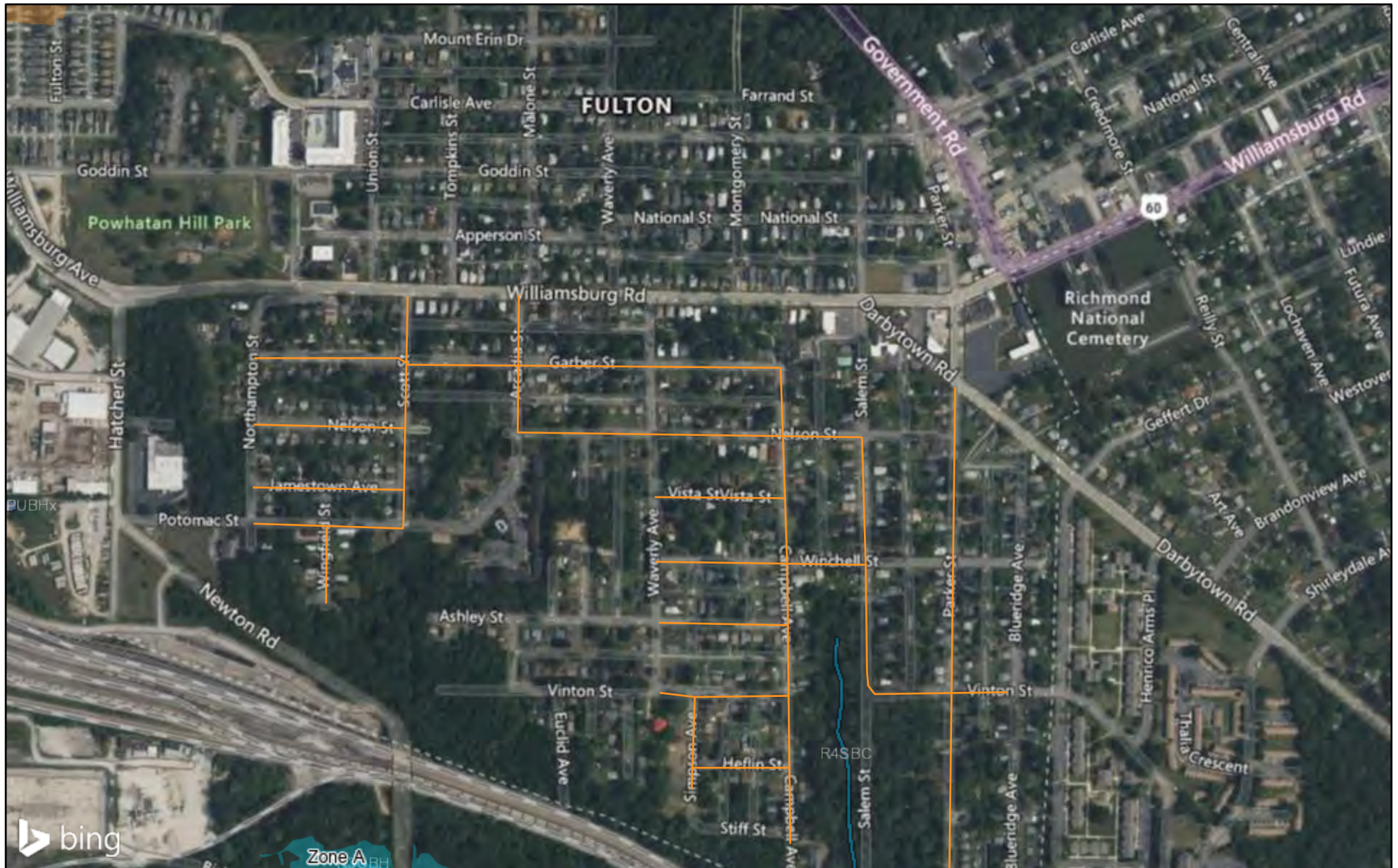
July 19, 2023

Wetlands

- | | | |
|--------------------------------|-----------------------------------|----------|
| Estuarine and Marine Deepwater | Freshwater Forested/Shrub Wetland | Lake |
| Estuarine and Marine Wetland | Freshwater Pond | Other |
| Gas Lines | | Riverine |

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108062

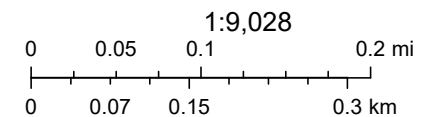


November 15, 2023

- 108062
- Flood Hazard Zones
- 1% Annual Chance Flood Hazard
- Regulatory Floodway
- Special Floodway
- Area of Undetermined Flood Hazard
- 0.2% Annual Chance Flood Hazard
- Future Conditions 1% Annual Chance Flood Hazard
- Area with Reduced Risk Due to Levee
- Area with Risk Due to Levee

- Wetlands
- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland

- Freshwater Pond
- Lake
- Other
- Riverine



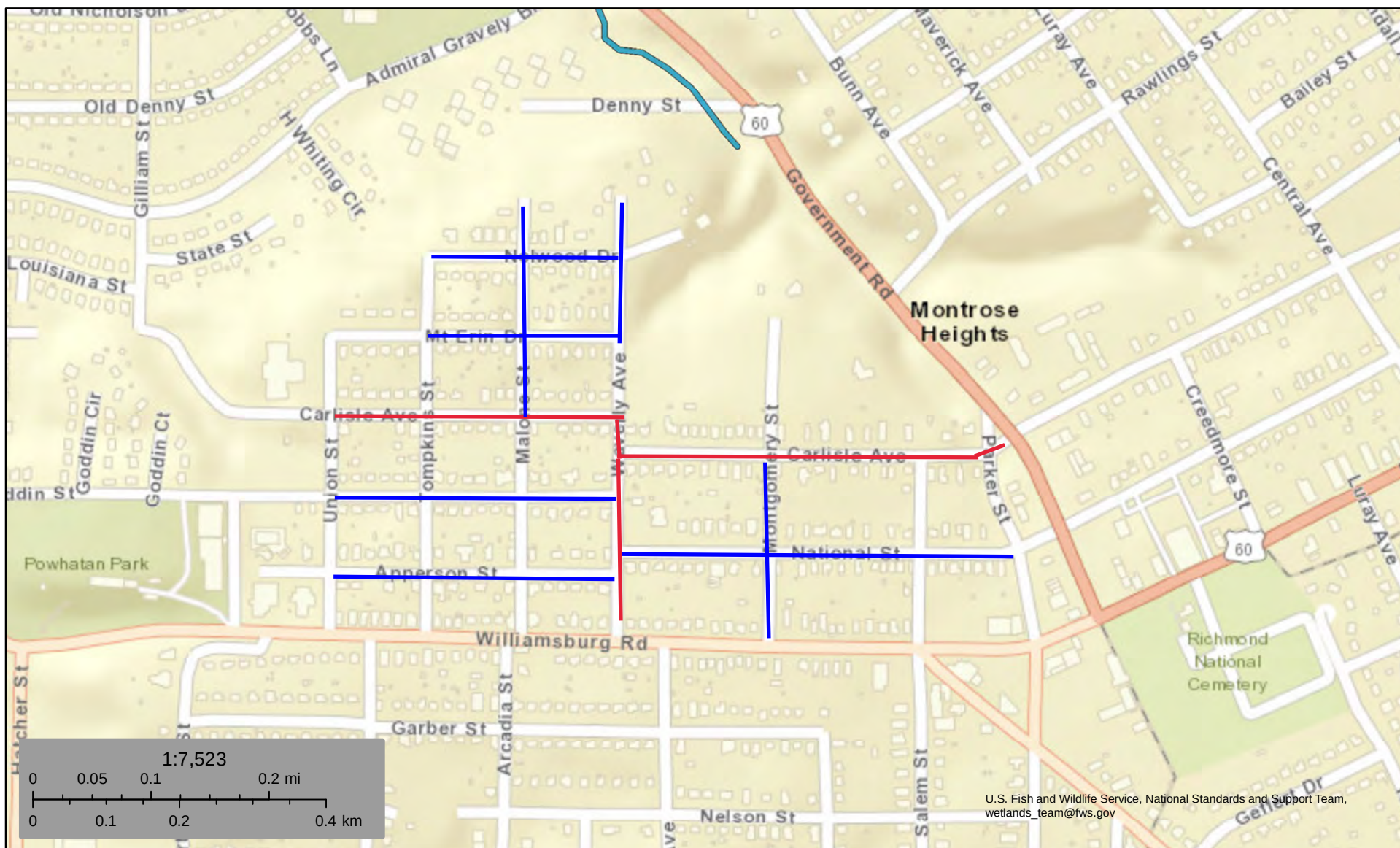
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U.S. Fish and Wildlife Service

National Wetlands Inventory

Work Package 108063-Union, Williamsburg, Government, Nelwood



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wetlands_team@fws.gov

July 19, 2023

Wetlands

Estuarine and Marine Deepwater

Estuarine and Marine Wetland

Gas Lines

Freshwater Emergent Wetland

Freshwater Forested/Shrub Wetland

Freshwater Pond

Lake

Other

Riverine

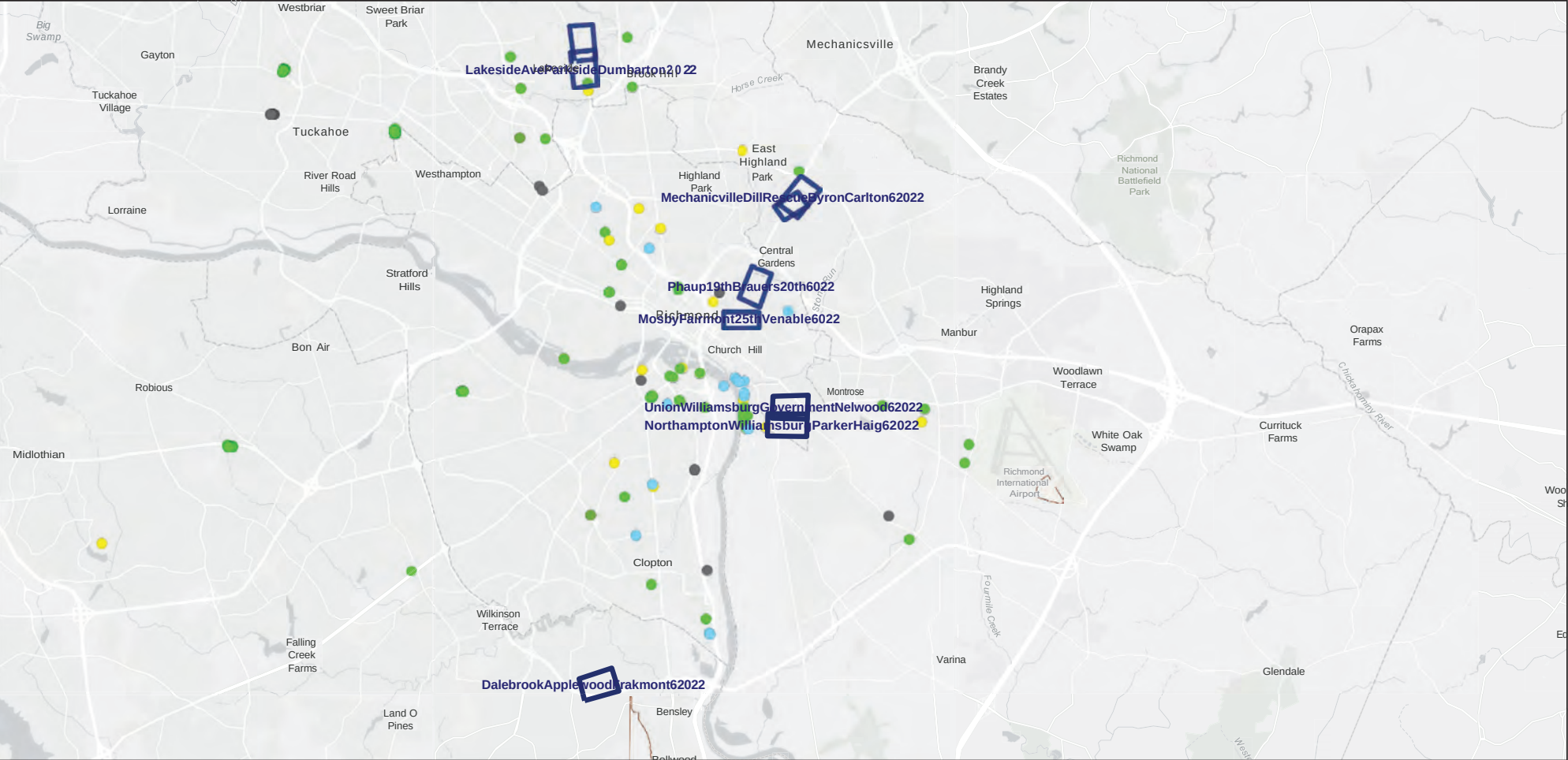
This map is for general reference only. The US Fish and Wildlife Service is not responsible for the accuracy or currentness of the base data shown on this map. All wetlands related data should be used in accordance with the layer metadata found on the Wetlands Mapper web site.



Appendix E

Hazardous Materials

Richmond GasWorks Brownfield / Historic Sites



7/26/2022, 11:12:02 AM

GasGrantProjects2022

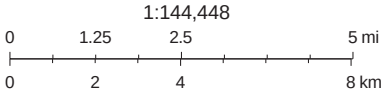
Proclamation_and_Other_Planning_Boundaries_View - Proclamation and Other Planning Boundaries

Department of Defense (DOD)

VRP Site Addresses (Daily)

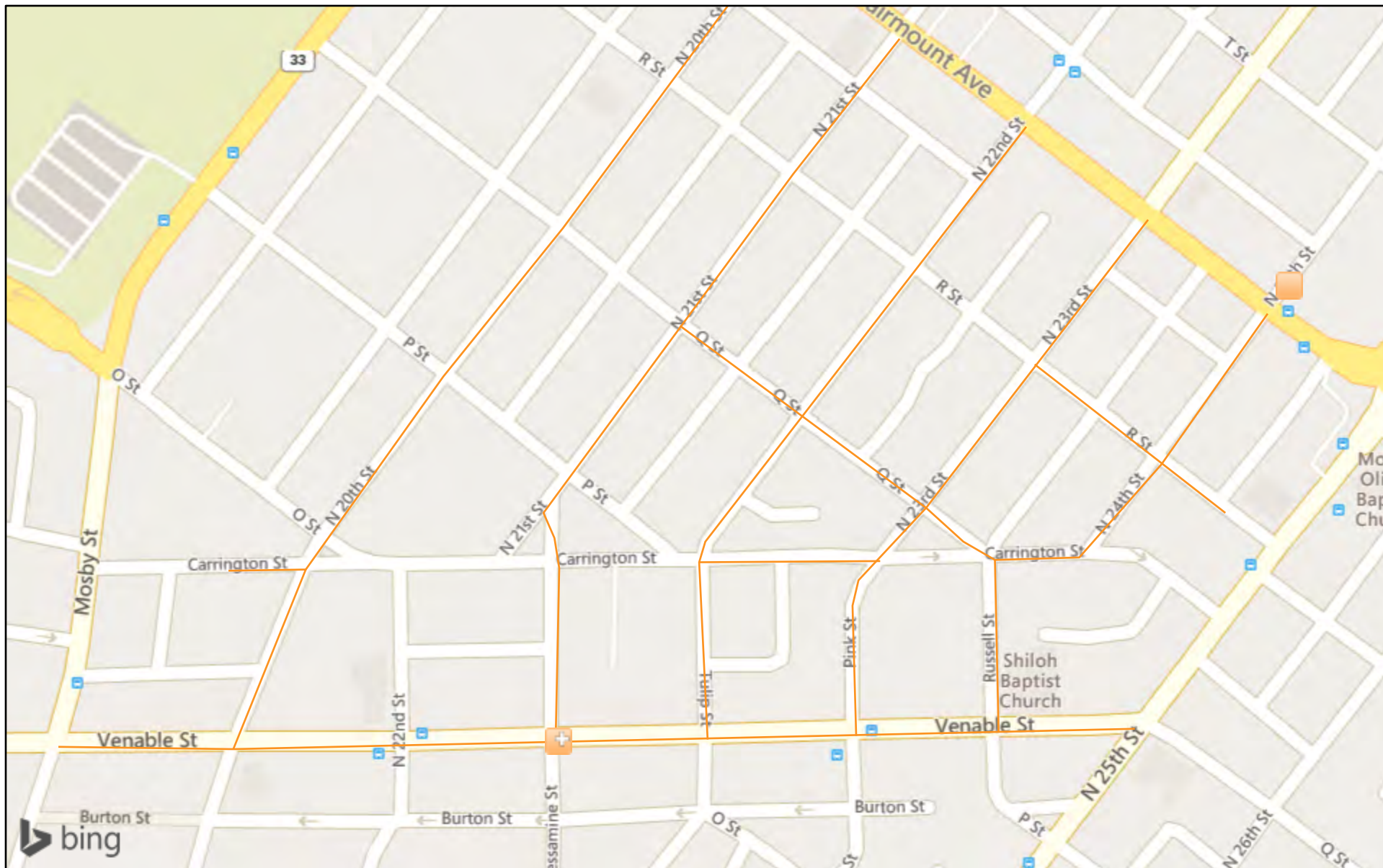
Certificate Amendment

- Certificate Issued
- Enrolled in Program
- Potential Site
- Pre-VRP
- Terminated



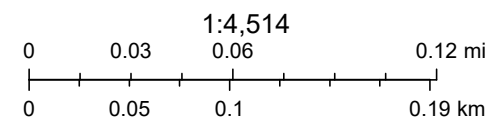
Virginia Department of Environmental Quality, City of Richmond, County of Henrico, VGIN, Esri, HERE, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA

EPA NEPAssist, EPA Facilities, Segment 108061



November 16, 2023

-  Brownfields (ACRES) 108061
-  Brownfields (ACRES)



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Appendix F

Soils Report



United States
Department of
Agriculture

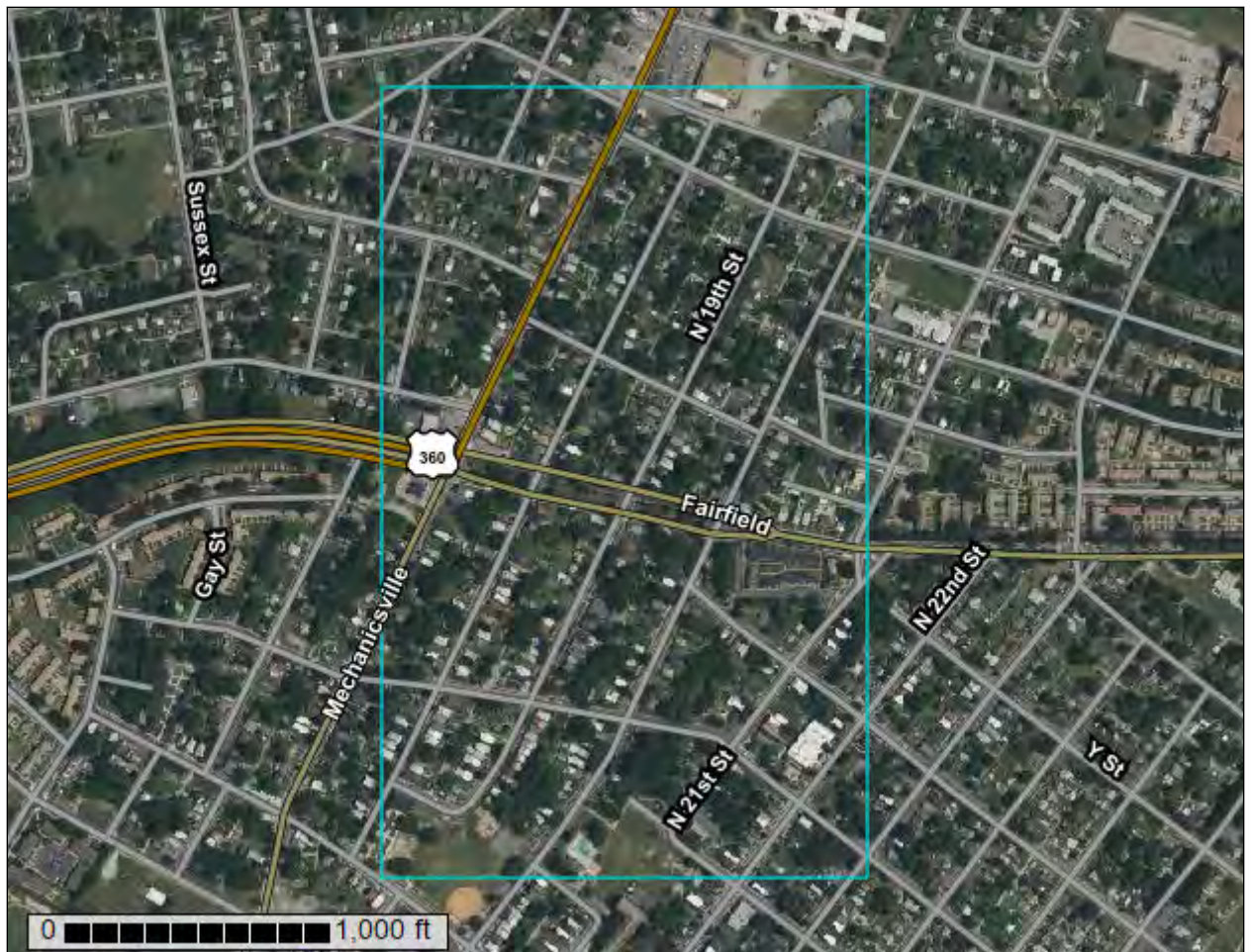
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for City of Richmond, Virginia, and Henrico County, Virginia

107989



October 30, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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41—Urban land.....	15
Henrico County, Virginia.....	16
UR—Urban land.....	16
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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: City of Richmond, Virginia

Survey Area Data: Version 19, Sep 5, 2023

Soil Survey Area: Henrico County, Virginia

Survey Area Data: Version 16, Sep 5, 2023

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

MAP LEGEND

MAP INFORMATION

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5A	Atlee-Urban land complex, 0 to 4 percent slopes	120.4	95.6%
41	Urban land	1.4	1.1%
Subtotals for Soil Survey Area		121.8	96.7%
Totals for Area of Interest		125.9	100.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
UR	Urban land	4.1	3.3%
Subtotals for Soil Survey Area		4.1	3.3%
Totals for Area of Interest		125.9	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it

was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

City of Richmond, Virginia

5A—Atlee-Urban land complex, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 4prh
Elevation: 70 to 260 feet
Mean annual precipitation: 28 to 61 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 182 to 221 days
Farmland classification: Not prime farmland

Map Unit Composition

Atlee and similar soils: 70 percent
Urban land: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Atlee

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fluviomarine deposits

Typical profile

H1 - 0 to 11 inches: very fine sandy loam
H2 - 11 to 20 inches: clay loam
H3 - 20 to 36 inches: clay loam
H4 - 36 to 163 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 30 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

41—Urban land

Map Unit Setting

National map unit symbol: 4pqw

Mean annual precipitation: 28 to 61 inches

Mean annual air temperature: 47 to 69 degrees F

Frost-free period: 182 to 221 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Henrico County, Virginia

UR—Urban land

Map Unit Setting

National map unit symbol: 4048

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

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United States
Department of
Agriculture

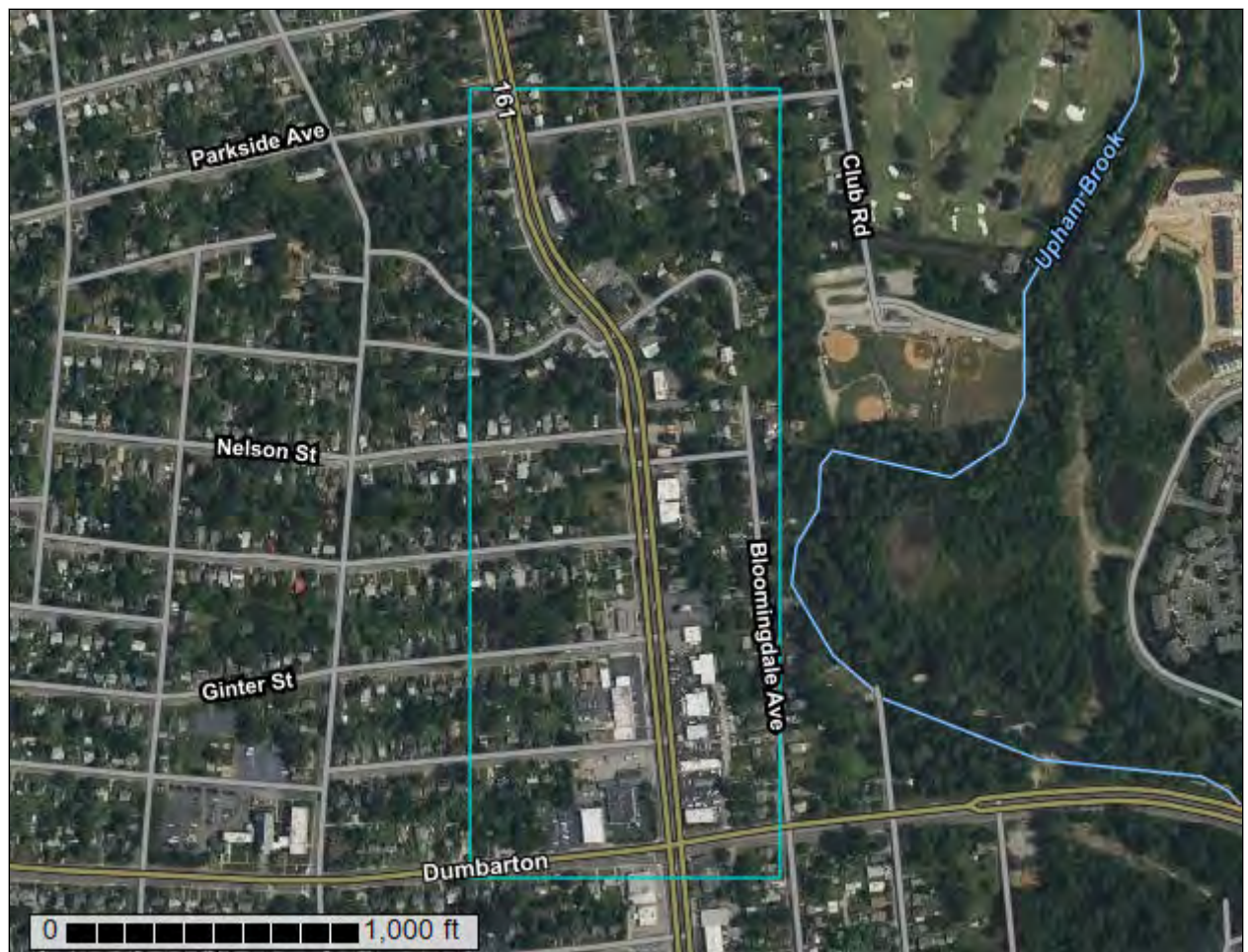
NRCS

Natural
Resources
Conservation
Service

A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Henrico County, Virginia**

107990



October 30, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

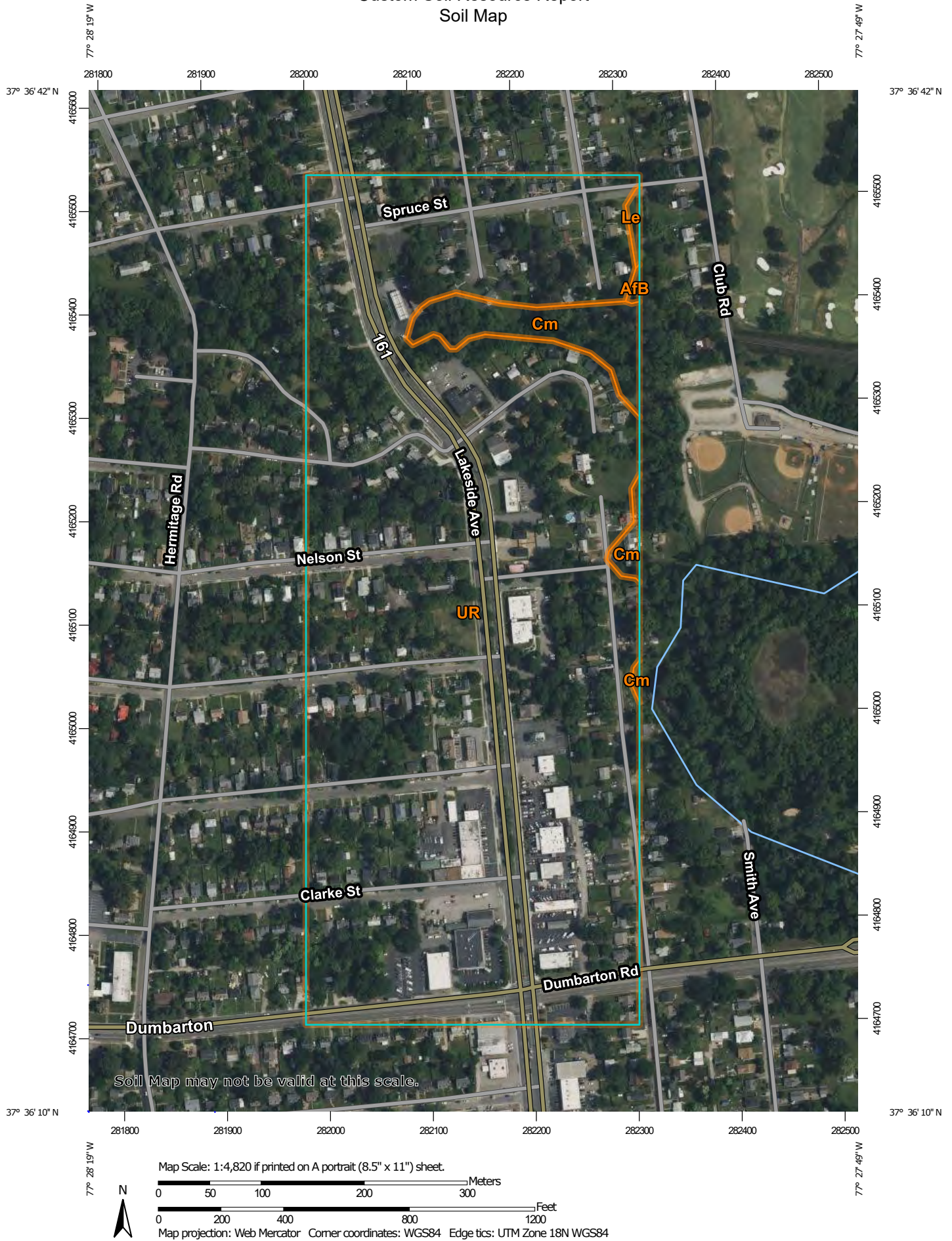
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Henrico County, Virginia
Survey Area Data: Version 16, Sep 5, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AfB	Altavista fine sandy loam, 2 to 6 percent slopes	0.1	0.1%
Cm	Chewacla and Riverview soils	2.9	4.4%
Le	Lenoir silt loam	0.2	0.2%
UR	Urban land	62.9	95.2%
Totals for Area of Interest		66.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

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Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

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An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Henrico County, Virginia

AfB—Altavista fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 400w
Elevation: 20 to 210 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Altavista and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Altavista

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Alluvium

Typical profile

H1 - 0 to 19 inches: fine sandy loam
H2 - 19 to 50 inches: sandy clay loam
H3 - 50 to 99 inches: sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Very low to high (0.00 to 1.98 in/hr)
Depth to water table: About 30 to 42 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 9.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Cm—Chewacla and Riverview soils

Map Unit Setting

National map unit symbol: 401t
Elevation: 0 to 500 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: Not prime farmland

Map Unit Composition

Chewacla and similar soils: 40 percent
Riverview and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chewacla

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 44 inches: silt loam
H3 - 44 to 79 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Hydric soil rating: Yes

Description of Riverview

Setting

Landform: Flood plains

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Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Typical profile

H1 - 0 to 5 inches: silt loam

H2 - 5 to 27 inches: silt loam

H3 - 27 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: About 48 to 79 inches

Frequency of flooding: NoneFrequent

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Roanoke

Percent of map unit: 5 percent

Landform: Stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: Yes

Chastain

Percent of map unit: 5 percent

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: Yes

Pouncey

Percent of map unit: 5 percent

Landform: Depressions

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Convex

Hydric soil rating: Yes

Le—Lenoir silt loam

Map Unit Setting

National map unit symbol: 402v
Elevation: 0 to 350 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: Not prime farmland

Map Unit Composition

Lenoir and similar soils: 85 percent
Minor components: 6 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lenoir

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 79 inches: silty clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 18 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 5w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Roanoke

Percent of map unit: 3 percent
Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: Yes

Coxville

Percent of map unit: 3 percent
Landform: Marine terraces, depressions
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: Yes

UR—Urban land

Map Unit Setting

National map unit symbol: 4048
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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Department of
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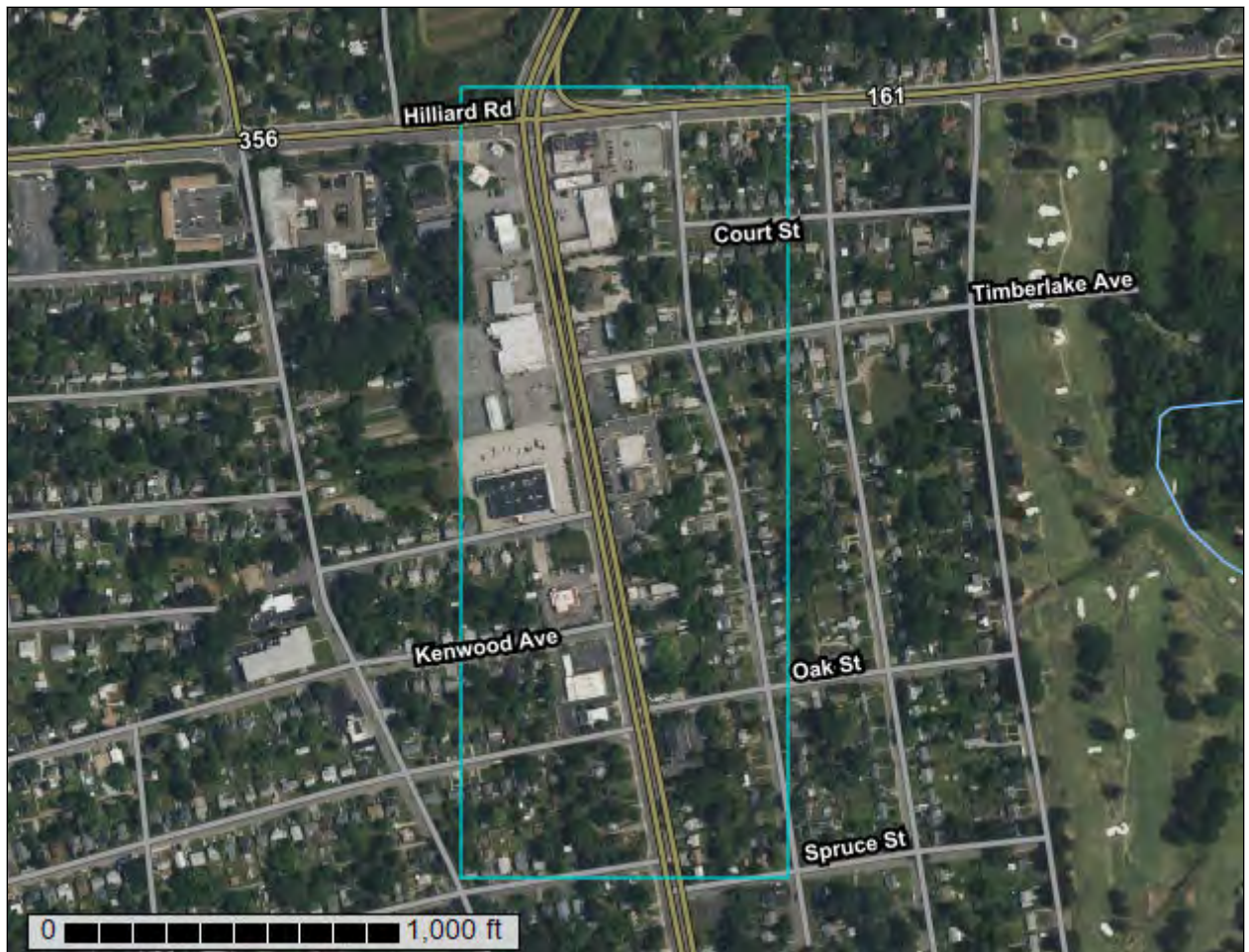
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Natural
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Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Henrico County, Virginia**

107991



October 31, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

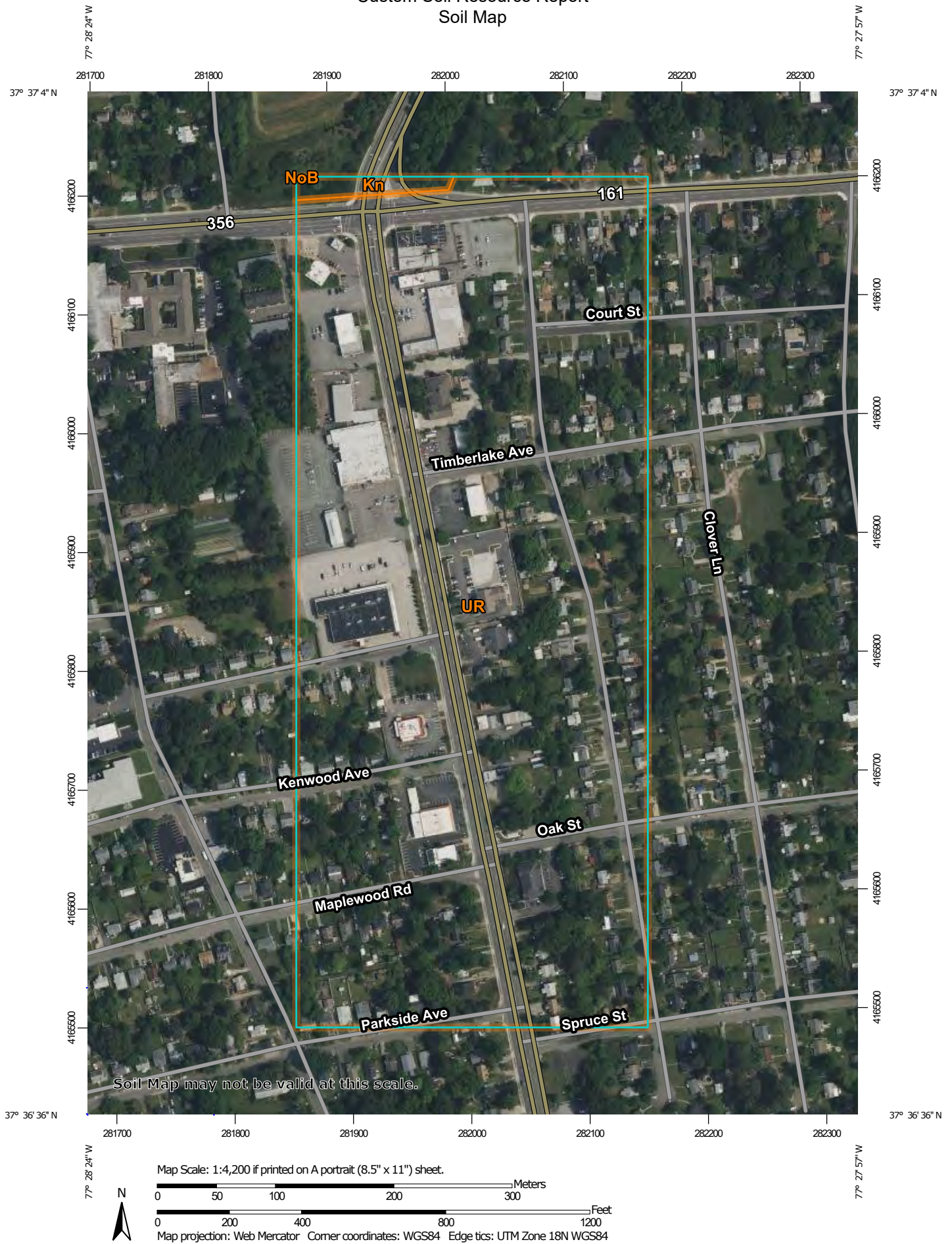
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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Henrico County, Virginia
Survey Area Data: Version 16, Sep 5, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Kn	Kinston and Mantachie soils	0.5	0.9%
NoB	Norfolk fine sandy loam, 2 to 6 percent slopes	0.0	0.0%
UR	Urban land	52.2	99.1%
Totals for Area of Interest		52.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

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development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Henrico County, Virginia

Kn—Kinston and Mantachie soils

Map Unit Setting

National map unit symbol: 402t
Elevation: 0 to 310 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: Not prime farmland

Map Unit Composition

Kinston and similar soils: 40 percent
Mantachie and similar soils: 35 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Kinston

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 6 inches: silt loam
H2 - 6 to 74 inches: clay loam
H3 - 74 to 79 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 6w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Description of Mantachie

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear

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Across-slope shape: Linear

Parent material: Alluvium

Typical profile

H1 - 0 to 17 inches: loam

H2 - 17 to 47 inches: clay loam

H3 - 47 to 79 inches: sandy clay loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Somewhat poorly drained

Runoff class: Very high

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: About 12 to 18 inches

Frequency of flooding: NoneFrequent

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 10.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 5w

Hydrologic Soil Group: B/D

Hydric soil rating: No

Minor Components

Chewacla

Percent of map unit: 10 percent

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: Yes

NoB—Norfolk fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 4031

Elevation: 30 to 450 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Norfolk and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norfolk

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 18 inches: fine sandy loam
H2 - 18 to 63 inches: sandy clay loam
H3 - 63 to 79 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 48 to 72 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

UR—Urban land

Map Unit Setting

National map unit symbol: 4048
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

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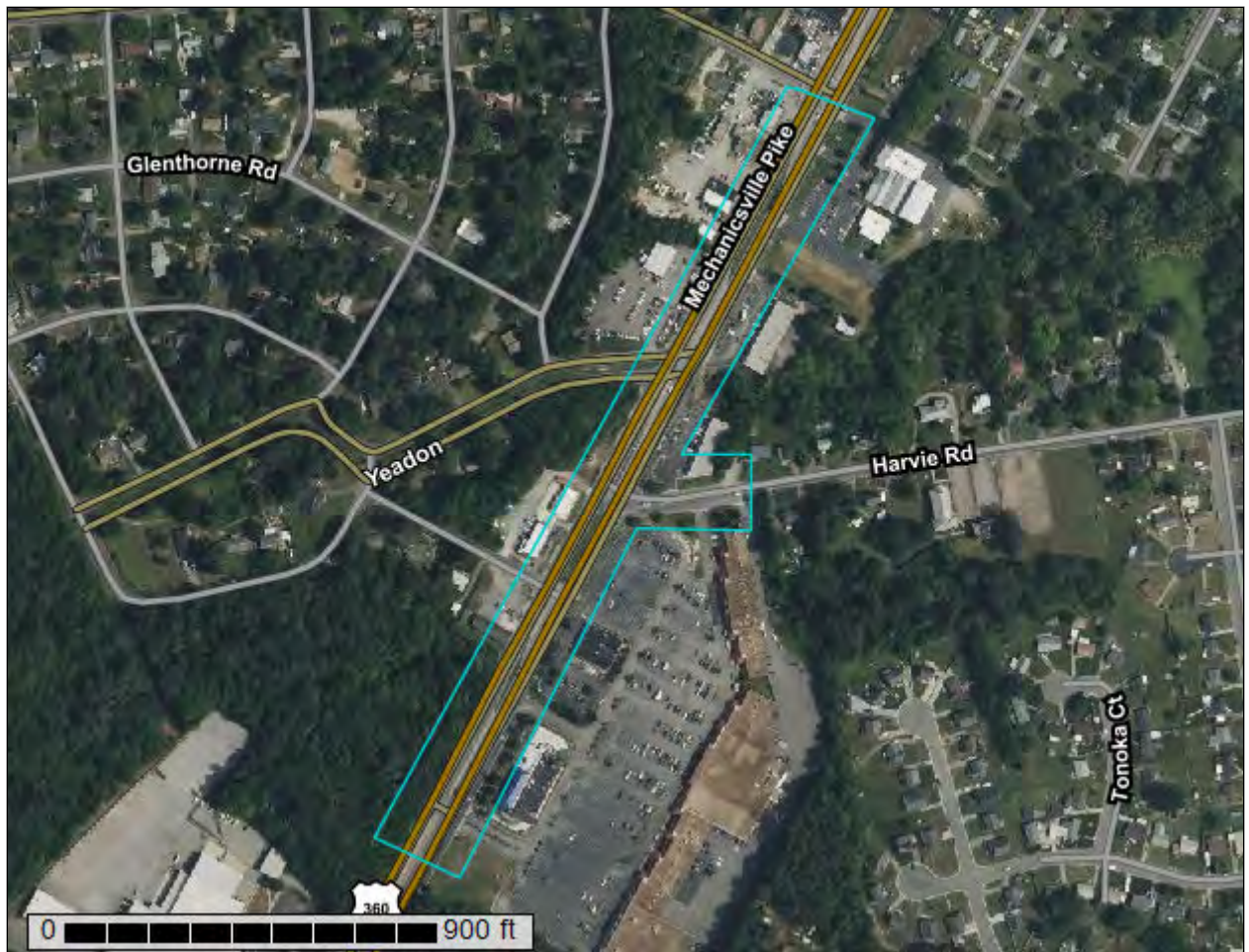
NRCS

Natural
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A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Henrico County, Virginia**

108020



November 1, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Henrico County, Virginia
Survey Area Data: Version 16, Sep 5, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Cm	Chewacla and Riverview soils	3.1	28.2%
DuB2	Duplin very fine sandy loam, 2 to 6 percent slopes, eroded	1.1	10.1%
DuC2	Duplin very fine sandy loam, 6 to 10 percent slopes, eroded	3.5	32.1%
DuD2	Duplin very fine sandy loam, 10 to 15 percent slopes, eroded	0.2	1.5%
UR	Urban land	3.1	28.1%
Totals for Area of Interest		11.0	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

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The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Henrico County, Virginia

Cm—Chewacla and Riverview soils

Map Unit Setting

National map unit symbol: 401t
Elevation: 0 to 500 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: Not prime farmland

Map Unit Composition

Chewacla and similar soils: 40 percent
Riverview and similar soils: 35 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Chewacla

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 10 inches: silt loam
H2 - 10 to 44 inches: silt loam
H3 - 44 to 79 inches: loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: C
Hydric soil rating: Yes

Description of Riverview

Setting

Landform: Flood plains
Landform position (three-dimensional): Tread
Down-slope shape: Linear

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Across-slope shape: Linear

Parent material: Alluvium

Typical profile

H1 - 0 to 5 inches: silt loam

H2 - 5 to 27 inches: silt loam

H3 - 27 to 79 inches: silt loam

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: About 48 to 79 inches

Frequency of flooding: NoneFrequent

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4w

Hydrologic Soil Group: B

Hydric soil rating: No

Minor Components

Roanoke

Percent of map unit: 5 percent

Landform: Stream terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Hydric soil rating: Yes

Chastain

Percent of map unit: 5 percent

Landform: Flood plains

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Hydric soil rating: Yes

Pouncey

Percent of map unit: 5 percent

Landform: Depressions

Landform position (two-dimensional): Summit

Landform position (three-dimensional): Interfluve

Down-slope shape: Linear

Across-slope shape: Convex

Hydric soil rating: Yes

DuB2—Duplin very fine sandy loam, 2 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 4020

Elevation: 70 to 310 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Duplin and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duplin

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 7 inches: very fine sandy loam

H2 - 7 to 79 inches: clay

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: C

Hydric soil rating: No

DuC2—Duplin very fine sandy loam, 6 to 10 percent slopes, eroded

Map Unit Setting

National map unit symbol: 4021

Elevation: 50 to 210 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Duplin and similar soils: 95 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duplin

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 7 inches: very fine sandy loam

H2 - 7 to 79 inches: clay

Properties and qualities

Slope: 6 to 10 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3e

Hydrologic Soil Group: C

Hydric soil rating: No

DuD2—Duplin very fine sandy loam, 10 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: 4022

Elevation: 50 to 200 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Duplin and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duplin

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 7 inches: very fine sandy loam

H2 - 7 to 79 inches: clay

Properties and qualities

Slope: 10 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: C

Hydric soil rating: No

UR—Urban land

Map Unit Setting

National map unit symbol: 4048

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

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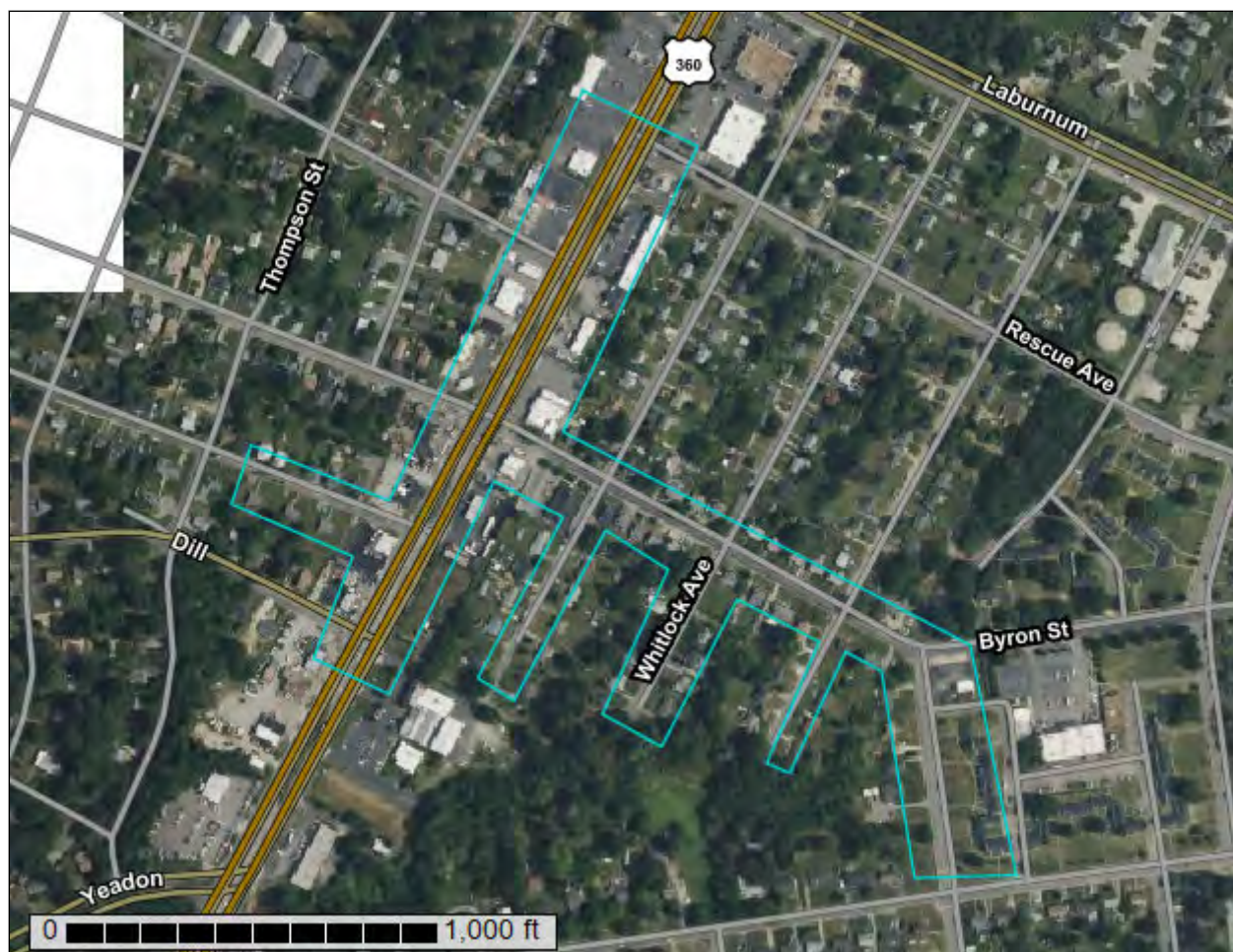
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Custom Soil Resource Report for **Henrico County, Virginia**

108023



Preface

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How Soil Surveys Are Made

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Henrico County, Virginia
Survey Area Data: Version 16, Sep 5, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
DuD2	Duplin very fine sandy loam, 10 to 15 percent slopes, eroded	0.3	1.1%
Ra	Rains very fine sandy loam	0.8	3.1%
UR	Urban land	24.6	95.8%
Totals for Area of Interest		25.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the

Custom Soil Resource Report

development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Henrico County, Virginia

DuD2—Duplin very fine sandy loam, 10 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: 4022

Elevation: 50 to 200 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Duplin and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duplin

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 7 inches: very fine sandy loam

H2 - 7 to 79 inches: clay

Properties and qualities

Slope: 10 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 18 to 30 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: C

Hydric soil rating: No

Ra—Rains very fine sandy loam

Map Unit Setting

National map unit symbol: 403j

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Elevation: 40 to 450 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Rains and similar soils: 85 percent
Minor components: 7 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Rains

Setting

Landform: Depressions
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 11 inches: very fine sandy loam
H2 - 11 to 79 inches: clay

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: NoneFrequent
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

Minor Components

Coxville

Percent of map unit: 7 percent
Landform: Marine terraces, depressions
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Hydric soil rating: Yes

UR—Urban land

Map Unit Setting

National map unit symbol: 4048

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

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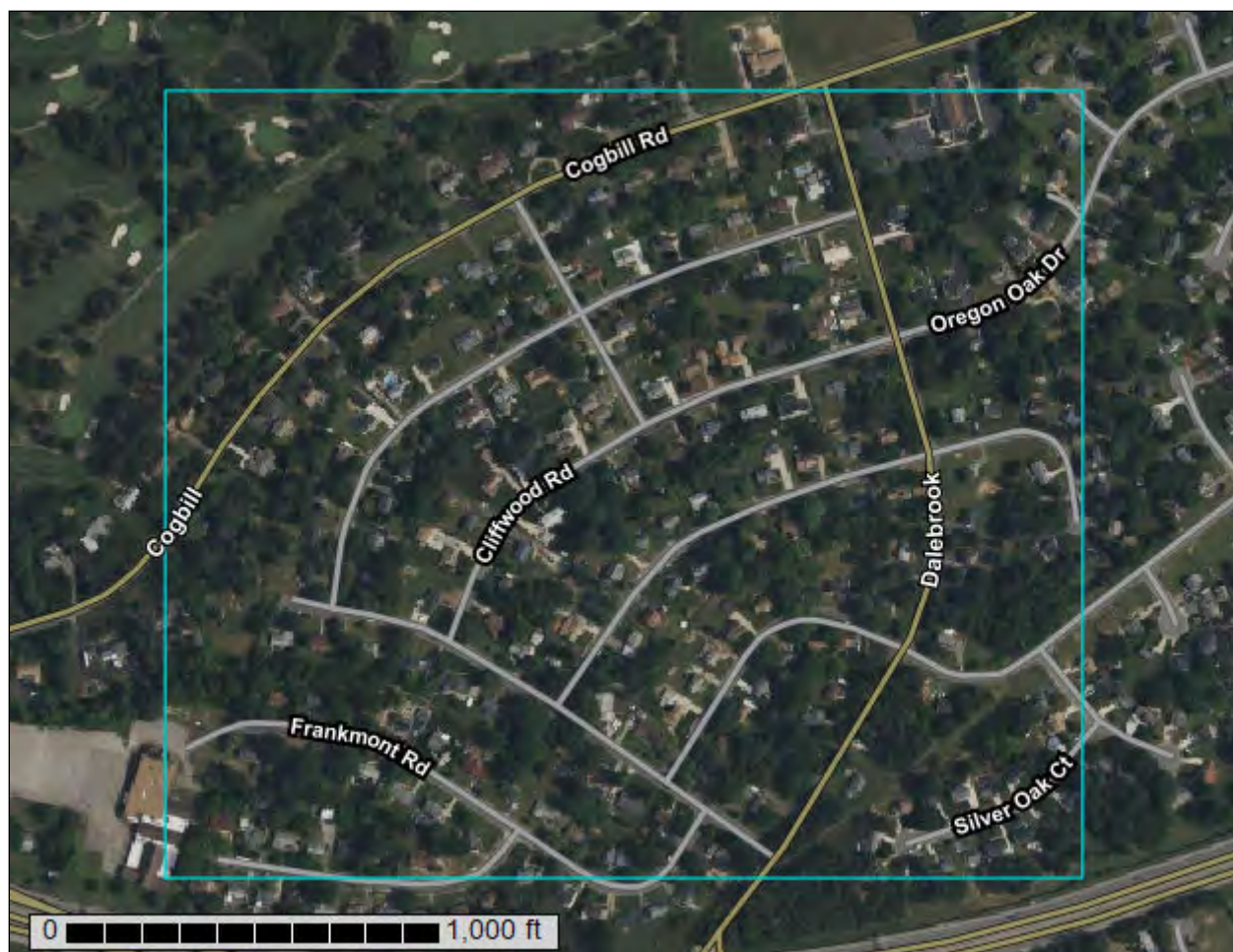
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Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **Chesterfield County, Virginia**

108024



November 8, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

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scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Chesterfield County, Virginia
Survey Area Data: Version 16, Aug 25, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
49B	Bourne fine sandy loam, 2 to 6 percent slopes	36.8	31.0%
66B	Varina fine sandy loam, 0 to 4 percent slopes	3.0	2.5%
70B	Norfolk fine sandy loam, 0 to 6 percent slopes	9.9	8.3%
107B	Turbeville fine sandy loam, 2 to 6 percent slopes	4.7	4.0%
110B	Faceville-Gritney gravelly fine sandy loams, 2 to 6 percent slopes	6.1	5.1%
188	Dunbar fine sandy loam, 0 to 4 percent slopes	20.9	17.6%
191	Myatt loam, 0 to 2 percent slopes, rarely flooded	2.8	2.4%
244B	Edgehill very gravelly fine sandy loam, 2 to 6 percent slopes	16.2	13.6%
244C	Edgehill very gravelly fine sandy loam, 6 to 12 percent slopes	4.8	4.0%
244D	Edgehill very gravelly fine sandy loam, 12 to 20 percent slopes	7.6	6.4%
261B	Bourne-Colfax complex, 2 to 6 percent slopes	5.8	4.9%
Totals for Area of Interest		118.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made

up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

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An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Chesterfield County, Virginia

49B—Bourne fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 3zqr
Elevation: -50 to 390 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 46 to 70 degrees F
Frost-free period: 170 to 202 days
Farmland classification: Not prime farmland

Map Unit Composition

Bourne and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bourne

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 22 inches: sandy clay loam
H3 - 22 to 44 inches: fine sandy loam
H4 - 44 to 72 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

66B—Varina fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 3zrc

Elevation: 250 to 500 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 46 to 70 degrees F

Frost-free period: 170 to 202 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Varina and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Varina

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Clayey marine deposits

Typical profile

H1 - 0 to 10 inches: fine sandy loam

H2 - 10 to 55 inches: clay

H3 - 55 to 70 inches: sandy clay

Properties and qualities

Slope: 0 to 4 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 48 to 60 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: B

Hydric soil rating: No

70B—Norfolk fine sandy loam, 0 to 6 percent slopes

Map Unit Setting

National map unit symbol: 3zrh

Elevation: 30 to 450 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 46 to 70 degrees F

Frost-free period: 170 to 202 days

Farmland classification: All areas are prime farmland

Map Unit Composition

Norfolk and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norfolk

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 11 inches: fine sandy loam

H2 - 11 to 31 inches: sandy clay loam

H3 - 31 to 90 inches: clay

H4 - 90 to 107 inches: sandy loam

Properties and qualities

Slope: 0 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 1.98 in/hr)

Depth to water table: About 48 to 72 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: B

Hydric soil rating: No

107B—Turbeville fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 3zmr
Elevation: 200 to 900 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 46 to 70 degrees F
Frost-free period: 170 to 202 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Turbeville and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Turbeville

Setting

Landform: Stream terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey alluvium

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 62 inches: clay loam
H3 - 62 to 70 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Ecological site: F136XY820GA - Acidic upland forest, moist
Hydric soil rating: No

110B—Faceville-Gritney gravelly fine sandy loams, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 3zmw
Elevation: 80 to 450 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 46 to 70 degrees F
Frost-free period: 170 to 202 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Faceville and similar soils: 50 percent
Gritney and similar soils: 35 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Faceville

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey marine deposits

Typical profile

H1 - 0 to 12 inches: gravelly fine sandy loam
H2 - 12 to 18 inches: sandy clay loam
H3 - 18 to 72 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

Description of Gritney

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread

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Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey marine deposits

Typical profile

H1 - 0 to 9 inches: gravelly sandy loam
H2 - 9 to 52 inches: clay
H3 - 52 to 85 inches: loamy sand

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: High
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: About 18 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C/D
Hydric soil rating: No

188—Dunbar fine sandy loam, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 3zp1
Elevation: 20 to 340 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 46 to 70 degrees F
Frost-free period: 170 to 202 days
Farmland classification: Prime farmland if drained

Map Unit Composition

Dunbar and similar soils: 85 percent
Minor components: 5 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Dunbar

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey marine deposits

Typical profile

H1 - 0 to 12 inches: fine sandy loam
H2 - 12 to 20 inches: sandy clay loam
H3 - 20 to 72 inches: clay

Properties and qualities

Slope: 0 to 4 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 12 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.3 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C/D
Hydric soil rating: No

Minor Components

Coxville

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

Pouncey

Percent of map unit: 2 percent
Landform: Depressions
Hydric soil rating: Yes

191—Myatt loam, 0 to 2 percent slopes, rarely flooded

Map Unit Setting

National map unit symbol: 2y7jv
Elevation: 500 to 1,100 feet
Mean annual precipitation: 31 to 52 inches
Mean annual air temperature: 48 to 66 degrees F
Frost-free period: 210 to 230 days
Farmland classification: Not prime farmland

Map Unit Composition

Myatt, rarely flooded, and similar soils: 93 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Myatt, Rarely Flooded

Setting

Landform: Depressions
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread, dip
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Fluvio-marine deposits

Typical profile

A - 0 to 9 inches: loam
Btg - 9 to 50 inches: clay loam
Cg - 50 to 80 inches: sandy loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Poorly drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.20 to 1.98 in/hr)
Depth to water table: About 0 to 12 inches
Frequency of flooding: Rare
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 10.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4w
Hydrologic Soil Group: B/D
Hydric soil rating: Yes

244B—Edgehill very gravelly fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 3zpm
Elevation: 110 to 390 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 46 to 70 degrees F
Frost-free period: 170 to 202 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Edgehill and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edgehill

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex

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Across-slope shape: Convex

Parent material: Clayey marine deposits

Typical profile

H1 - 0 to 17 inches: very gravelly fine sandy loam

H2 - 17 to 41 inches: very gravelly clay

H3 - 41 to 80 inches: very gravelly sandy loam

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 3s

Hydrologic Soil Group: B

Hydric soil rating: No

244C—Edgehill very gravelly fine sandy loam, 6 to 12 percent slopes

Map Unit Setting

National map unit symbol: 3zpn

Elevation: 30 to 390 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 46 to 70 degrees F

Frost-free period: 170 to 202 days

Farmland classification: Not prime farmland

Map Unit Composition

Edgehill and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edgehill

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Clayey marine deposits

Typical profile

H1 - 0 to 17 inches: very gravelly fine sandy loam

H2 - 17 to 41 inches: very gravelly clay

H3 - 41 to 80 inches: very gravelly sandy loam

Properties and qualities

Slope: 6 to 12 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

244D—Edgehill very gravelly fine sandy loam, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: 3zpp
Elevation: 30 to 390 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 46 to 70 degrees F
Frost-free period: 170 to 202 days
Farmland classification: Not prime farmland

Map Unit Composition

Edgehill and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Edgehill

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey marine deposits

Typical profile

H1 - 0 to 17 inches: very gravelly fine sandy loam
H2 - 17 to 41 inches: very gravelly clay
H3 - 41 to 80 inches: very gravelly sandy loam

Properties and qualities

Slope: 12 to 20 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium

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Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 5.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Hydric soil rating: No

261B—Bourne-Colfax complex, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 3zpy

Elevation: 70 to 400 feet

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 46 to 70 degrees F

Frost-free period: 170 to 202 days

Farmland classification: Not prime farmland

Map Unit Composition

Bourne and similar soils: 45 percent

Colfax and similar soils: 40 percent

Minor components: 3 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bourne

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 11 inches: sandy loam

H2 - 11 to 22 inches: sandy clay loam

H3 - 22 to 44 inches: fine sandy loam

H4 - 44 to 72 inches: clay

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Moderately well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)

Depth to water table: About 12 to 30 inches

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Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 3.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

Description of Colfax

Setting

Landform: Hillslopes
Landform position (two-dimensional): Summit
Landform position (three-dimensional): Interfluve
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy granite and gneiss

Typical profile

H1 - 0 to 8 inches: fine sandy loam
H2 - 8 to 24 inches: sandy clay loam
H3 - 24 to 40 inches: sandy clay loam
H4 - 40 to 86 inches: clay
H5 - 86 to 117 inches: sandy loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Somewhat poorly drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 6.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 3w
Hydrologic Soil Group: C
Ecological site: F136XY810SC - Acidic upland forest, seasonally wet
Hydric soil rating: No

Minor Components

Worsham

Percent of map unit: 3 percent
Landform: Depressions
Hydric soil rating: Yes

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United States
Department of
Agriculture

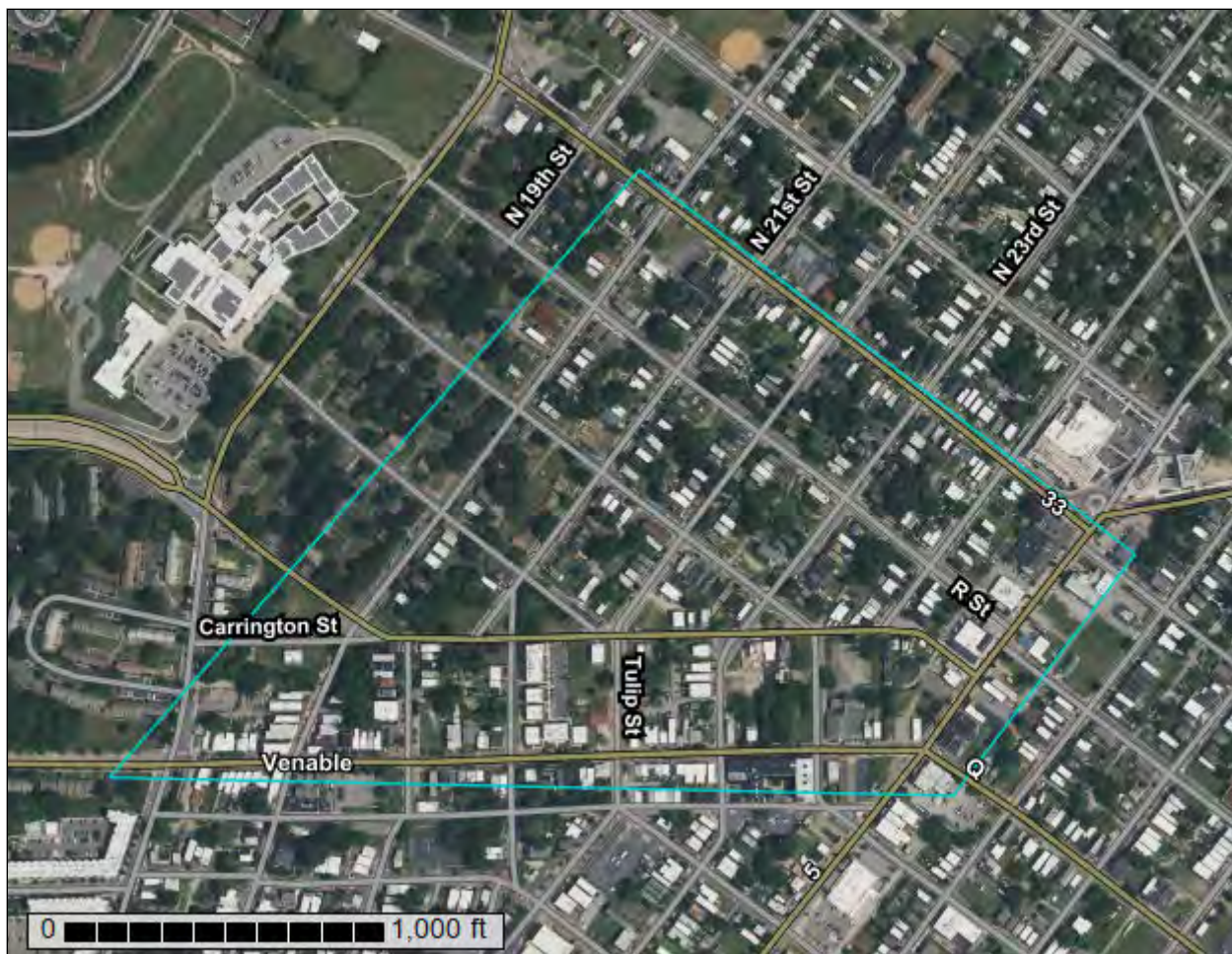
NRCS

Natural
Resources
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A product of the National
Cooperative Soil Survey,
a joint effort of the United
States Department of
Agriculture and other
Federal agencies, State
agencies including the
Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **City of Richmond, Virginia**

108061



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: City of Richmond, Virginia
Survey Area Data: Version 19, Sep 5, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
5A	Atlee-Urban land complex, 0 to 4 percent slopes	75.0	94.1%
41	Urban land	4.2	5.3%
44E	Wateree-Wedowee complex, 20 to 45 percent slopes	0.5	0.6%
Totals for Area of Interest		79.7	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

City of Richmond, Virginia

5A—Atlee-Urban land complex, 0 to 4 percent slopes

Map Unit Setting

National map unit symbol: 4prh
Elevation: 70 to 260 feet
Mean annual precipitation: 28 to 61 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 182 to 221 days
Farmland classification: Not prime farmland

Map Unit Composition

Atlee and similar soils: 70 percent
Urban land: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Atlee

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Fluviomarine deposits

Typical profile

H1 - 0 to 11 inches: very fine sandy loam
H2 - 11 to 20 inches: clay loam
H3 - 20 to 36 inches: clay loam
H4 - 36 to 163 inches: clay loam

Properties and qualities

Slope: 0 to 2 percent
Depth to restrictive feature: 20 to 30 inches to fragipan
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.2 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2w
Hydrologic Soil Group: C
Hydric soil rating: No

41—Urban land

Map Unit Setting

National map unit symbol: 4pqw

Mean annual precipitation: 28 to 61 inches

Mean annual air temperature: 47 to 69 degrees F

Frost-free period: 182 to 221 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

44E—Wateree-Wedowee complex, 20 to 45 percent slopes

Map Unit Setting

National map unit symbol: 4psc

Elevation: 20 to 340 feet

Mean annual precipitation: 28 to 61 inches

Mean annual air temperature: 47 to 69 degrees F

Frost-free period: 182 to 221 days

Farmland classification: Not prime farmland

Map Unit Composition

Wateree and similar soils: 50 percent

Wedowee and similar soils: 40 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wateree

Setting

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Loamy residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 9 inches: sandy loam

H2 - 9 to 22 inches: sandy loam

H3 - 22 to 80 inches: bedrock

Properties and qualities

Slope: 20 to 45 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Drainage class: Well drained

Runoff class: Very high

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Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: A

Ecological site: F136XY860VA - Lower piedmont acidic river bluff forest

Hydric soil rating: No

Description of Wedowee

Setting

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Clayey residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 17 inches: gravelly fine sandy loam

H2 - 17 to 33 inches: clay

H3 - 33 to 60 inches: sandy loam

Properties and qualities

Slope: 20 to 45 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B

Ecological site: F136XY820GA - Acidic upland forest, moist

Hydric soil rating: No

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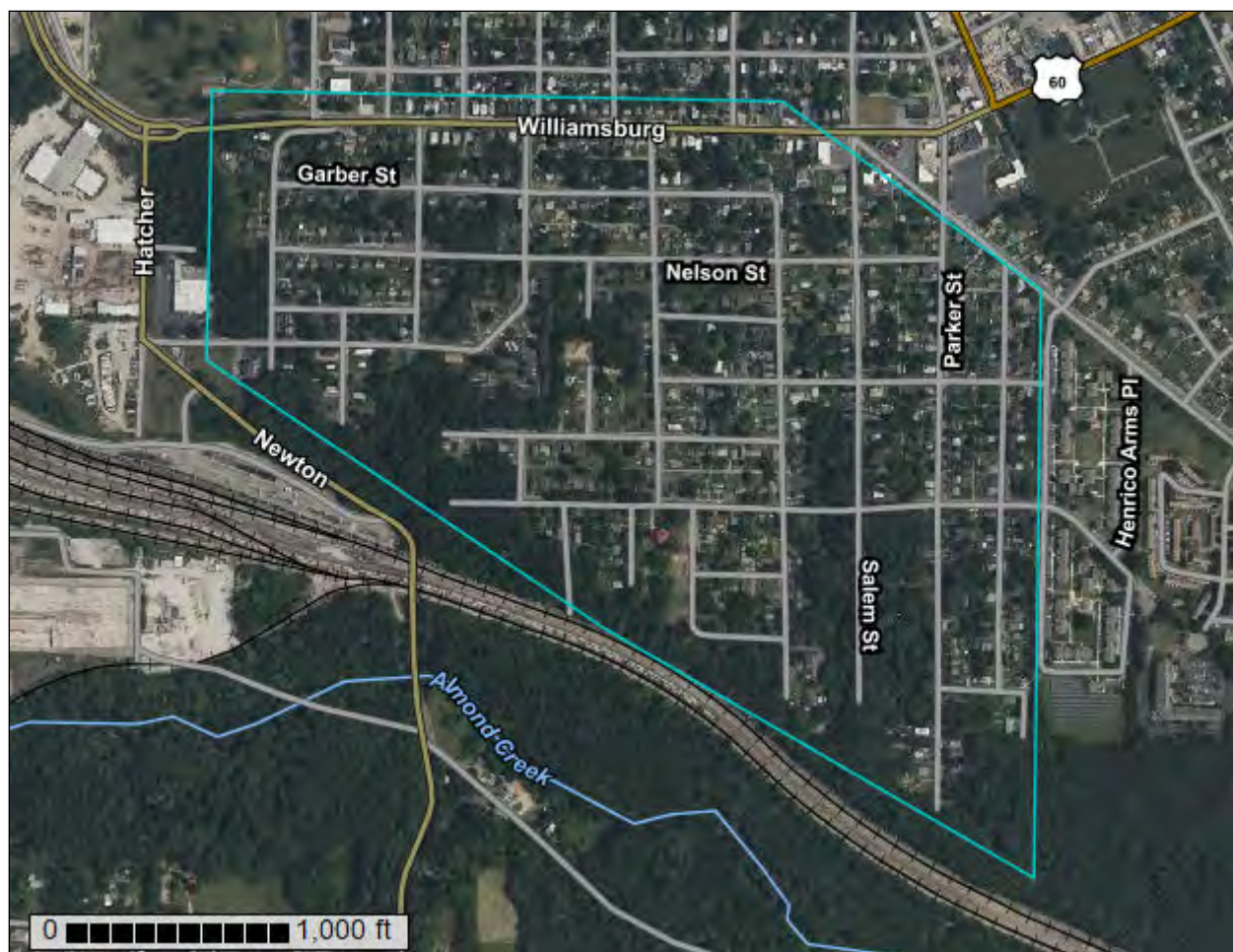
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Custom Soil Resource Report for City of Richmond, Virginia, and Henrico County, Virginia

108062



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The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

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identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

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MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at scales ranging from 1:15,800 to 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: City of Richmond, Virginia

Survey Area Data: Version 19, Sep 5, 2023

Soil Survey Area: Henrico County, Virginia

Survey Area Data: Version 16, Sep 5, 2023

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

MAP LEGEND

MAP INFORMATION

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
4D	Appling-Wedowee complex, 12 to 20 percent slopes	47.9	24.5%
37B	Turbeville-Urban land complex, 2 to 6 percent slopes	143.5	73.5%
40	Udorthents-Dumps complex, pits	2.3	1.2%
41	Urban land	0.8	0.4%
Subtotals for Soil Survey Area		194.5	99.7%
Totals for Area of Interest		195.1	100.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
CbC3	Caroline clay loam, 2 to 10 percent slopes, severely eroded	0.0	0.0%
DuB2	Duplin very fine sandy loam, 2 to 6 percent slopes, eroded	0.0	0.0%
NoB	Norfolk fine sandy loam, 2 to 6 percent slopes	0.0	0.0%
UR	Urban land	0.5	0.3%
Subtotals for Soil Survey Area		0.6	0.3%
Totals for Area of Interest		195.1	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called

noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can

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be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

City of Richmond, Virginia

4D—Appling-Wedowee complex, 12 to 20 percent slopes

Map Unit Setting

National map unit symbol: 4prg

Elevation: 50 to 300 feet

Mean annual precipitation: 28 to 61 inches

Mean annual air temperature: 47 to 69 degrees F

Frost-free period: 182 to 221 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Appling and similar soils: 45 percent

Wedowee and similar soils: 40 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Appling

Setting

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 10 inches: fine sandy loam

H2 - 10 to 42 inches: clay

H3 - 42 to 60 inches: clay loam

H4 - 60 to 72 inches: sandy loam

Properties and qualities

Slope: 12 to 20 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: F136XY820GA - Acidic upland forest, moist

Hydric soil rating: No

Description of Wedowee

Setting

Landform: Hillslopes

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Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Clayey residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 17 inches: fine sandy loam

H2 - 17 to 33 inches: clay

H3 - 33 to 60 inches: sandy loam

Properties and qualities

Slope: 12 to 20 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Ecological site: F136XY820GA - Acidic upland forest, moist

Hydric soil rating: No

37B—Turbeville-Urban land complex, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 4psx

Elevation: 30 to 380 feet

Mean annual precipitation: 28 to 61 inches

Mean annual air temperature: 47 to 69 degrees F

Frost-free period: 182 to 221 days

Farmland classification: Not prime farmland

Map Unit Composition

Turbeville and similar soils: 70 percent

Urban land: 20 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Turbeville

Setting

Landform: Terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

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Across-slope shape: Convex

Parent material: Clayey alluvium

Typical profile

H1 - 0 to 11 inches: fine sandy loam

H2 - 11 to 62 inches: clay

H3 - 62 to 70 inches: gravelly loam

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: B

Hydric soil rating: No

40—Udorthents-Dumps complex, pits

Map Unit Setting

National map unit symbol: 4pt2

Elevation: -330 to 330 feet

Mean annual precipitation: 28 to 61 inches

Mean annual air temperature: 47 to 69 degrees F

Frost-free period: 182 to 221 days

Farmland classification: Not prime farmland

Map Unit Composition

Udorthents and similar soils: 51 percent

Dumps: 49 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Udorthents

Properties and qualities

Depth to restrictive feature: More than 80 inches

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

41—Urban land

Map Unit Setting

National map unit symbol: 4pqw

Mean annual precipitation: 28 to 61 inches

Mean annual air temperature: 47 to 69 degrees F

Frost-free period: 182 to 221 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Henrico County, Virginia

CbC3—Caroline clay loam, 2 to 10 percent slopes, severely eroded

Map Unit Setting

National map unit symbol: 4011
Elevation: 80 to 200 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: Not prime farmland

Map Unit Composition

Caroline and similar soils: 95 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Caroline

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 21 inches: clay loam
H2 - 21 to 79 inches: clay

Properties and qualities

Slope: 2 to 10 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.20 to 1.98 in/hr)
Depth to water table: About 42 to 55 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 11.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Hydric soil rating: No

DuB2—Duplin very fine sandy loam, 2 to 6 percent slopes, eroded

Map Unit Setting

National map unit symbol: 4020

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Elevation: 70 to 310 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Duplin and similar soils: 85 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Duplin

Setting

Landform: Marine terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 7 inches: very fine sandy loam
H2 - 7 to 79 inches: clay

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)
Depth to water table: About 18 to 30 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: High (about 9.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: C
Hydric soil rating: No

NoB—Norfolk fine sandy loam, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 4031
Elevation: 30 to 450 feet
Mean annual precipitation: 31 to 54 inches
Mean annual air temperature: 54 to 57 degrees F
Frost-free period: 170 to 201 days
Farmland classification: All areas are prime farmland

Map Unit Composition

Norfolk and similar soils: 85 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Norfolk

Setting

Landform: Marine terraces

Landform position (three-dimensional): Tread

Down-slope shape: Convex

Across-slope shape: Convex

Parent material: Loamy marine deposits

Typical profile

H1 - 0 to 18 inches: fine sandy loam

H2 - 18 to 63 inches: sandy clay loam

H3 - 63 to 79 inches: clay

Properties and qualities

Slope: 2 to 6 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): Moderately high (0.20 to 0.57 in/hr)

Depth to water table: About 48 to 72 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 2e

Hydrologic Soil Group: B

Hydric soil rating: No

UR—Urban land

Map Unit Setting

National map unit symbol: 4048

Mean annual precipitation: 31 to 54 inches

Mean annual air temperature: 54 to 57 degrees F

Frost-free period: 170 to 201 days

Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

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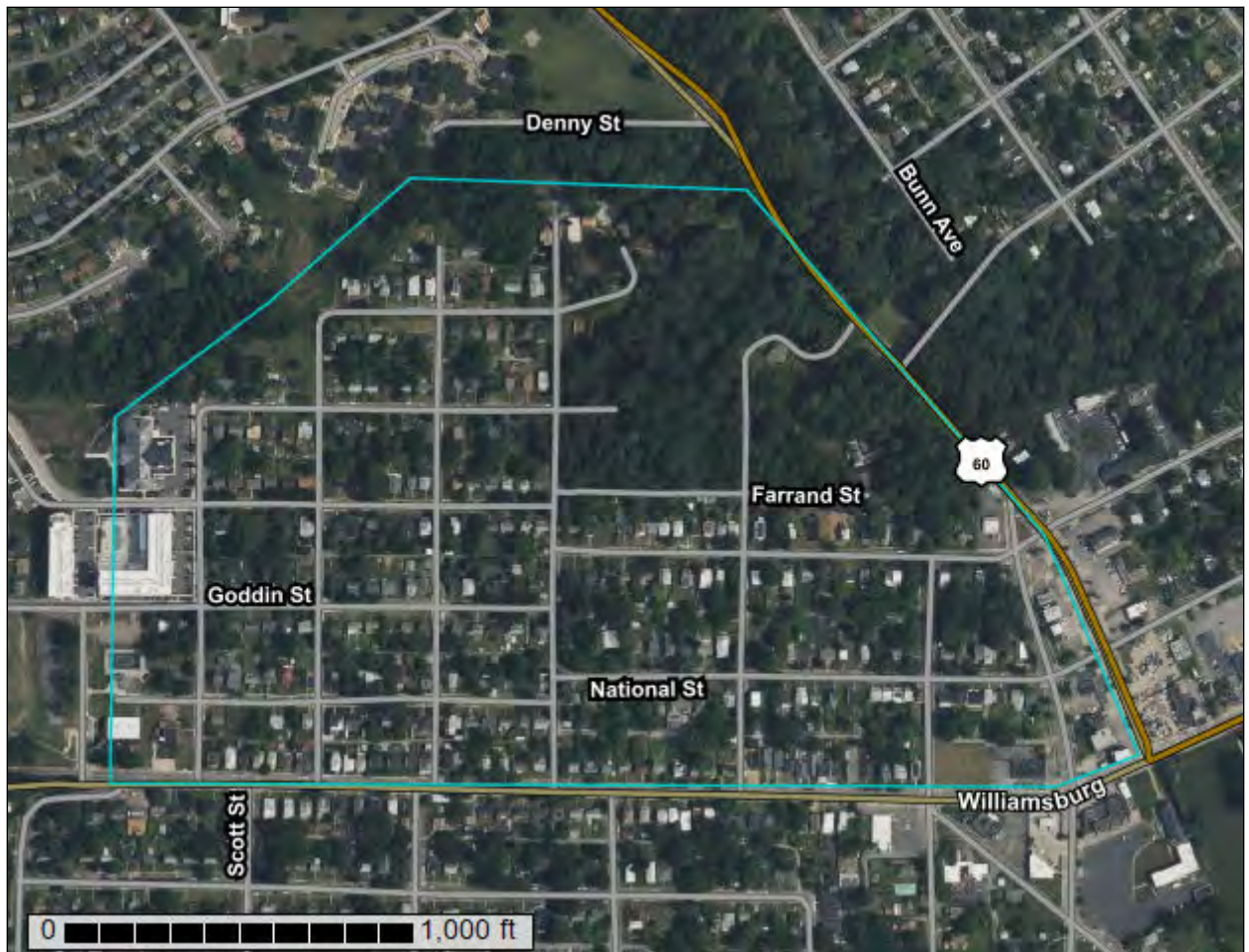
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Agricultural Experiment
Stations, and local
participants

Custom Soil Resource Report for **City of Richmond, Virginia**

108063



Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (<http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/>) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (<https://offices.sc.egov.usda.gov/locator/app?agency=nrcs>) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

Custom Soil Resource Report

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report Soil Map



Custom Soil Resource Report

MAP LEGEND

Area of Interest (AOI)

 Area of Interest (AOI)

Soils

 Soil Map Unit Polygons

 Soil Map Unit Lines

 Soil Map Unit Points

Special Point Features

 Blowout

 Borrow Pit

 Clay Spot

 Closed Depression

 Gravel Pit

 Gravelly Spot

 Landfill

 Lava Flow

 Marsh or swamp

 Mine or Quarry

 Miscellaneous Water

 Perennial Water

 Rock Outcrop

 Saline Spot

 Sandy Spot

 Severely Eroded Spot

 Sinkhole

 Slide or Slip

 Sodic Spot

 Spoil Area

 Stony Spot

 Very Stony Spot

 Wet Spot

 Other

 Special Line Features

Water Features

 Streams and Canals

Transportation

 Rails

 Interstate Highways

 US Routes

 Major Roads

 Local Roads

Background

 Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service

Web Soil Survey URL:

Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: City of Richmond, Virginia

Survey Area Data: Version 19, Sep 5, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: May 19, 2022—Jul 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
37B	Turbeville-Urban land complex, 2 to 6 percent slopes	72.1	78.7%
41	Urban land	4.9	5.3%
44E	Wateree-Wedowee complex, 20 to 45 percent slopes	14.7	16.0%
Totals for Area of Interest		91.6	100.0%

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The

delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

City of Richmond, Virginia

37B—Turbeville-Urban land complex, 2 to 6 percent slopes

Map Unit Setting

National map unit symbol: 4psx
Elevation: 30 to 380 feet
Mean annual precipitation: 28 to 61 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 182 to 221 days
Farmland classification: Not prime farmland

Map Unit Composition

Turbeville and similar soils: 70 percent
Urban land: 20 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Turbeville

Setting

Landform: Terraces
Landform position (three-dimensional): Tread
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Clayey alluvium

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 62 inches: clay
H3 - 62 to 70 inches: gravelly loam

Properties and qualities

Slope: 2 to 6 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 8.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 2e
Hydrologic Soil Group: B
Hydric soil rating: No

41—Urban land

Map Unit Setting

National map unit symbol: 4pqw
Mean annual precipitation: 28 to 61 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 182 to 221 days
Farmland classification: Not prime farmland

Map Unit Composition

Urban land: 100 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

44E—Wateree-Wedowee complex, 20 to 45 percent slopes

Map Unit Setting

National map unit symbol: 4psc
Elevation: 20 to 340 feet
Mean annual precipitation: 28 to 61 inches
Mean annual air temperature: 47 to 69 degrees F
Frost-free period: 182 to 221 days
Farmland classification: Not prime farmland

Map Unit Composition

Wateree and similar soils: 50 percent
Wedowee and similar soils: 40 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Wateree

Setting

Landform: Hillslopes
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Convex
Parent material: Loamy residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 9 inches: sandy loam
H2 - 9 to 22 inches: sandy loam
H3 - 22 to 80 inches: bedrock

Properties and qualities

Slope: 20 to 45 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high

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Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 2.4 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: A

Ecological site: F136XY860VA - Lower piedmont acidic river bluff forest

Hydric soil rating: No

Description of Wedowee

Setting

Landform: Hillslopes

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Linear

Across-slope shape: Convex

Parent material: Clayey residuum weathered from granite and gneiss

Typical profile

H1 - 0 to 17 inches: gravelly fine sandy loam

H2 - 17 to 33 inches: clay

H3 - 33 to 60 inches: sandy loam

Properties and qualities

Slope: 20 to 45 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: High

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.0 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B

Ecological site: F136XY820GA - Acidic upland forest, moist

Hydric soil rating: No

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Appendix G

Biological Resources



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0010769
Project Name: Richmond, VA Pipeline Replacement

October 30, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

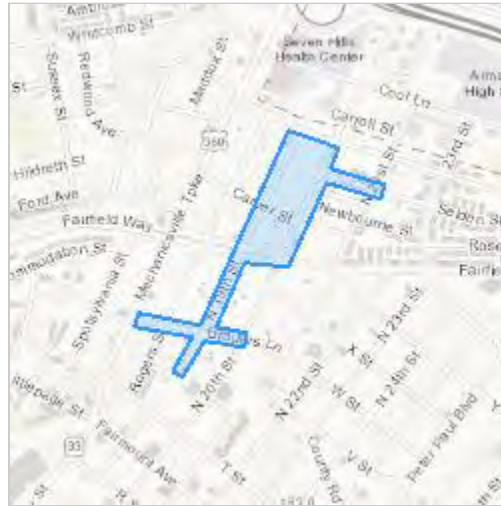
Gloucester, VA 23061-4410

(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0010769
Project Name: Richmond, VA Pipeline Replacement
Project Type: Federal Grant / Loan Related
Project Description: Project area: 107989
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.5484477,-77.4114643224311,14z>



Counties: Richmond County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 2. The [Migratory Birds Treaty Act](#) of 1918.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

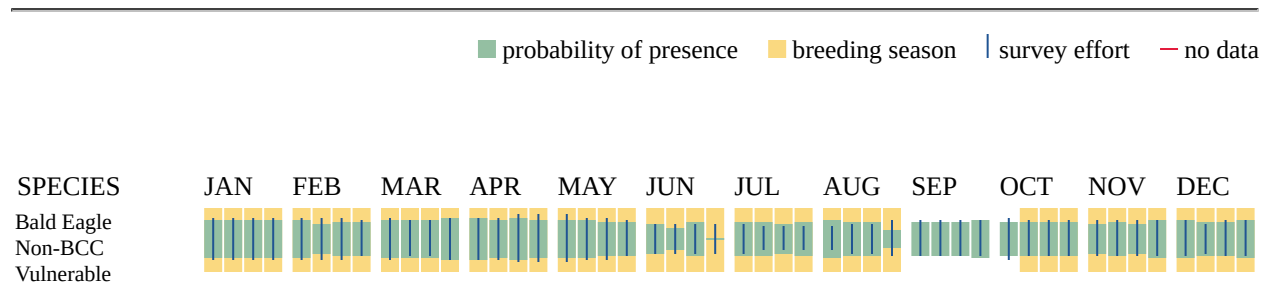
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Migratory Birds Treaty Act](#) of 1918.
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3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler <i>Vermivora pinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Cerulean Warbler <i>Dendroica cerulea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 29 to Jul 20
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20

NAME	BREEDING SEASON
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

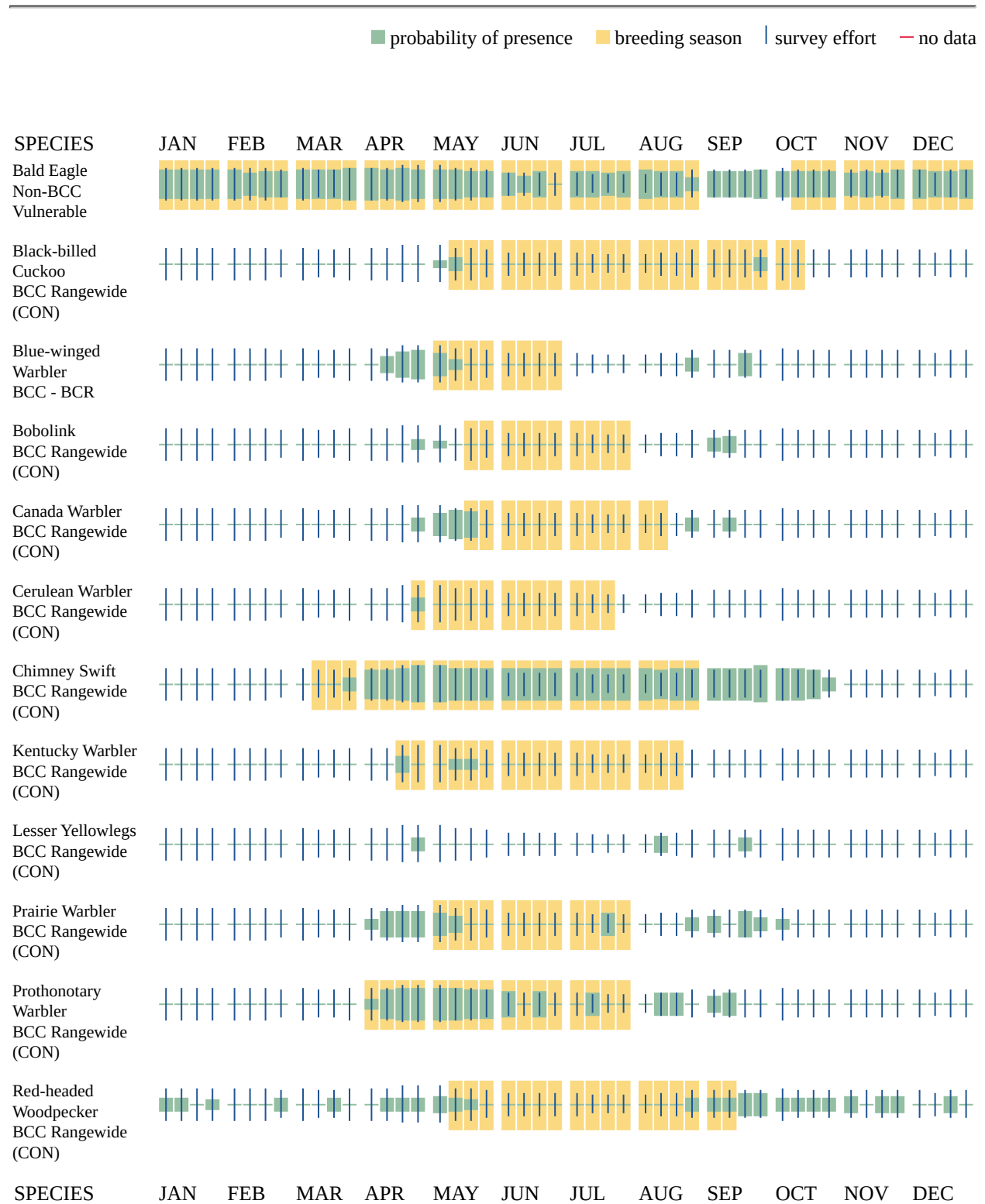
Breeding Season (■)

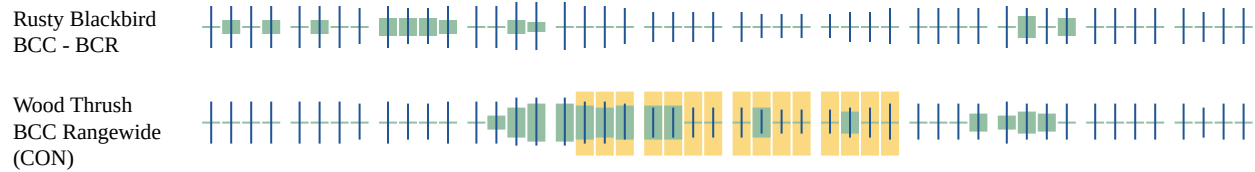
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

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State: MA

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Email: danielle.larimer@dot.gov

Phone: 8579981686

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0010805
Project Name: Richmond, VA Pipeline Replacement

October 30, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

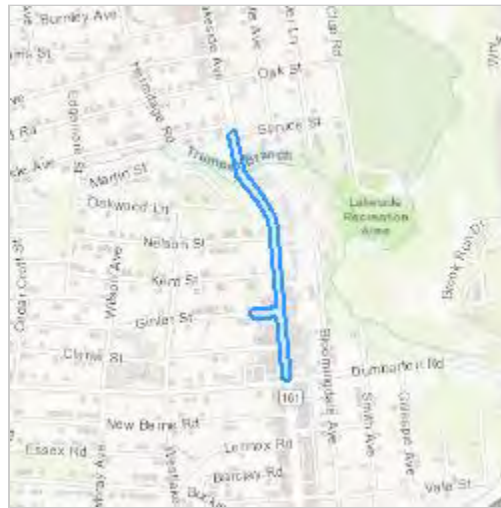
Gloucester, VA 23061-4410

(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0010805
Project Name: Richmond, VA Pipeline Replacement
Project Type: Federal Grant / Loan Related
Project Description: project 107990
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.6072623,-77.46782389916838,14z>



Counties: Henrico County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

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1. The [Bald and Golden Eagle Protection Act](#) of 1940.
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There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
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PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

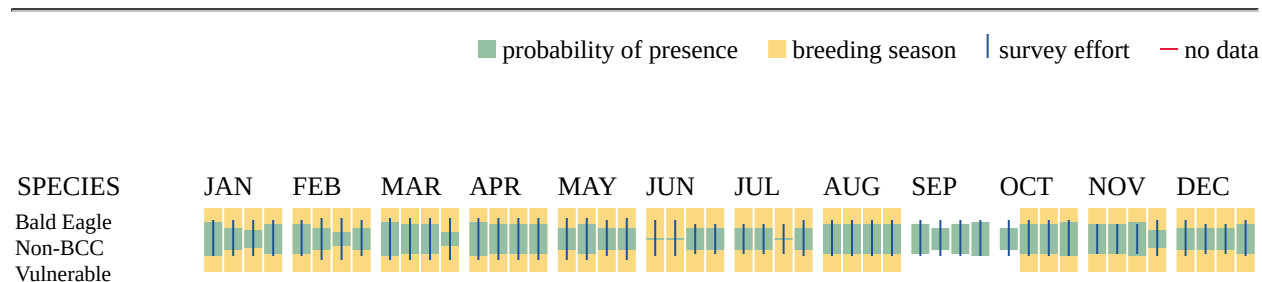
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Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

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Additional information can be found using the following links:

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Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler <i>Vermivora pinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere

NAME	BREEDING SEASON
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

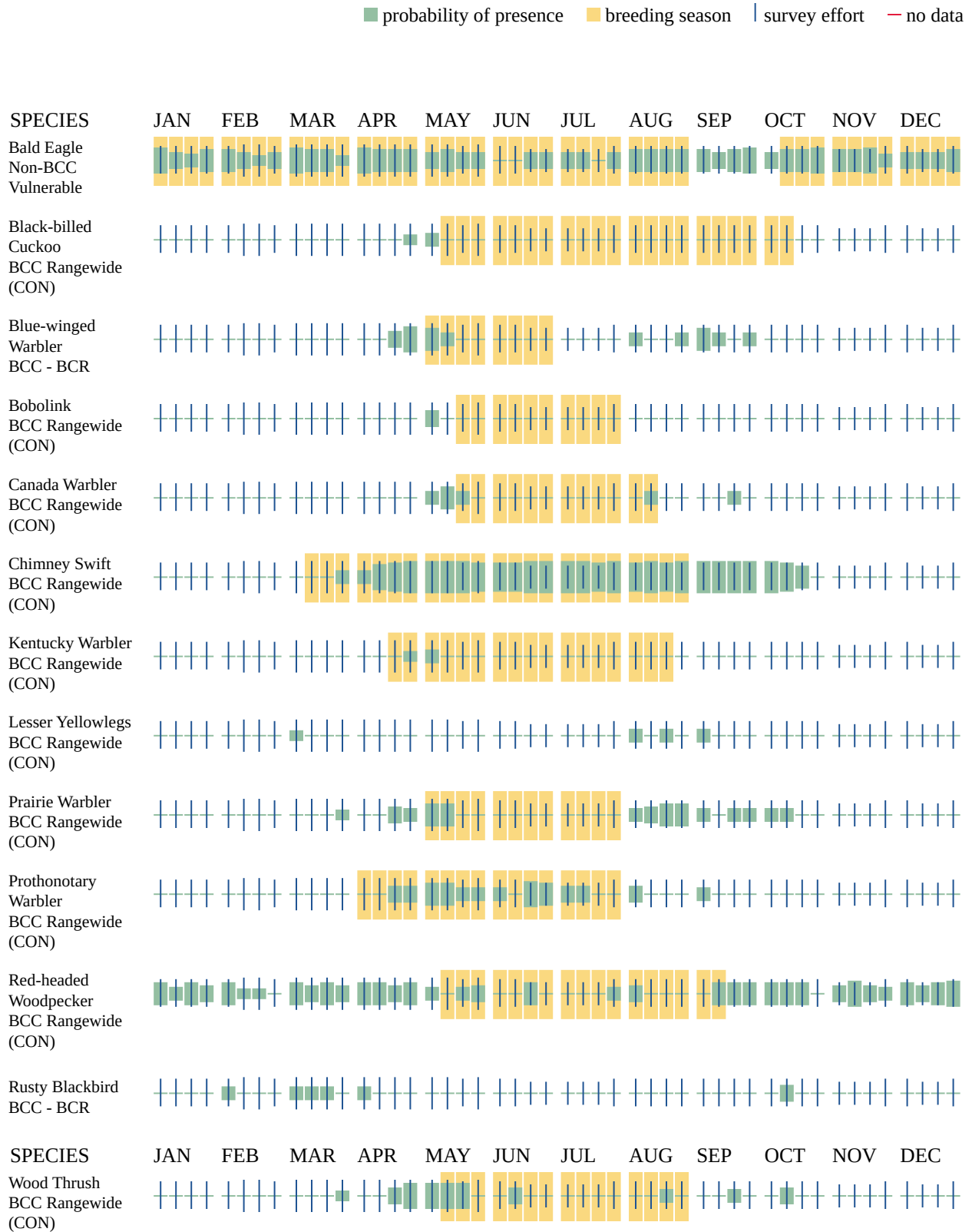
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

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Additional information can be found using the following links:

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IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

Name: Danielle Larimer

Address: 55 Broadway

City: Cambridge

State: MA

Zip: 02142

Email: danielle.larimer@dot.gov

Phone: 8579981686

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0011195
Project Name: Richmond, VA Pipeline Replacement

October 31, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

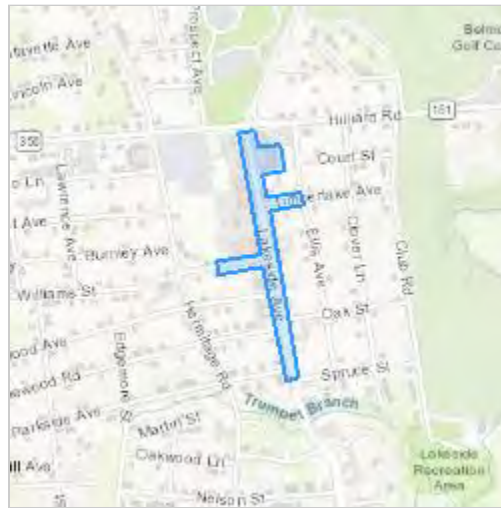
Gloucester, VA 23061-4410

(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0011195
Project Name: Richmond, VA Pipeline Replacement
Project Type: Federal Grant / Loan Related
Project Description: project 107991
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.61363645,-77.4702768126443,14z>



Counties: Henrico County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 2. The [Migratory Birds Treaty Act](#) of 1918.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

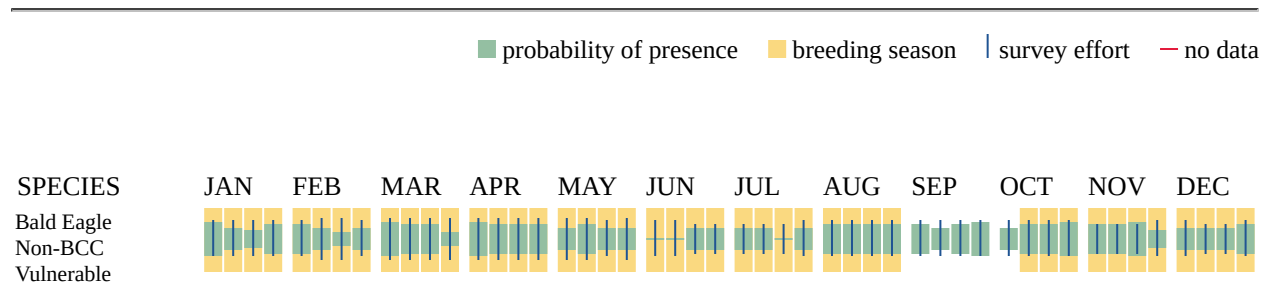
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.

3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler <i>Vermivora pinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere

NAME	BREEDING SEASON
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

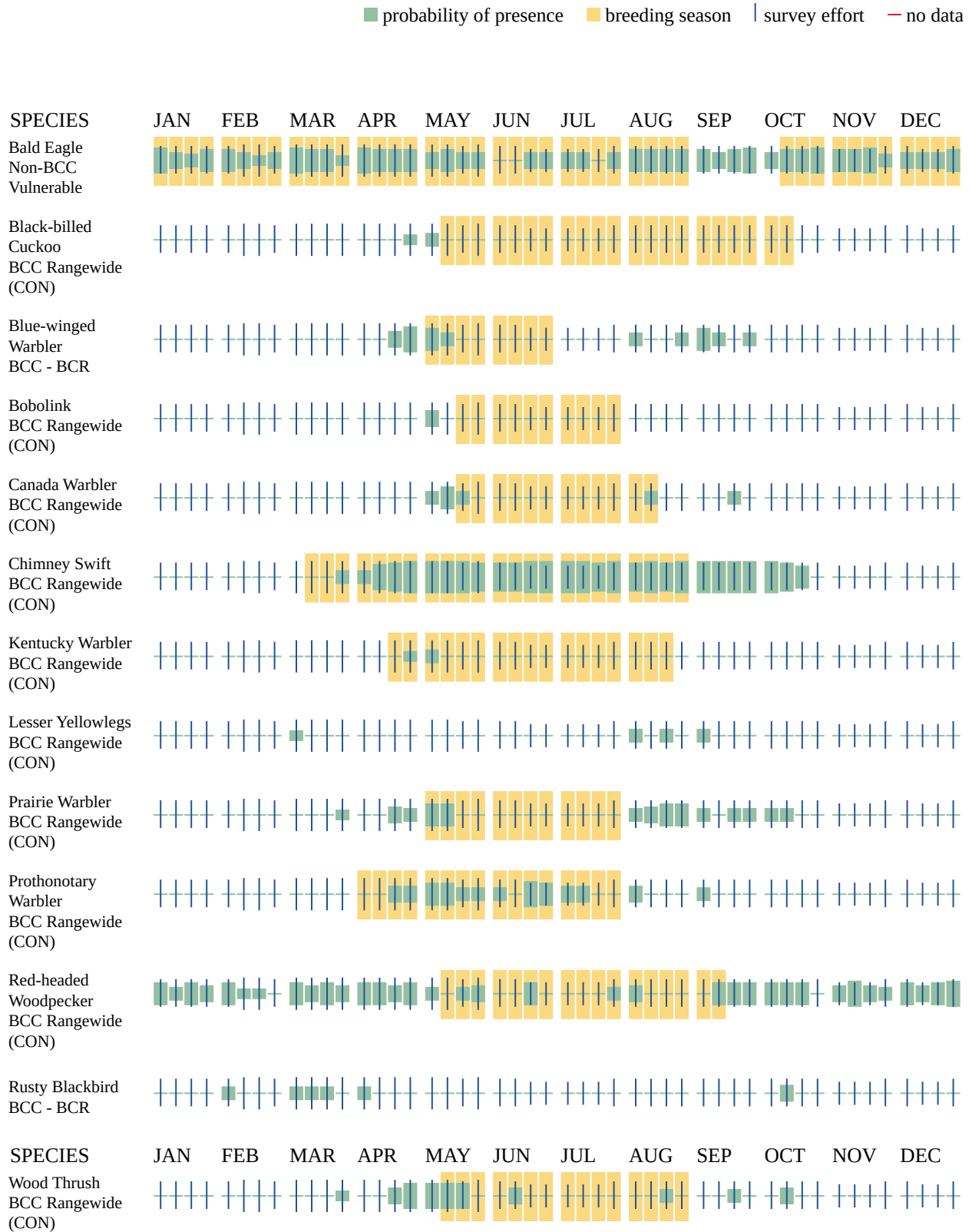
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

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Additional information can be found using the following links:

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- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

Name: Danielle Larimer

Address: 55 Broadway

City: Cambridge

State: MA

Zip: 02142

Email: danielle.larimer@dot.gov

Phone: 8579981686

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0011523
Project Name: Richmond, VA Pipeline Replacement

November 01, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

Gloucester, VA 23061-4410

(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0011523
Project Name: Richmond, VA Pipeline Replacement
Project Type: Federal Grant / Loan Related
Project Description: project 108020
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.569741449999995,-77.40052693810861,14z>



Counties: Henrico County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 2. The [Migratory Birds Treaty Act](#) of 1918.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

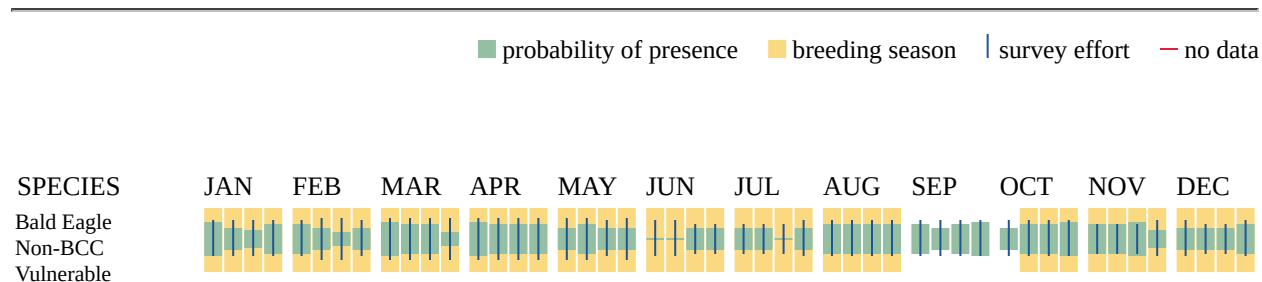
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

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Additional information can be found using the following links:

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For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

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Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler <i>Vermivora pinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere

NAME	BREEDING SEASON
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.

■ probability of presence
 ■ breeding season
 | survey effort
 — no data



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

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State: MA

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LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0011801
Project Name: Richmond, VA Pipeline Replacement

November 01, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

Gloucester, VA 23061-4410

(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0011801
Project Name: Richmond, VA Pipeline Replacement
Project Type: Federal Grant / Loan Related
Project Description: project 108023
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.5734688,-77.39955285958447,14z>



Counties: Henrico County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 2. The [Migratory Birds Treaty Act](#) of 1918.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

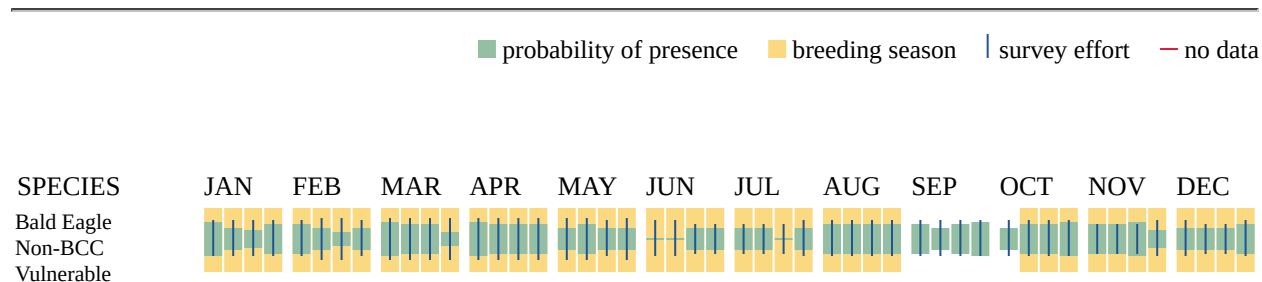
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.

3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler <i>Vermivora pinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere

NAME	BREEDING SEASON
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

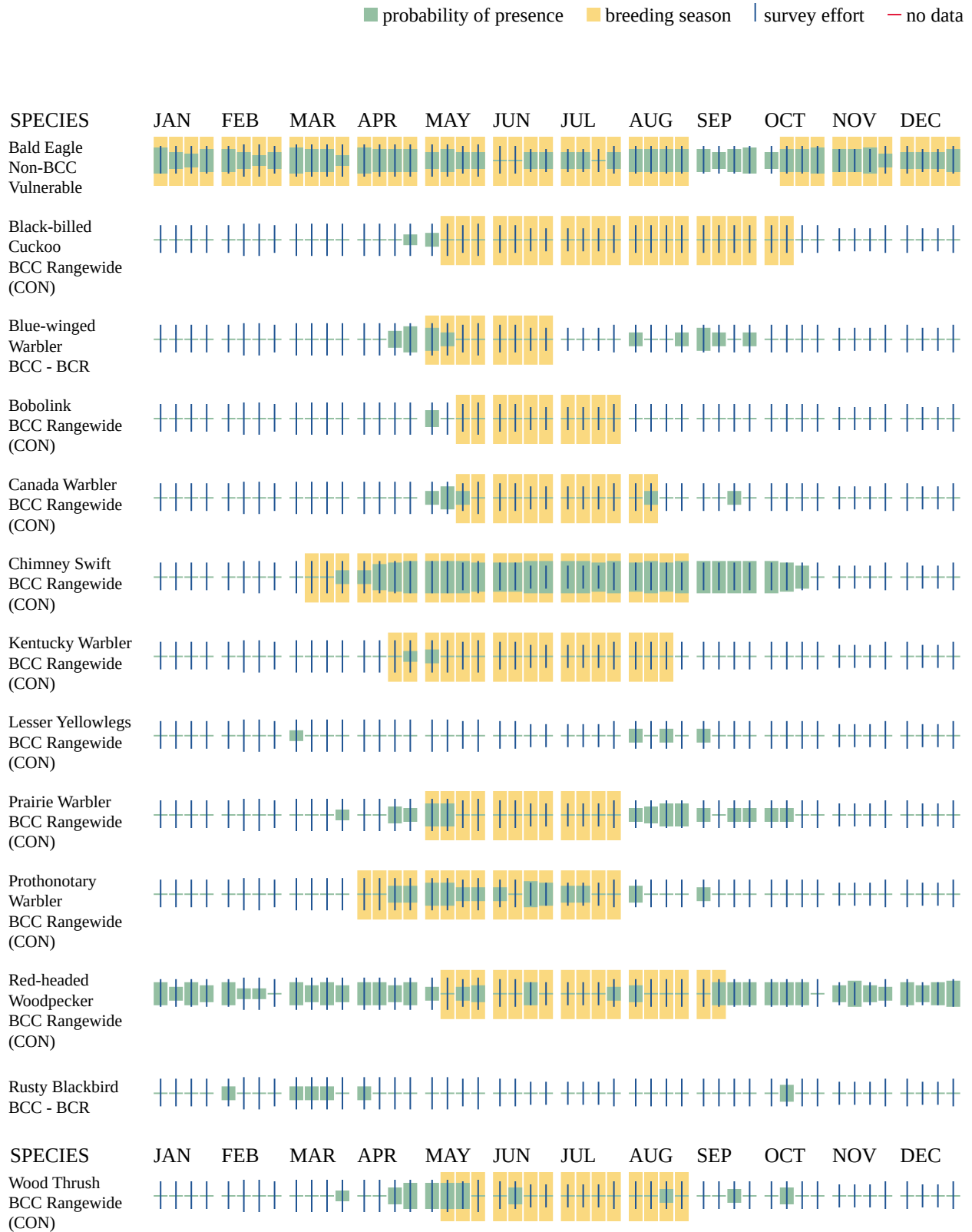
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

Name: Danielle Larimer

Address: 55 Broadway

City: Cambridge

State: MA

Zip: 02142

Email: danielle.larimer@dot.gov

Phone: 8579981686

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0014908
Project Name: Richmond, VA Pipeline Replacement

November 09, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

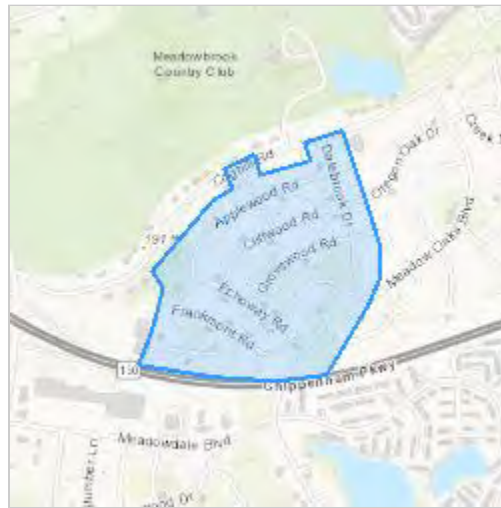
Gloucester, VA 23061-4410

(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0014908
Project Name: Richmond, VA Pipeline Replacement
Project Type: Federal Grant / Loan Related
Project Description: 108024
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.4427425,-77.4637717921391,14z>



Counties: Chesterfield County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 2. The [Migratory Birds Treaty Act](#) of 1918.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

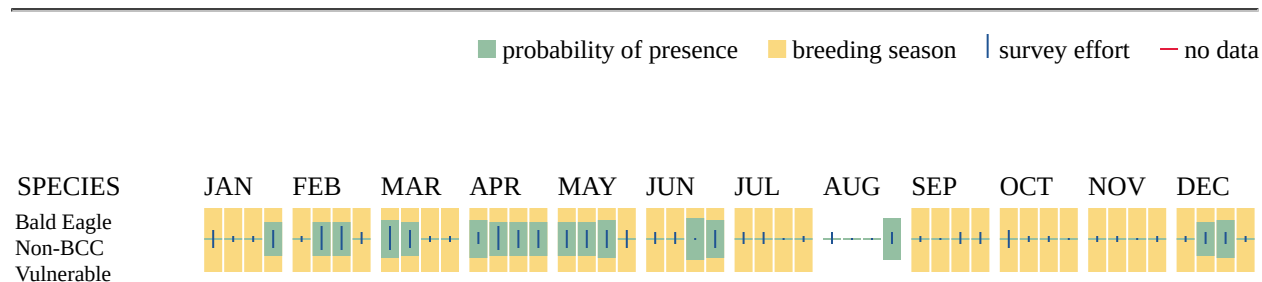
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Migratory Birds Treaty Act](#) of 1918.
 2. The [Bald and Golden Eagle Protection Act](#) of 1940.

3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Sep 1 to Jul 31
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

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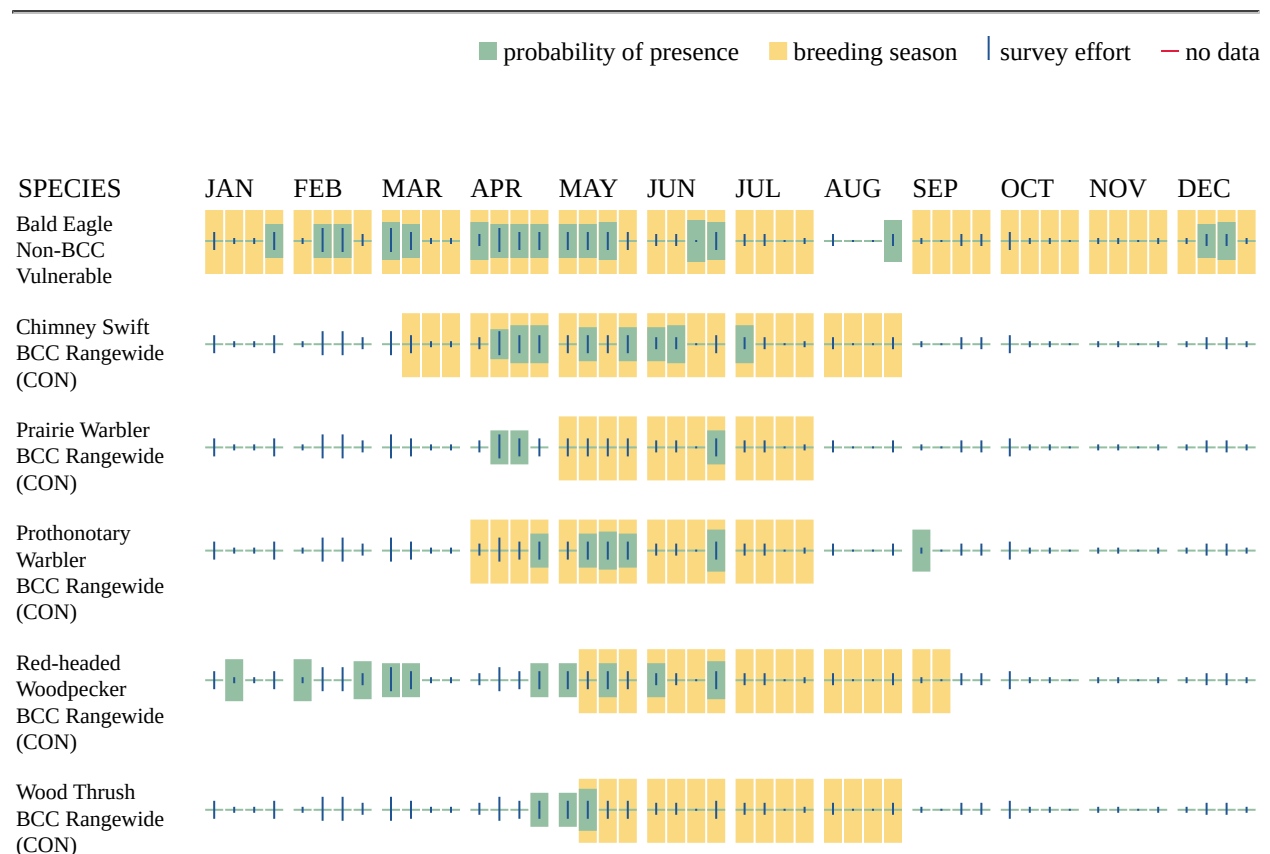
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IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

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City: Cambridge

State: MA

Zip: 02142

Email: danielle.larimer@dot.gov

Phone: 8579981686

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0014913
Project Name: Richmond, VA Pipeline Replacement

November 09, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

Gloucester, VA 23061-4410

(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0014913

Project Name: Richmond, VA Pipeline Replacement

Project Type: Federal Grant / Loan Related

Project Description: 108061

Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.54072365,-77.4142907031908,14z>



Counties: Richmond County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
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 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

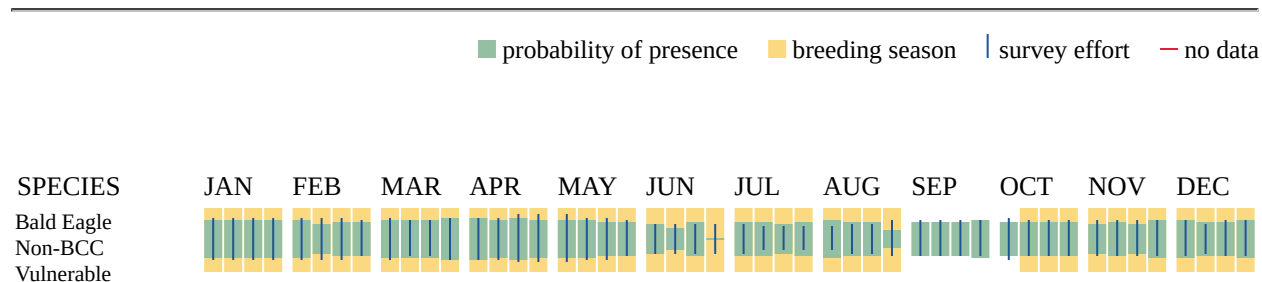
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

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Additional information can be found using the following links:

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Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler <i>Vermivora pinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Cerulean Warbler <i>Dendroica cerulea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 29 to Jul 20
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20

NAME	BREEDING SEASON
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

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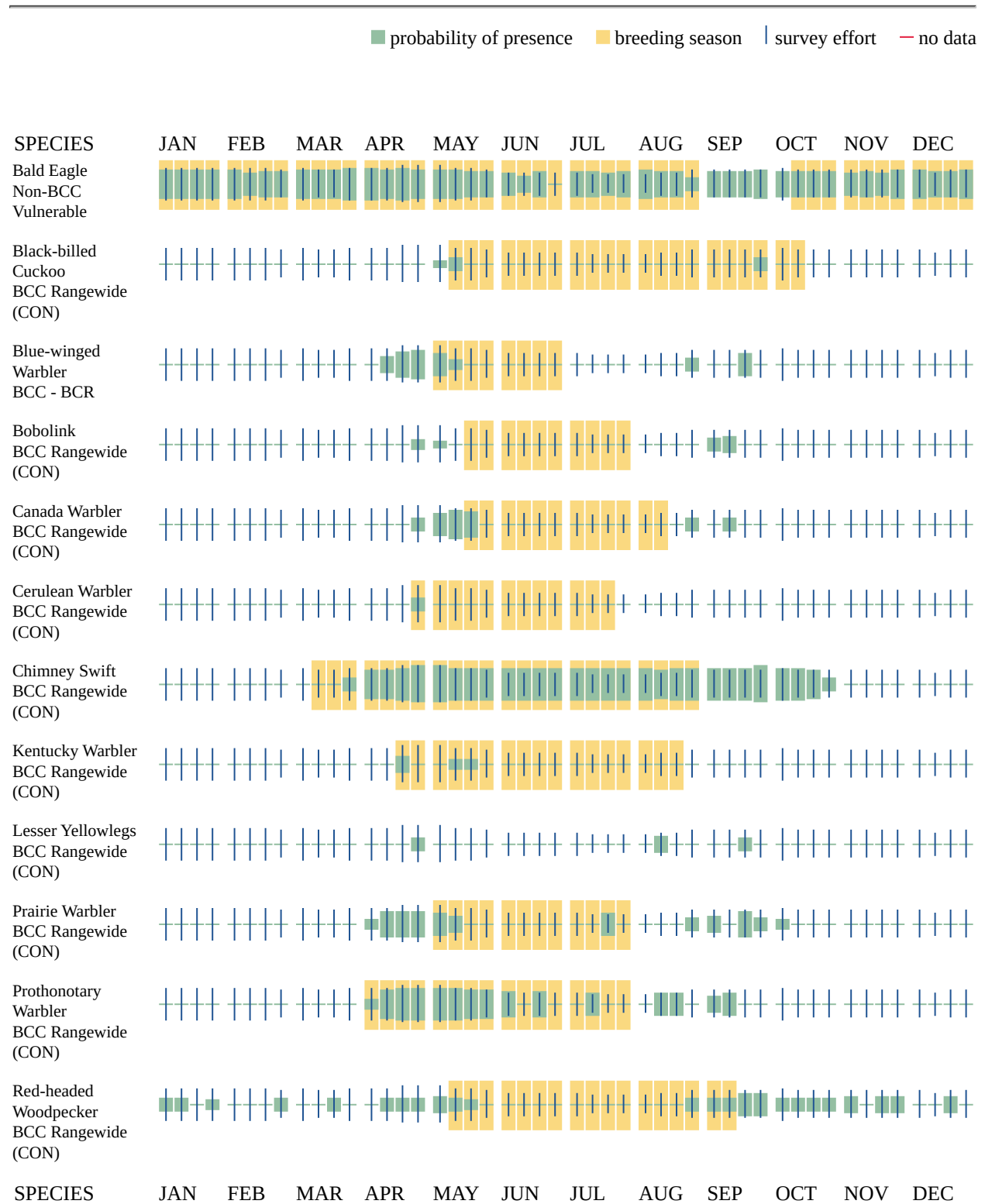
Breeding Season (■)

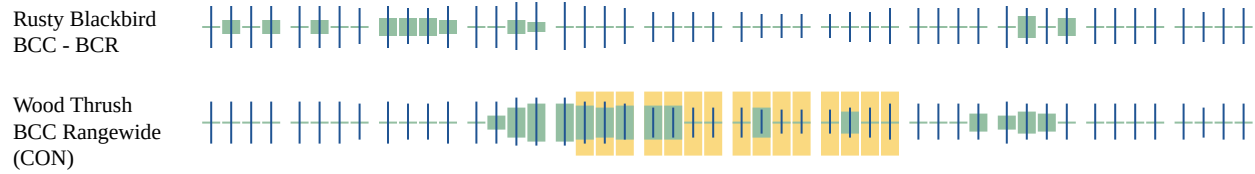
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IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

Name: Danielle Larimer

Address: 55 Broadway

City: Cambridge

State: MA

Zip: 02142

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Phone: 8579981686

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0014921
Project Name: Richmond, VA Pipeline Replacement

November 09, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

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Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

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We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

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PROJECT SUMMARY

Project Code: 2024-0014921
Project Name: Richmond, VA Pipeline Replacement
Project Type: Federal Grant / Loan Related
Project Description: 108062
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.51013425,-77.39874222996131,14z>



Counties: Henrico and Richmond counties, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

Any person or organization who plans or conducts activities that may result in impacts to bald or golden eagles, or their habitats³, should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

-
1. The [Bald and Golden Eagle Protection Act](#) of 1940.
 2. The [Migratory Birds Treaty Act](#) of 1918.
 3. 50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)

There are bald and/or golden eagles in your project area.

For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

NAME	BREEDING SEASON
Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

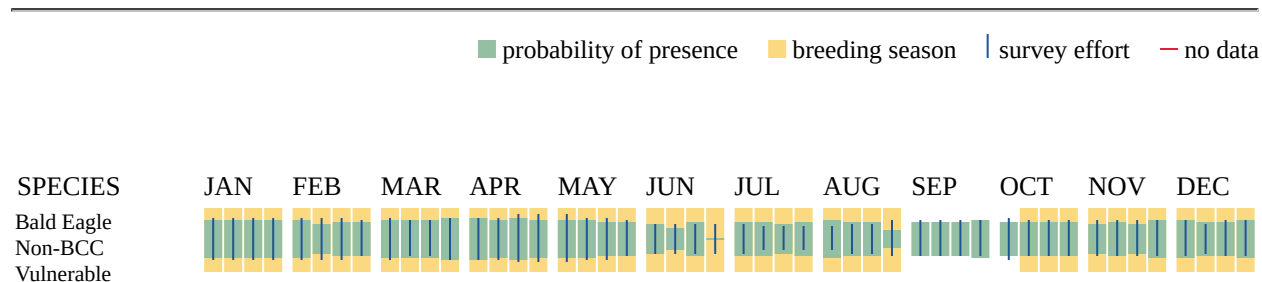
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

No Data (—)

A week is marked as having no data if there were no survey events for that week.



Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
- Nationwide conservation measures for birds <https://www.fws.gov/sites/default/files/documents/nationwide-standard-conservation-measures.pdf>
- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

MIGRATORY BIRDS

Certain birds are protected under the Migratory Bird Treaty Act¹ and the Bald and Golden Eagle Protection Act².

Any person or organization who plans or conducts activities that may result in impacts to migratory birds, eagles, and their habitats³ should follow appropriate regulations and consider implementing appropriate conservation measures, as described below.

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1. The [Migratory Birds Treaty Act](#) of 1918.
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For guidance on when to schedule activities or implement avoidance and minimization measures to reduce impacts to migratory birds on your list, click on the PROBABILITY OF PRESENCE SUMMARY at the top of your list to see when these birds are most likely to be present and breeding in your project area.

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Bald Eagle <i>Haliaeetus leucocephalus</i> This is not a Bird of Conservation Concern (BCC) in this area, but warrants attention because of the Eagle Act or for potential susceptibilities in offshore areas from certain types of development or activities. https://ecos.fws.gov/ecp/species/1626	Breeds Oct 15 to Aug 31
Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler <i>Vermivora pinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Cerulean Warbler <i>Dendroica cerulea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 29 to Jul 20
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20

NAME	BREEDING SEASON
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

The graphs below provide our best understanding of when birds of concern are most likely to be present in your project area. This information can be used to tailor and schedule your project activities to avoid or minimize impacts to birds. Please make sure you read the supplemental information and specifically the FAQ "Proper Interpretation and Use of Your Migratory Bird Report" before using or attempting to interpret this report.

Probability of Presence (■)

Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

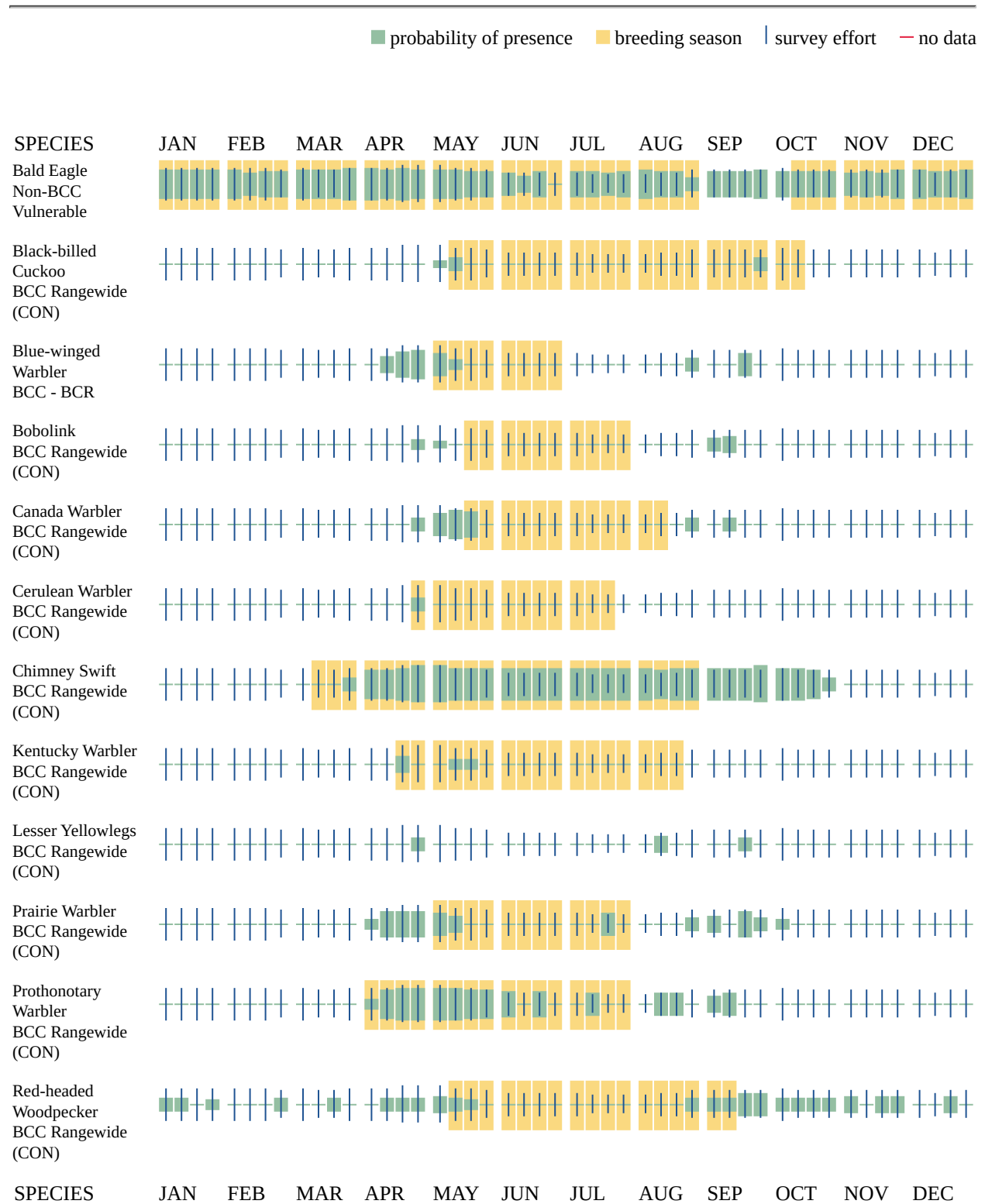
Breeding Season (■)

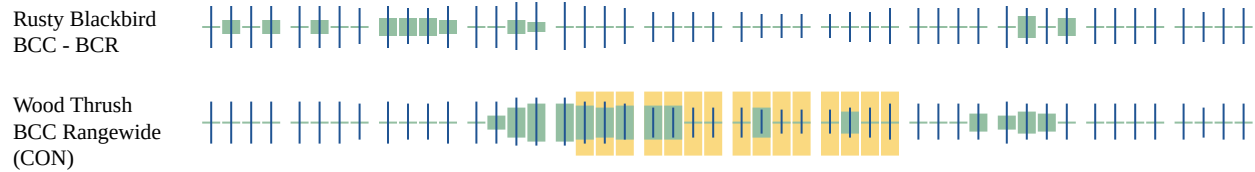
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

A week is marked as having no data if there were no survey events for that week.





Additional information can be found using the following links:

- Eagle Management <https://www.fws.gov/program/eagle-management>
- Measures for avoiding and minimizing impacts to birds <https://www.fws.gov/library/collections/avoiding-and-minimizing-incidental-take-migratory-birds>
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- Supplemental Information for Migratory Birds and Eagles in IPaC <https://www.fws.gov/media/supplemental-information-migratory-birds-and-bald-and-golden-eagles-may-occur-project-action>

IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

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Address: 55 Broadway

City: Cambridge

State: MA

Zip: 02142

Email: danielle.larimer@dot.gov

Phone: 8579981686

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration



United States Department of the Interior

FISH AND WILDLIFE SERVICE
Virginia Ecological Services Field Office
6669 Short Lane
Gloucester, VA 23061-4410
Phone: (804) 693-6694 Fax: (804) 693-9032



In Reply Refer To:
Project Code: 2024-0014928
Project Name: Richmond, VA Pipeline Replacement

November 09, 2023

Subject: List of threatened and endangered species that may occur in your proposed project location or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*). Any activity proposed on National Wildlife Refuge lands must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<https://www.fws.gov/sites/default/files/documents/endangered-species-consultation-handbook.pdf>

Migratory Birds: In addition to responsibilities to protect threatened and endangered species under the Endangered Species Act (ESA), there are additional responsibilities under the Migratory Bird Treaty Act (MBTA) and the Bald and Golden Eagle Protection Act (BGEPA) to protect native birds from project-related impacts. Any activity, intentional or unintentional, resulting in take of migratory birds, including eagles, is prohibited unless otherwise permitted by the U.S. Fish and Wildlife Service (50 C.F.R. Sec. 10.12 and 16 U.S.C. Sec. 668(a)). For more information regarding these Acts, see <https://www.fws.gov/program/migratory-bird-permit/what-we-do>.

The MBTA has no provision for allowing take of migratory birds that may be unintentionally killed or injured by otherwise lawful activities. It is the responsibility of the project proponent to comply with these Acts by identifying potential impacts to migratory birds and eagles within applicable NEPA documents (when there is a federal nexus) or a Bird/Eagle Conservation Plan (when there is no federal nexus). Proponents should implement conservation measures to avoid or minimize the production of project-related stressors or minimize the exposure of birds and their resources to the project-related stressors. For more information on avian stressors and recommended conservation measures, see <https://www.fws.gov/library/collections/threats-birds>.

In addition to MBTA and BGEPA, Executive Order 13186: *Responsibilities of Federal Agencies to Protect Migratory Birds*, obligates all Federal agencies that engage in or authorize activities that might affect migratory birds, to minimize those effects and encourage conservation measures that will improve bird populations. Executive Order 13186 provides for the protection of both migratory birds and migratory bird habitat. For information regarding the implementation of Executive Order 13186, please visit <https://www.fws.gov/partner/council-conservation-migratory-birds>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Project Code in the header of this

letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment(s):

- Official Species List
- USFWS National Wildlife Refuges and Fish Hatcheries
- Bald & Golden Eagles
- Migratory Birds

OFFICIAL SPECIES LIST

This list is provided pursuant to Section 7 of the Endangered Species Act, and fulfills the requirement for Federal agencies to "request of the Secretary of the Interior information whether any species which is listed or proposed to be listed may be present in the area of a proposed action".

This species list is provided by:

Virginia Ecological Services Field Office

6669 Short Lane

Gloucester, VA 23061-4410

(804) 693-6694

PROJECT SUMMARY

Project Code: 2024-0014928
Project Name: Richmond, VA Pipeline Replacement
Project Type: Federal Grant / Loan Related
Project Description: 108063
Project Location:

The approximate location of the project can be viewed in Google Maps: <https://www.google.com/maps/@37.51673825,-77.40193006750829,14z>



Counties: Richmond County, Virginia

ENDANGERED SPECIES ACT SPECIES

There is a total of 3 threatened, endangered, or candidate species on this species list.

Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species.

IPaC does not display listed species or critical habitats under the sole jurisdiction of NOAA Fisheries¹, as USFWS does not have the authority to speak on behalf of NOAA and the Department of Commerce.

See the "Critical habitats" section below for those critical habitats that lie wholly or partially within your project area under this office's jurisdiction. Please contact the designated FWS office if you have questions.

-
1. [NOAA Fisheries](#), also known as the National Marine Fisheries Service (NMFS), is an office of the National Oceanic and Atmospheric Administration within the Department of Commerce.

MAMMALS

NAME	STATUS
Northern Long-eared Bat <i>Myotis septentrionalis</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9045	Endangered
Tricolored Bat <i>Perimyotis subflavus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/10515	Proposed Endangered

INSECTS

NAME	STATUS
Monarch Butterfly <i>Danaus plexippus</i> No critical habitat has been designated for this species. Species profile: https://ecos.fws.gov/ecp/species/9743	Candidate

CRITICAL HABITATS

THERE ARE NO CRITICAL HABITATS WITHIN YOUR PROJECT AREA UNDER THIS OFFICE'S JURISDICTION.

YOU ARE STILL REQUIRED TO DETERMINE IF YOUR PROJECT(S) MAY HAVE EFFECTS ON ALL ABOVE LISTED SPECIES.

USFWS NATIONAL WILDLIFE REFUGE LANDS AND FISH HATCHERIES

Any activity proposed on lands managed by the [National Wildlife Refuge](#) system must undergo a 'Compatibility Determination' conducted by the Refuge. Please contact the individual Refuges to discuss any questions or concerns.

THERE ARE NO REFUGE LANDS OR FISH HATCHERIES WITHIN YOUR PROJECT AREA.

BALD & GOLDEN EAGLES

Bald and golden eagles are protected under the Bald and Golden Eagle Protection Act¹ and the Migratory Bird Treaty Act².

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There are bald and/or golden eagles in your project area.

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NAME	BREEDING SEASON
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PROBABILITY OF PRESENCE SUMMARY

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Green bars; the bird's relative probability of presence in the 10km grid cell(s) your project overlaps during that week of the year.

Breeding Season (■)

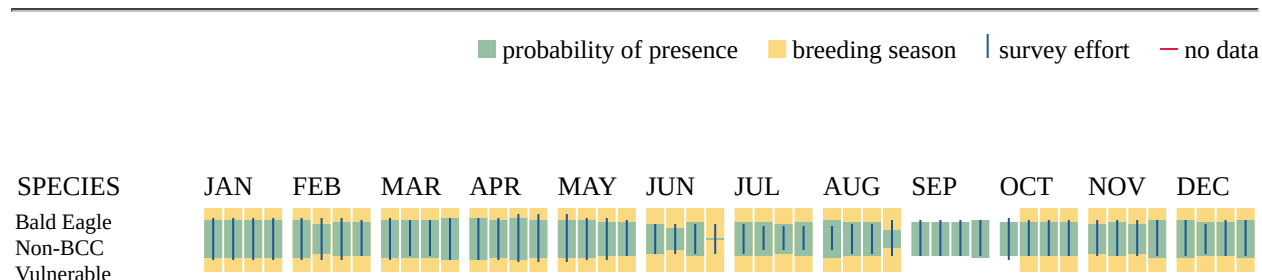
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

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Vertical black lines; the number of surveys performed for that species in the 10km grid cell(s) your project area overlaps.

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Black-billed Cuckoo <i>Coccyzus erythrophthalmus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9399	Breeds May 15 to Oct 10
Blue-winged Warbler <i>Vermivora pinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9509	Breeds May 1 to Jun 30
Bobolink <i>Dolichonyx oryzivorus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9454	Breeds May 20 to Jul 31
Canada Warbler <i>Cardellina canadensis</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9643	Breeds May 20 to Aug 10
Cerulean Warbler <i>Dendroica cerulea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/2974	Breeds Apr 29 to Jul 20
Chimney Swift <i>Chaetura pelagica</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9406	Breeds Mar 15 to Aug 25
Kentucky Warbler <i>Oporornis formosus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9443	Breeds Apr 20 to Aug 20

NAME	BREEDING SEASON
Lesser Yellowlegs <i>Tringa flavipes</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9679	Breeds elsewhere
Prairie Warbler <i>Dendroica discolor</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9513	Breeds May 1 to Jul 31
Prothonotary Warbler <i>Protonotaria citrea</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9439	Breeds Apr 1 to Jul 31
Red-headed Woodpecker <i>Melanerpes erythrocephalus</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9398	Breeds May 10 to Sep 10
Rusty Blackbird <i>Euphagus carolinus</i> This is a Bird of Conservation Concern (BCC) only in particular Bird Conservation Regions (BCRs) in the continental USA https://ecos.fws.gov/ecp/species/9478	Breeds elsewhere
Wood Thrush <i>Hylocichla mustelina</i> This is a Bird of Conservation Concern (BCC) throughout its range in the continental USA and Alaska. https://ecos.fws.gov/ecp/species/9431	Breeds May 10 to Aug 31

PROBABILITY OF PRESENCE SUMMARY

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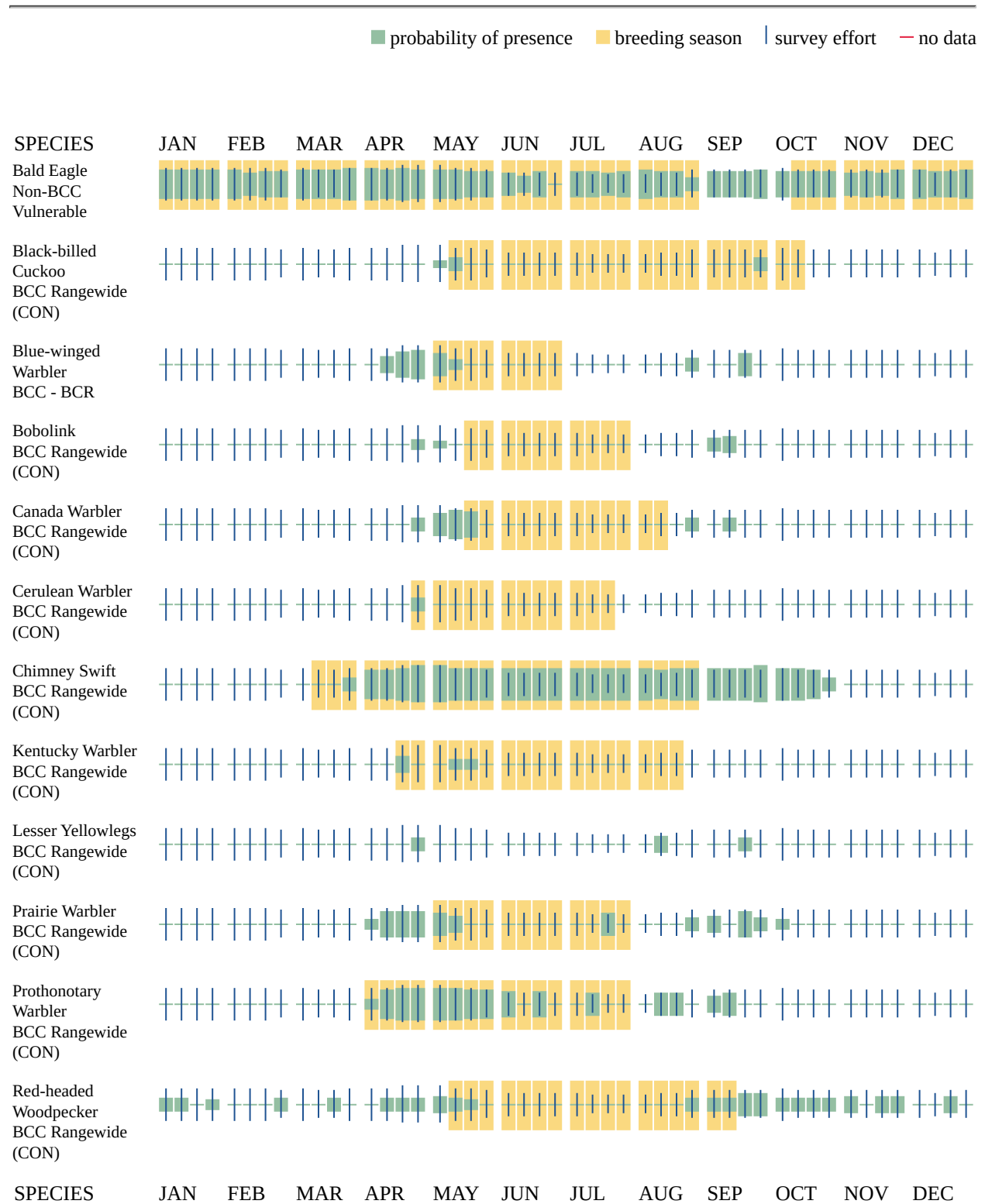
Breeding Season (■)

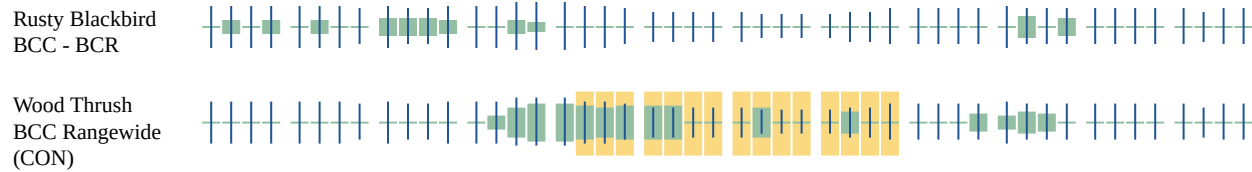
Yellow bars; liberal estimate of the timeframe inside which the bird breeds across its entire range.

Survey Effort (|)

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IPAC USER CONTACT INFORMATION

Agency: Department of Transportation

Name: Danielle Larimer

Address: 55 Broadway

City: Cambridge

State: MA

Zip: 02142

Email: danielle.larimer@dot.gov

Phone: 8579981686

LEAD AGENCY CONTACT INFORMATION

Lead Agency: Pipeline and Hazardous Materials Safety Administration

Natural Heritage Source

Your Criteria

State Legal Status: Select All

County: Chesterfield, Henrico, Richmond

Search Run: 11/16/2023 13:11:00 PM

Summary

Total Species returned: 15

Total Communities returned: 0

Click scientific names below to go to NatureServe report.

Click column headings for a explanation of species and community ranks.

Common Name/Natural Community	Scientific Name	Scientific Name Linked	Global Conservation Status Rank	State Conservation Status Rank	Federal Legal Status	State Legal Status	Statewide Occurrences	Virginia Coastal Zone
Chertford								
BIVALVIA (MUSSELS)								
Atlantic Pigtoe	Fuscosuaria masoia	Fuscosuaria masoia	G1n	S2	LTn	LTn	30n	Y
Green Floater	Lasmigona subviridis	Lasmigona subviridis	RG3	S2n	None	LTn	67	Y
FISH								
Atlantic Sturgeon	Acipenser oxyrinchus	Acipenser oxyrinchus	G3n	S2n	LE	LE	4	Y
INVERTEBRATE								
Rusty-patched Bumblebee	Bombus affinis	Bombus affinis	G2	S1n	LEn	LEn	56	Y
VASCULAR PLANTS								
Sensitive Joint-vetch	Aeschynomene virginica	Aeschynomene virginica	G2	S2n	LTn	LTn	22n	Y
Henric								
FISH								
Atlantic Sturgeon	Acipenser oxyrinchus	Acipenser oxyrinchus	G3	S2n	LEn	LEn	4n	Y
MAMMALS								
Eastern Big-eared Bat	Corynorhinus rafinesquii macrotis	Corynorhinus rafinesquii macrotis	G3G4T3n	S2n	None	LEn	45	Y
VASCULAR PLANTS								
Sensitive Joint-vetch	Aeschynomene	Aeschynomene	G2	S2n	LTn	LTn	22n	Yn

Common Name/Na a Z Commun y	Sc en f c Name	Sc en f c Name L nked	G bba Conse va on S a s Rank	S a e Conse va on S a s Rank	Fede a Lega S a s	S a e Lega S a s	S a ew de Occ ences Z	V g n a Coas a one
Swamp-p nk New Je sey R sh	v g n ca He on as b a a J nc s caesa ens s	v g n ca He on as b a a Z J nc s caesa ens s	G3 G2G3 Z	S2S3 Z S2 Z	LT Z SOC	LE Z LT Z	35 13	Y Y

Richmond

BIRDS								
Back Ra Z	La e a s jama cens s Z	La e a s jama cens s Z	G3 Z	S1B,S1N Z	LT Z	LE Z	23 Z	Y
VASCULAR PLANTS								
Sens ve Jo n -ve ch	Aeschynomene v g n ca Z	Aeschynomene v g n ca	G2	S2 Z	LT Z	LT Z	22	Y

Richmond (City)

BIRDS								
Pe eg ne Fa con	Fa co pe eg n s	Fa co pe eg n s	G4 Z	S1B,S2N Z	None Z	LT Z	42 Z	Y
BIVALVIA (MUSSELS)								
A an c P g oe	F scona a mason	F scona a mason	G1 Z	S2	LT Z	LT	30	Y
Green F oa e Z	Lasm gona s bv ds	Lasm gona s bv ds	G3 Z	S2 Z	None Z	LT Z	67 Z	Y

Note: On-line queries provide basic information from DCR's databases at the time of the request. They are NOT to be substituted for a project review or for on-site surveys required for environmental assessments of specific project areas.

For Additional Information on oca ons of Na a He age Reso ces please s bmi an [nfo ma on eq es](#).

To Contribute information on oca ons of na a he age eso ces, please f o and s bmi a [a e spec es s gh ng fo m](#). Z

Appendix H

Cultural Resources



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

March 14, 2024

Roger Kirchen
Review and Compliance Division Manager
Virginia Department of Historic Resources
2801 Kensington Avenue
Richmond, VA 23221

Section 106 Consultation: PHMSA Pipeline Replacement Project in the City of Richmond (DHR File No. 2024-3320)

Grant Recipient: City of Richmond

Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear Roger Kirchen:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) (Grant Recipient) for the replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The above referenced project is related to the emergency work submitted to your office on February 9, 2024. On the same day, the Virginia Department of Historic Resources concurred with a finding of No Historic Properties Affected for the emergency work. The emergency work is therefore not included in this consultation.

Project Description/Background

The Grant Recipient will be replacing 13.2 miles (60,447 linear feet (LF)) of 2-inch to 12-inch cast iron, ductile iron, steel, and vintage polyethylene pipes with new polyethylene gas mains to address aging infrastructure, legacy pipe material, and leaks in the City of Richmond. Replacement of pipelines will enhance safety, improve operations, and reduce methane emissions of natural gas. The methods of construction will include open cut excavation (trenching) as well as directional drilling. The Undertaking is located throughout the City of Richmond:

- Work Package: 107991, Henrico County
- Lakeside Avenue (Parkside Avenue to Hilliard Road)- total 2,902 LF
- Work Package: 107990, Henrico County
- Lakeside Avenue (Dumbarton Road to Parkside Avenue)- total 3,317 LF
- Work Package: 108024, Chesterfield County
- Dalebrook Drive (Applewood Road to Frankmont Road)- total 12,646 LF
- Work Package: 108023, Henrico County
- Mechanicsville Turnpike at Byron Street- total 4,366 LF
- Work Package: 108020, Henrico County

- Mechanicsville Turnpike and Euclid Road- total 3,104 LF

Work Package: 108061, City of Richmond

- Mosby Street, Fairmont Street, 25th Street, and Venable Street- total 10,998 LF

Work Package: 108062, City of Richmond and Henrico County

- Northampton Street, Williamsburg Road, Parker Street, and Haig Street– total 18,499 LF

Work Package: 107989, City of Richmond and Henrico County

- Phaup Street, 19th Street, and Brauers Lane – total 4,615 LF

All work will take place within the existing, paved, right-of-way (ROW) and will not require new ROW or easements. The new pipes will be placed adjacent to the existing pipes and the existing pipe will be abandoned in place. Abandonment of the existing pipeline (versus excavation and removal) will minimize ground disturbance. It is anticipated that ground disturbance will be limited to the roadway/sidewalk. All gas main replacements proposed are within moderately developed urban and suburban areas that are primarily commercial and residential. The entire roadway has been previously disturbed by pipeline work and several other utilities. The expected maximum depth of excavation for this Undertaking is 42 inches below grade by 24 inches wide. The staging areas for the project have not been identified. Project location maps are enclosed in **Attachment A**. Photographs showing the overall character of the project areas are included in **Attachment B**.

Area of Potential Effects (APE)

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the Undertaking may directly or indirectly affect historic resources. Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, PHMSA has delineated the APE for this Undertaking to encompass the existing ROW, which includes the limits of disturbance. The APE extends to the depth of proposed ground disturbance of up to 42 inches below grade. The Undertaking does not have the potential to cause visual or audible effects after the completion of construction. The existing ROW includes the roadway, parking lanes, sidewalk, light poles, overhead power lines, overhead streetlights, fire hydrants, bike lanes, bus stops, benches, signs, trees, and bushes. The APE is shown on the maps in **Attachment A**.

Identification and Evaluation

To identify historic properties in the APE, individuals who meet the Secretary of the Interior's (SOI) Professional Qualification Standards reviewed available information on previously identified historic properties in the APE, including the National Register of Historic Places (NRHP) database and data gathered from the Virginia Cultural Resources Information System (VCRIS) database and the USDA Web Soil Survey. Historic topographic maps and historic aerial photographs were also examined. SOI-qualified individuals conducted research to determine if there are any previously unidentified properties within the APE that are 45 years of age or older and may be eligible for listing in the NRHP and assessed the archaeological sensitivity of the APE.

Historic Architecture

The Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory are NRHP-listed historic properties located within the APE.

The Fairmont Historic District comprises a ten-block-by-seven-block nearly level hilltop area. As a whole, Fairmont Historic District is a unified urban neighborhood that is made up of rows of small, frame town houses, rows of bungalows in repeated designs, and only a few other buildings. The district retains integrity because most of the extant buildings date from the 1890s, the neighborhood's first decade of existence, and about half of these resources retain original wooden ornamental details. In a large percentage of the houses, the original exterior siding has been covered with replacement siding, but the ornamental details remain

intact. Many of the buildings built between 1900 and 1946 also retain a high degree of integrity. Some of the non-contributing buildings built between the 1950s and 2000 are visually intrusive; however, an effort has been made since 2000 to build infill houses in a style that is compatible with the character of the district. The district contains 542 contributing buildings and 172 non-contributing buildings.

Union Hill Historic District is in the east end of the City of Richmond. Union Hill is primarily a residential district with a few churches and commercial buildings concentrated along 25th Street and Venable Street. The buildings, constructed of frame and brick, are modest working-class houses, many of which were built prior to 1867 when Union Hill was annexed from Henrico County. Today, Union Hill Historic District is fragile as thirty-nine houses have been lost since the district was surveyed in 1993 and another forty-eight antebellum houses identified in the 1940s have been demolished. Despite this, Union Hill Historic District still possesses a high level of integrity and conveys the sense of its historic environment. The district contains a park and 369 buildings. Twelve of the buildings are non-contributing and one, the Hasker and Marcuse Factory was previously listed in the NRHP.

The Hasker Marcuse Factory is a 4-to 5-story brick masonry building constructed between 1893 and about 1915. Situated at the western edge of Union Hill Historic District, the factory contrasts with neighboring structures in use, overall character, and scale. It was built to house the Hasker & Marcuse Manufacturing Company, manufacturers of printed, polychromatic tin boxes and tin tags (labels) for plugs of chewing tobacco. The factory has a distinct industrial character, typical of the late nineteenth century, characterized by the exterior, running-bond-brickwork, the heavy massing of the structure, and the rhythmic patterning of the segmental-arched six-over-six, double-hung wood sash windows with rough-faced stone sills. While a degree of integrity of association has been lost due to the removal of the machinery in 1951, the structure itself sufficiently conveys the associative values and the integrity of materials, workmanship, setting, location, and feeling of the building remain intact.

Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, the identification effort for previously unidentified above-ground historic properties focused on identifying properties that are susceptible to the vibration effects of pipeline replacement and could experience diminished integrity as a result of the Undertaking. A review of the APE found no additional above-ground resources that have the potential to be affected by the Undertaking.

Archeology

VCRIS was examined to identify the presence of previously recorded archeological sites and previously conducted archeological surveys within the APE. The APE is comprised of five general areas within the greater Richmond area. The four northernmost areas are in Henrico County and the southernmost in Chesterfield County. As a result of the VCRIS search, two previous surveys were identified as intersecting the APE, and no previously recorded archeological sites were identified within the APE (Table 1). The two surveys intersecting the APE are associated with the same Virginia Department of Transportation project. In 2019, Dovetail Cultural Resources Group conducted a Phase I cultural resources survey for street and sidewalk alterations and upgrades near I-95 and Broad Street and Oliver Way. During the survey, two archeological sites were identified. The initial Phase I survey document was followed by an addendum survey of a slightly expanded APE (McCloskey et al. 2020).

Table 1. Previously Conducted Archeological Surveys within the APE

Report	Citation	Report Number
Phase I Cultural Resource Survey of the Shockoe Valley Streets Improvement Project, Richmond, Virginia	McCloskey et al. 2019	HE-393
Addendum: Phase I Archaeological Survey of Impervious Surface Areas for the Shockoe Valley Streets Improvement Project, Richmond, Virginia	McCloskey et al. 2020	HE-429

A quarter of a mile search radius was also examined for previously recorded archeological sites and surveys. In addition to the two surveys conducted within the APE, five archeological surveys have been conducted within a quarter of a mile of the APE. Mouer et al. (1978) conducted a large-scale archaeological survey and inventory of sites for various parts of Henrico County. The survey identified 19 sites, but none are within a quarter of a mile of the APE. Browning's 2005 monitoring survey of the Belmont Golf Course identified no sites. Both Browning (2008) and Reid and Southerlin (2008) conducted surveys of the Cedar and Broad block in downtown Richmond ahead of proposed development. One site, 44HE591, was investigated and is located within a quarter of a mile of the APE. Funk et al. (2022) conducted a cultural resource survey of a proposed trail in the Lakeside community. None of the sites identified through the survey are located within a quarter of mile of the APE.

Table 2. Previously Conducted Archeological Surveys within a Quarter of Mile of the APE

Report	Citation	Report Number
Archeology in Henrico, Volume 1: Identification and Evaluation of Archaeological and Historic Resources for the Henrico County, Virginia Regional Wastewater System	Mouer et al. 1978	HE-013
Belmont Golf Course Storm Damage Rebuilding, Henrico County, Virginia, Archaeological Monitoring	Browning 2005	HE-199
Cedar & Broad Block, Richmond City, Virginia Phase I Intensive Cultural Resources Survey	Browning 2008	HE-258
Phase I Archaeological Study of the Cedar and Broad Block, Richmond, Virginia	Reid and Southerlin 2008	HE-260
Cultural Resource Survey, Proposed Lakeside Community Trail Phase 1, Henrico County, Virginia	Funk et al. 2022	HE-451

While no previously recorded archeological sites were identified within the APE, seven sites (Table 3) were identified within a quarter of a mile of the APE. All sites have unknown eligibilities for listing in the NRHP except site 44HE0591, which is recommended eligible.

Table 3. Previously Recorded Archeological Sites within a Quarter of Mile of the APE

Site Number	Type	NRHP	Citation
44HE0413	Precontact townsite	Unknown	Martha McCartney 1981 (no associated report)
44HE0422	Historic tavern site	Unknown	Martha McCartney 1981 (no associated report)
44HE0423	Historic artifact scatter	Unknown	Martha McCartney 1981 (no associated report)
44HE0433	Historic toll house site	Unknown	Martha McCartney 1981 (no associated report)
44HE0440	Precontact artifact scatter and historic house site	Unknown	Johnson and Kessler 1981 (no associated report)
44HE0591	Historic trash pit and domestic site	Eligible	Browning 2008
44HE0774	Historic railroad tunnel	Unknown	Chesapeake and Ohio Historical Society (1990)

An examination of Web Soil Survey data within the APE reveals 16 soil classes within the APE (Table 4). Well drained and moderately well drained soils can be indicative of human habitation during both the pre-

contact and historic periods. All soils within the APE are well drained or moderately well-draining soil types. Typically slopes greater than 15 percent are not suitable for human occupation, and the majority of the APE falls in this range. Much of the APE is comprised of soils indicating suitable conditions for human habitation in both the pre-contact and historic periods. However, the APE is comprised mostly of urban land (76.3 percent) with impervious surfaces such as buildings and pavement and is largely part of a built environment.

Table 4. Soil Types within the APE

Map Unit Name	Drainage Class	Slope	Percent of APE
Bourne fine sandy loam	Moderately well drained	2-6%	5.2
Bourne-Colfax complex	Moderately well drained	2-6%	1.5
Varina fine sandy loam	Well drained	0-4%	<1
Norfolk fine sandy loam	Well drained	0-6%	1.6
Faceville-Gritney gravelly fine sandy loams	Well drained	2-6%	<1
Dunbar fine sandy loam	Somewhat poorly drained	0-4%	2.4
Myatt loam	Poorly drained	0-2%	1.5
Edgehill very gravelly fine sandy loam	Well drained	2-20%	4.2
Appling-Wedowee complex	Well drained	12-20%	<1
Atlee-Urban land complex	Moderately well drained	0-4%	22.5
Turbeville-Urban land complex	Well drained	2-6%	31.4
Urban land	-		22.4
Wateree-Wedowee complex	Well drained	20-45%	<1
Chewacla and Riverview soils	Somewhat poorly drained	0-2%	1.9
Duplin very fine sandy loam	Moderately well drained	2-15%	2.7
Rains very fine sandy loam	Poorly drained	0-2%	<1

Historic topographic maps from 1894, 1934, 1938 and 1959 and historic aerial photographs from 1950s were examined for archeological resource potential within the APE. The presence of structures on historic maps and aerial photography may indicate the likelihood of historic period archeological deposits associated with the occupation of these structures. The APE is comprised of five distinct areas across Richmond. All segments of the APE are located in either dense urban or dense suburban areas. The 1894 Richmond topographic map shows central Richmond as a heavily dense area spanning the north and south sides of the James River. The 1894 Bermuda Hundred map, displaying the area south of downtown Richmond that includes the southernmost APE segment, shows less building density but a well-connected transportation system and moderately dense residential areas along the main roads. The 1934 Richmond topographic map shows greater detail near the APE segments, including various churches, schools, parks and other municipal buildings. While several churches are shown adjacent to the APE segments, the historic maps do not note any cemeteries. The 1938 Drewrys Bluff topographic map displays the area south of Richmond where the southernmost APE segment is located. This map shows small roads and a handful of residential structures near the APE, but no other indications of notable historic architectural resources. Aerial imagery from 1952, 1955, and 1959 shows the APE segments nearest Richmond to be densely developed in residences and commercial structures. The 1955 aerial shows the area surrounding the southernmost APE segment to be rural and containing a single house with an attached agricultural field and wooded area. An aerial from 1968 shows residential street development reflecting the current road layout of this part of the APE.

The Find a Grave online database was examined to identify the presence of historic cemeteries within the APE. No cemeteries were noted as being located within the APE, though the Richmond National Cemetery, containing more than 11,000 graves, is located adjacent to the APE segment along Williamsburg Road. The Richmond National Cemetery is located more than 400 feet from the APE and will not be affected by the Undertaking. Three battlefield study areas are located within a quarter of a mile of the APE: Beaver Dam Creek Battlefield (Mechanicsville/Ellersons Mill), Seven Pines Battlefield, and Chaffin's Farm/New Market Heights Battlefield. Only Seven Pines Battlefield has a study area boundary that intersects the APE, and none of the core battlefield areas intersect the APE; however, this portion of the Seven Pines Battlefield study area encompasses the Richmond National Cemetery.

Background research revealed two archeological surveys and no archeological sites within the APE. No known historic cemeteries are located within the APE, and no archeologically significant NRHP districts intersect the APE. Examination of soils within the APE indicates suitable conditions for human habitation in both precontact and historic contexts, and the prominence of the James River through Richmond was likely a key factor in both precontact and historic period human occupation. While three battlefield study areas are located within a quarter of a mile of the APE, the Seven Pines Battlefield study area is the only one that intersects the APE. The core battlefield area is located more than half a mile from the APE and will not be affected by the Undertaking. Historic topographic maps and aerial imagery also show heavy development and building density in the nineteenth century. Historic development of Richmond indicates a high probability for archeological deposits to exist within the APE. However, since the APE segments are in urban or suburban parts of Richmond that have experienced moderate to heavy development, construction of roads, sidewalks, and underground utility corridors have likely disturbed any archeological deposits located within the APE. The Undertaking will occur entirely within the existing ROW near or within previous road construction and utility installation corridors that lack soil integrity. Due to the limited scope of work and likelihood of disturbed context within the APE, an archeological survey is not recommended at this time.

Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are three historic properties as defined in 36 CFR 800.16(l) within the APE: the NRHP-listed Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory. The Undertaking will not alter any of the characteristics or contributing features of these historic properties that qualify them for inclusion in the NRHP in a manner that would diminish their integrity. The replacement of pipelines within the existing ROW and utility easements will take place under paved surfaces and will not result in lasting physical, visual, or audible effects to historic properties. No character-defining materials or features of any of these historic properties will be removed or altered as a result of the Undertaking. The Undertaking also does not include land acquisition, nor would it limit access to or change the use of any of the historic properties. Project work is limited to areas that demonstrate a low probability for intact significant archaeological resources.

Therefore, the Undertaking does not have the potential to adversely affect any of the identified historic properties. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Based on this assessment, in accordance with 36 CFR Part 800.5, PHMSA has determined the Undertaking will have No Adverse Effect on historic properties.

Consulting Party Outreach

PHMSA identified parties that may be interested in the Undertaking and its effects on historic properties. PHMSA invites the individuals/organizations copied on this letter to participate as Section 106 consulting parties. Invited parties should indicate their willingness to participate as a consulting party and provide comments on the enclosed form (**Attachment C**). Note that a non-response is considered to be a declination to participate; however, interested parties can request to join consultation at any time in the process. If any invited party expresses concern about the Undertaking's potential effects to historic properties, PHMSA will consult with the party to resolve those concerns prior to project implementation.

PHMSA will also invite the following federally recognized tribes to participate in consultation by separate letter:

- Catawba Indian Nation
- Chickahominy Indian Tribe
- Chickahominy Indian Tribe - Eastern Division
- Delaware Nation
- Pamunkey Indian Tribe
- Upper Mattaponi Tribe

Request for Section 106 Concurrence

Based on the information presented above, PHMSA has determined that the Undertaking will result in No Adverse Effect to properties that are either in, or eligible for inclusion in, the NRHP. PHMSA is submitting this Undertaking to your office for your review and comment. PHMSA requests your concurrence with this determination of effect within 30 calendar days of the date of this letter. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,



Matt Fuller
Senior Environmental Protection Specialist

MF/kg

cc: Elizabeth Williams, Environmental Protection Specialist, USDOT Volpe Center
Renee Taylor, PHMSA Grant Specialist
Christian Chirico, City of Richmond Natural Gas Pipeline Replacement
Historic Richmond

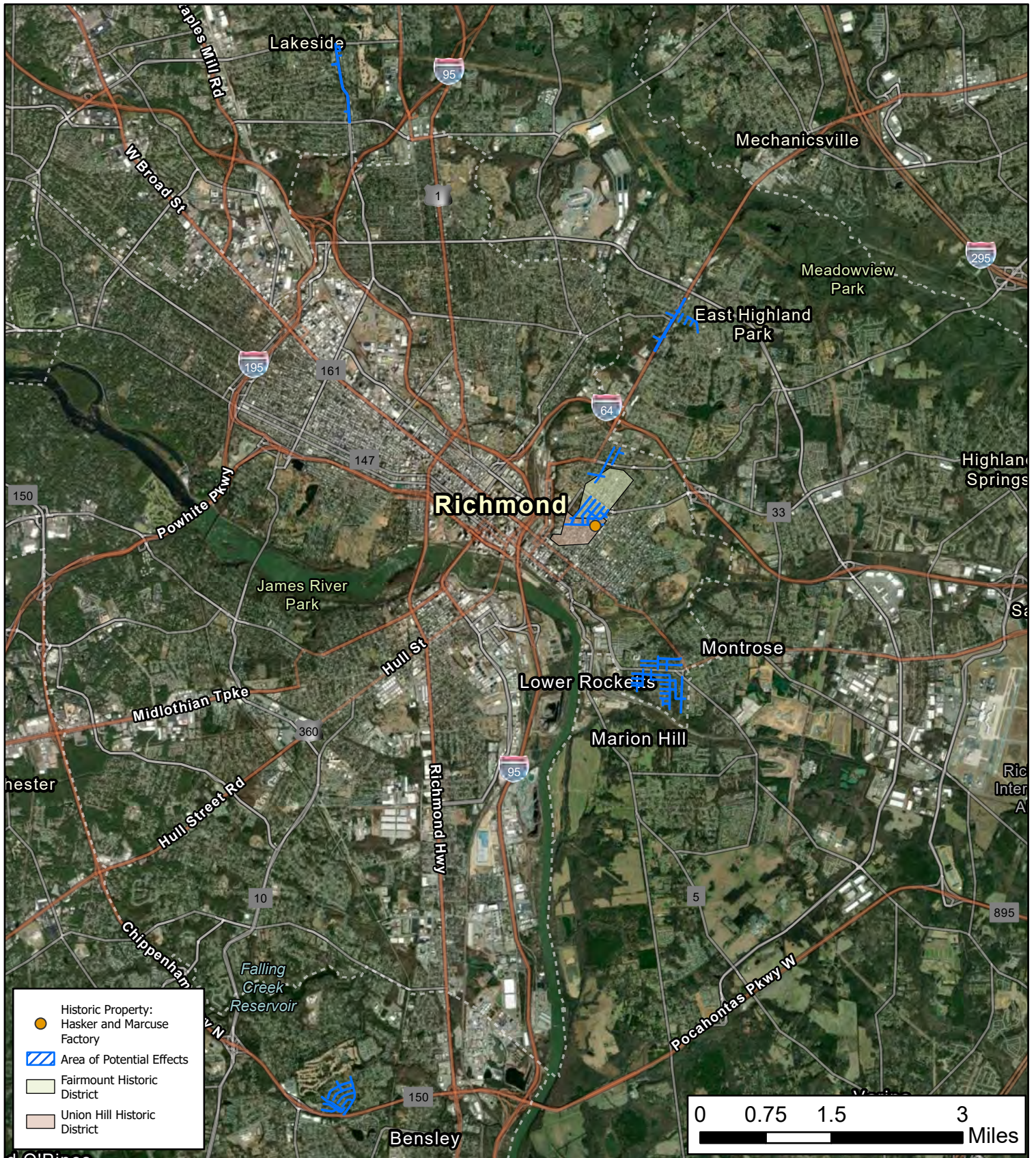
Enclosures:

Attachment A: Project Location and APE Maps
Attachment B: Project Area Photographs
Attachment C: Consulting Party Response Form

ATTACHMENT A

Project Location and APE Maps

Area of Potential Effects Map



Name: Richmond, Virginia Gas Line Replacement

Scale: 95,000

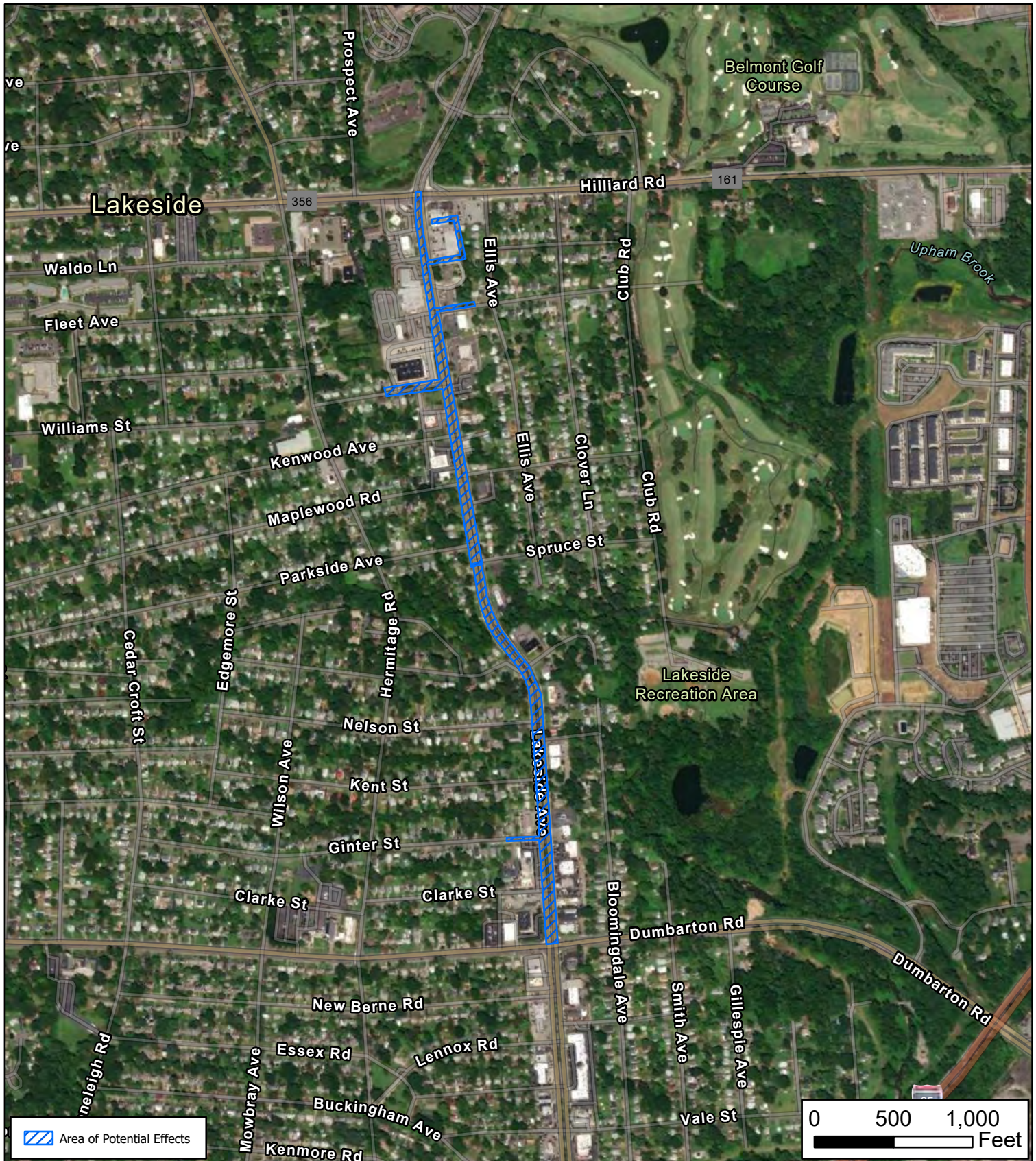
Total Acreage: 61.2

Richmond, VA, Richmond City County



Service Layer Credits: Earthstar Geographics, City of Richmond, County of Henrico, VGIN, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, USDA, USFWS

Area of Potential Effects Map

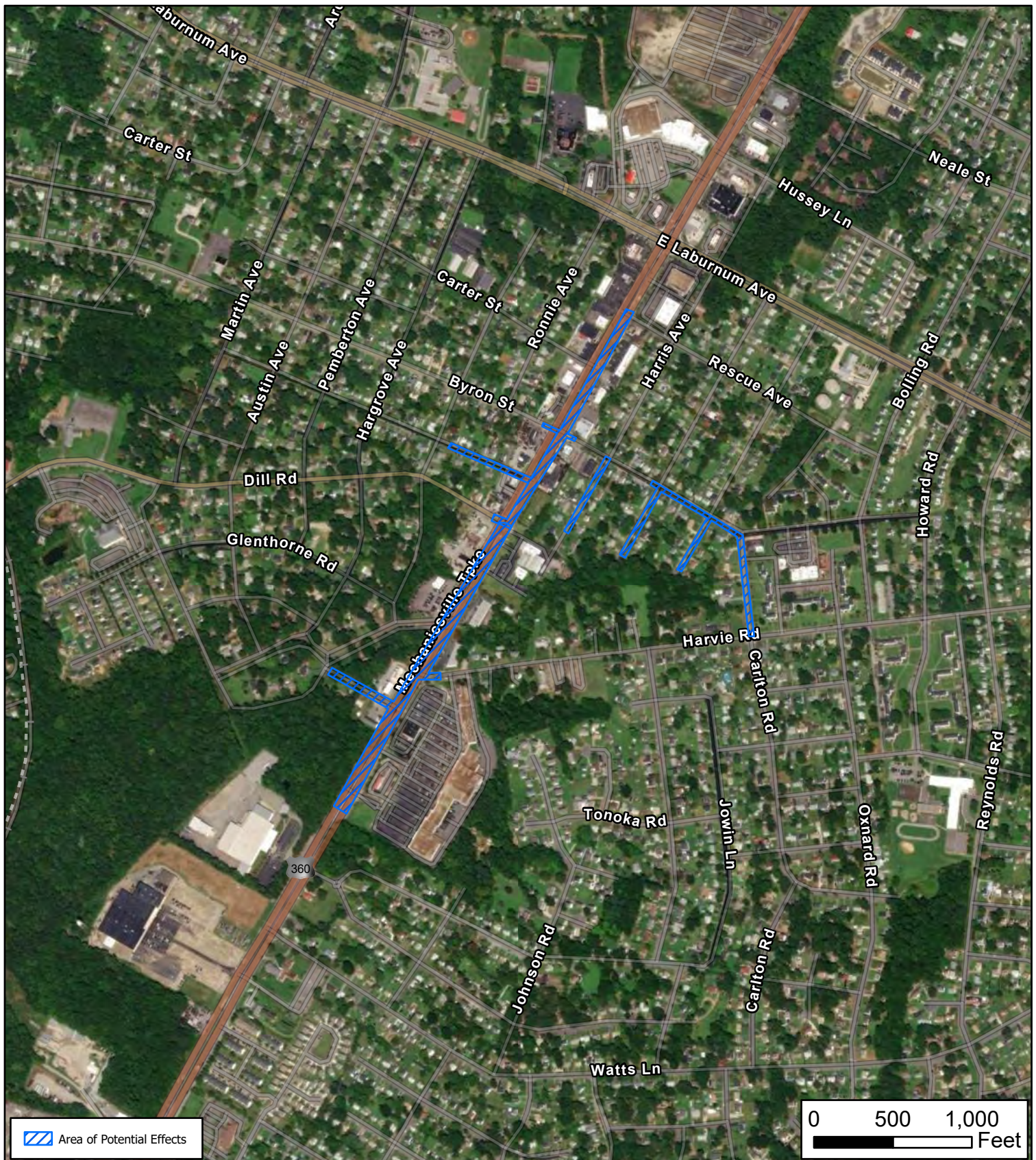


Name: Richmond, Virginia Gas Line Replacement
Scale: 10,000
Total Acreage: 61.2
Richmond, VA, Richmond City County



Service Layer Credits: Esri Community Maps
Contributors, County of Henrico, VGIN, Esri, TomTom,
Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA,
USGS, EPA, NPS, US Census Bureau, USDA, USFWS,
Maxar

Area of Potential Effects Map



Name: Richmond, Virginia Gas Line Replacement

Scale: 10,000

Total Acreage: 61.2

Richmond, VA, Richmond City County



Service Layer Credits: Esri Community Maps
Contributors, City of Richmond, County of Henrico,
VGIN, Esri, TomTom, Garmin, SafeGraph,
GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US
Census Bureau, USDA, USFWS, Maxar

Area of Potential Effects Map



Name: Richmond, Virginia Gas Line Replacement

Scale: 15,000

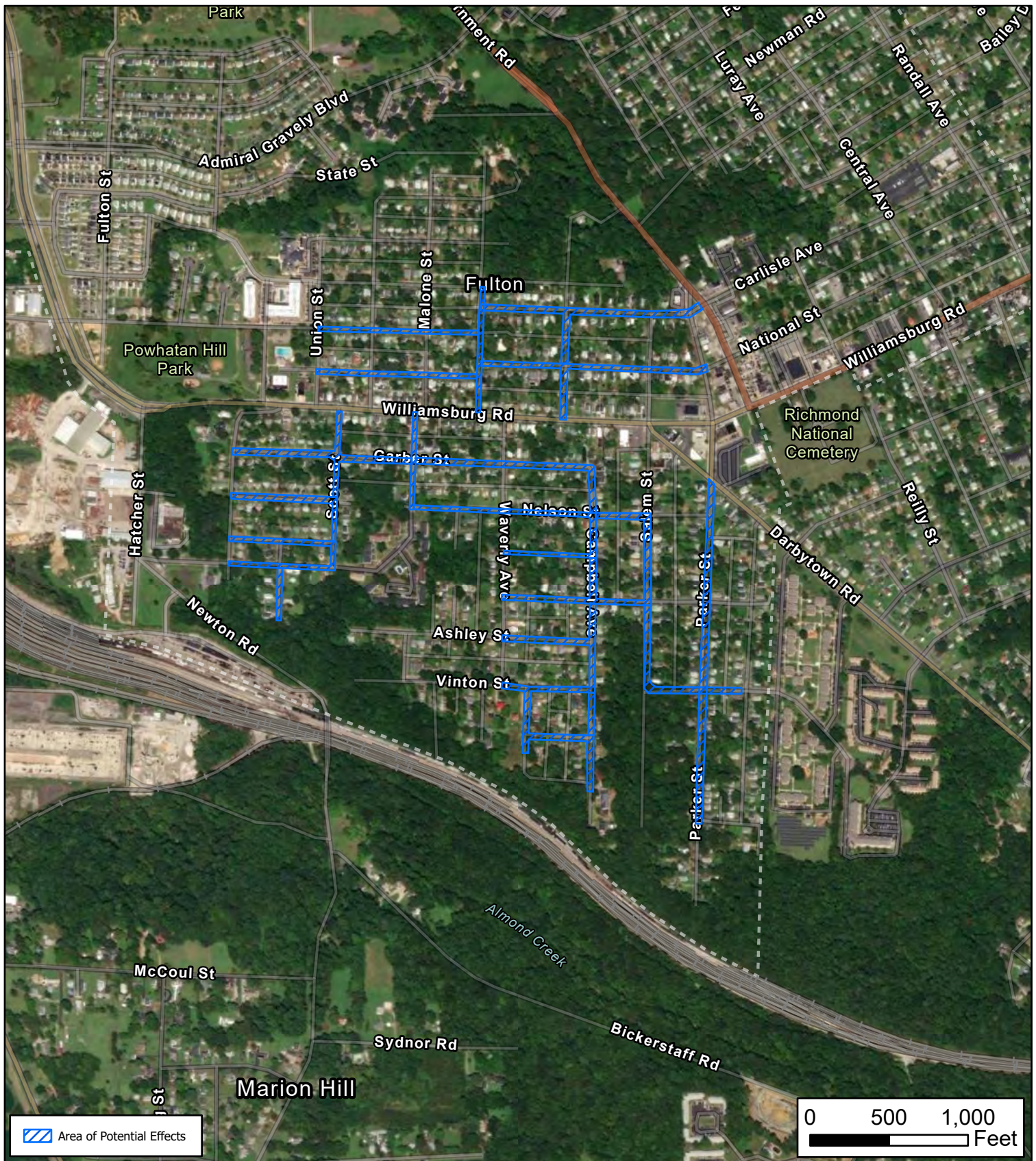
Total Acreage: 61.2

Richmond, VA, Richmond City County



Service Layer Credits: Esri Community Maps Contributors, City of Richmond, County of Henrico, VGIN, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, Maxar

Area of Potential Effects Map

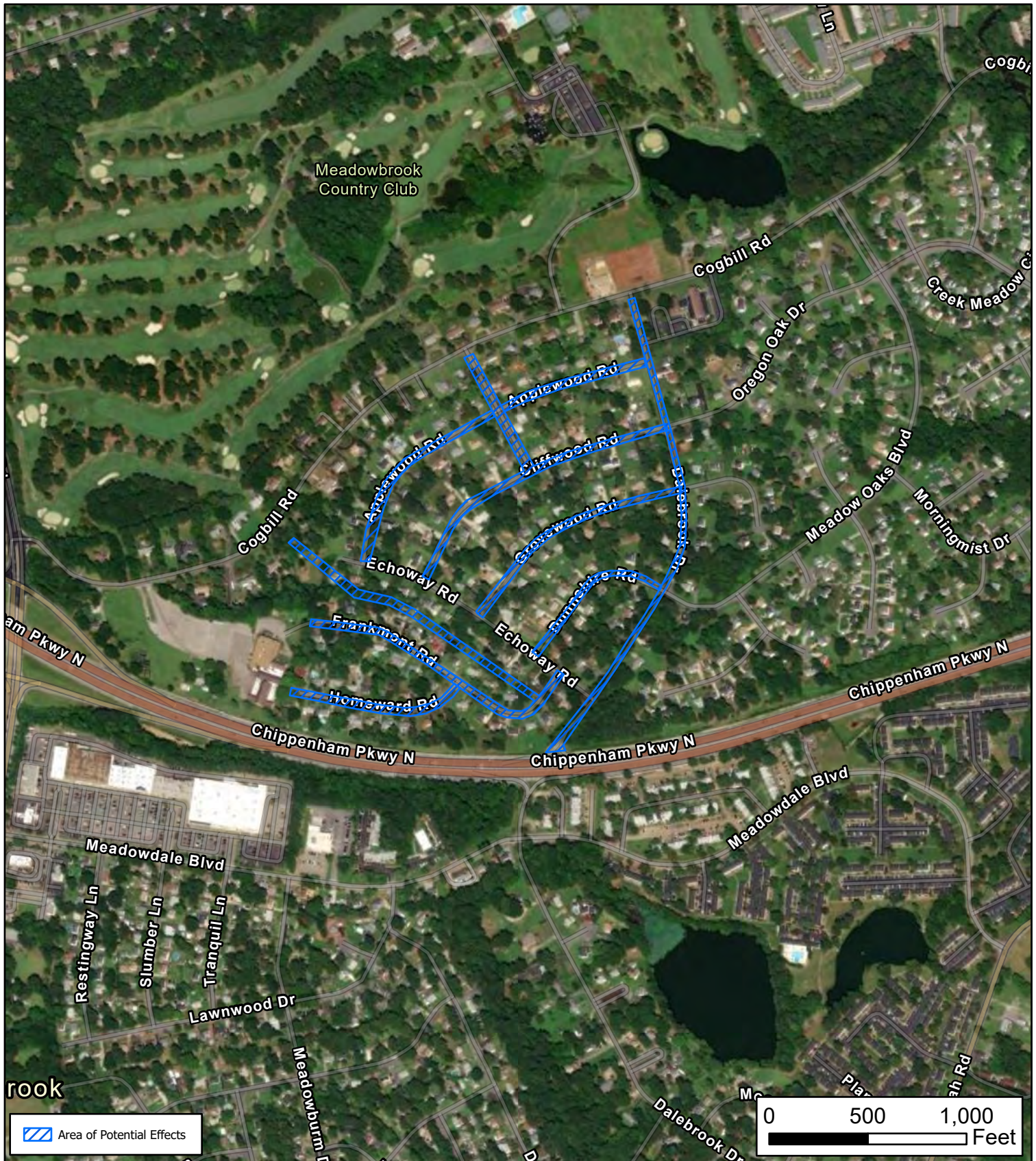


Name: Richmond, Virginia Gas Line Replacement
Scale: 10,000
Total Acreage: 61.2
Richmond, VA, Richmond City County



Service Layer Credits: Esri Community Maps
Contributors, City of Richmond, County of Henrico,
VGIN, Esri, TomTom, Garmin, SafeGraph,
GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US
Census Bureau, USDA, USFWS, Maxar

Area of Potential Effects Map



Name: Richmond, Virginia Gas Line Replacement

Scale: 8,000

Total Acreage: 61.2

Richmond, VA, Richmond City County



Service Layer Credits: Esri Community Maps Contributors, County of Henrico, VGIN, © OpenStreetMap, Microsoft, Esri, TomTom, Garmin, SafeGraph, GeoTechnologies, Inc, METI/NASA, USGS, EPA, NPS, US Census Bureau, USDA, USFWS, Maxar

ATTACHMENT B

Project Area Photographs



Garber St. Single family homes on either side of roadway.



Carlton Rd. Single family homes on either side of roadway.



Commercial facilities on both sides of roadway route 360



Jamestown Ave. Single family homes on either side of roadway.



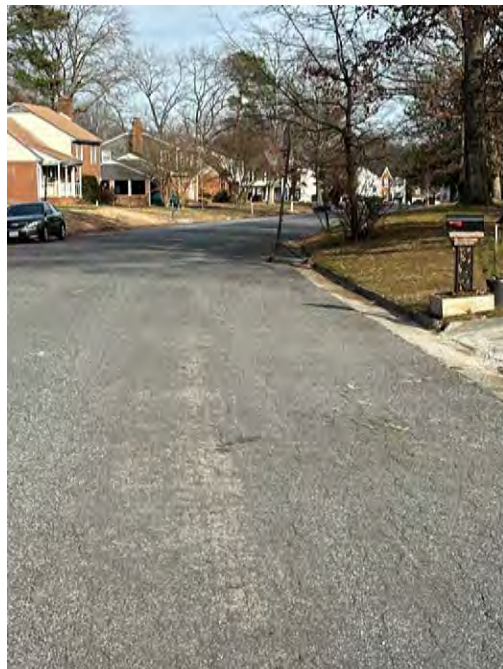
Intersection of Q St. and N23rd St. Single family homes on either side of roadway.



Echoway Rd onto Dunnshire Rd.



Intersection of Tulip St. and Venable St. Single family homes on either side of roadway.



Groveswood Rd. Single family homes on either side of roadway.



Intersection of Williamsburg Rd. And Scott St. Single family homes on either side of roadway.



Lakeside Ave at intersection of Spruce St. Single Family homes on either side of roadway.



Lakeside Ave. and Forest St. Mix of commercial facilities and single-family homes.



Nelson St. and Campbell Ave. Single family homes on either side of roadway.



Venable St. and N21st St. intersection.



North on N 21st St. Single family homes on either side of roadway.



Cliffwood Rd. intersection. Single family homes on either side of roadway.



Potomac St. Single family homes on either side of roadway.



West on Carlisle Ave. as it crosses Montgomery St. Single family homes on either side of roadway.

ATTACHMENT C

Consulting Party Response Form

Section 106 Consulting Party Response Form

Pipeline and Hazardous Materials Safety Administration (PHMSA)

Natural Gas Distribution Infrastructure Safety and Modernization Grant Program

Project Name/Location:

Date:

Organization:

Name:

Affiliation:

Address:

Phone Number:

E-mail:

Please check one of the following:

- ☐ **Yes**, I, or my organization, would like to participate in consultation on the project's potential effects to historic properties. I, or my organization, has a legal or economic relation to the project or affected properties or have a concern with the project's effects on historic properties.
- ☐ **No**, I, or my organization, do(es) not wish to participate as a consulting party for the project.

Do you know of any other potential consulting parties that should be contacted? If so, please list the name, email, or other contact information below.

Comments:

Please return by:

Please return to: Katheryn Giraldo
USDOT Volpe Center
220 Binney Street, Cambridge, MA
E-mail: PHMSASection106@dot.gov



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

March 14, 2024

Gerald Stewart
Chief

Chickahominy Indian Tribe - Eastern Division
2895 Mount Pleasant Road
Providence Forge, VA – 23140

Section 106 Consultation: PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear Chief Stewart:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) for the replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The purpose of this letter is to initiate Section 106 consultation for the Undertaking to determine if there are historic properties of cultural or religious significance to your Tribe/Nation that may be affected by the Undertaking, to determine if you want to be a consulting party, and to notify your Tribe/Nation of PHMSA's intention to make a finding of No Adverse Effect to Historic Properties. PHMSA is also available for Government-to-Government consultation on this Program.

Project Description/Background

The Grant Recipient will be replacing 13.2 miles (60,447 linear feet (LF)) of 2-inch to 12-inch cast iron, ductile iron, steel, and vintage polyethylene pipes with new polyethylene gas mains to address aging infrastructure, legacy pipe material, and leaks in the City of Richmond. Replacement of pipelines will enhance safety, improve operations, and reduce methane emissions of natural gas. The methods of construction will include open cut excavation (trenching) as well as directional drilling. The Undertaking is located throughout the City of Richmond:

- Work Package: 107991, Henrico County
- Lakeside Avenue (Parkside Avenue to Hilliard Road)- total 2,902 LF
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Work Package: 108061, City of Richmond

- Mosby Street, Fairmont Street, 25th Street, and Venable Street- total 10,998 LF

Work Package: 108062, City of Richmond and Henrico County

- Northampton Street, Williamsburg Road, Parker Street, and Haig Street– total 18,499 LF

Work Package: 107989, City of Richmond and Henrico County

- Phaup Street, 19th Street, and Brauers Lane – total 4,615 LF

All work will take place within the existing, paved, right-of-way (ROW) and will not require new ROW or easements. The new pipes will be placed adjacent to the existing pipes and the existing pipe will be abandoned in place. Abandonment of the existing pipeline (versus excavation and removal) will minimize ground disturbance. It is anticipated that ground disturbance will be limited to the roadway/sidewalk. All gas main replacements proposed are within moderately developed urban and suburban areas that are primarily commercial and residential. The entire roadway has been previously disturbed by pipeline work and several other utilities. The expected maximum depth of excavation for this Undertaking is 42 inches below grade by 24 inches wide. The staging areas for the project have not been identified. Project location maps are enclosed in **Attachment A**. Photographs showing the overall character of the project areas are included in **Attachment B**.

Area of Potential Effects (APE)

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the Undertaking may directly or indirectly affect historic resources. Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, PHMSA has delineated the APE for this Undertaking to encompass the existing ROW, which includes the limits of disturbance. The APE extends to the depth of proposed ground disturbance of up to 42 inches below grade. The Undertaking does not have the potential to cause visual or audible effects after the completion of construction. The existing ROW includes the roadway, parking lanes, sidewalk, light poles, overhead power lines, overhead streetlights, fire hydrants, bike lanes, bus stops, benches, signs, trees, and bushes. The APE is shown on the maps in **Attachment A**.

Identification and Evaluation

To identify historic properties in the APE, individuals who meet the Secretary of the Interior's (SOI) Professional Qualification Standards reviewed available information on previously identified historic properties in the APE, including the National Register of Historic Places (NRHP) database and data gathered from the Virginia Cultural Resources Information System (VCRIS) database and the USDA Web Soil Survey. Historic topographic maps and historic aerial photographs were also examined. SOI-qualified individuals conducted research to determine if there are any previously unidentified properties within the APE that are 45 years of age or older and may be eligible for listing in the NRHP and assessed the archaeological sensitivity of the APE.

Historic Architecture

The Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory are NRHP-listed historic properties located within the APE.

The Fairmont Historic District comprises a ten-block-by-seven-block nearly level hilltop area. As a whole, Fairmount Historic District is a unified urban neighborhood that is made up of rows of small, frame town

houses, rows of bungalows in repeated designs, and only a few other buildings. The district retains integrity because most of the extant buildings date from the 1890s, the neighborhood's first decade of existence, and about half of these resources retain original wooden ornamental details. In a large percentage of the houses, the original exterior siding has been covered with replacement siding, but the ornamental details remain intact. Many of the buildings built between 1900 and 1946 also retain a high degree of integrity. Some of the non-contributing buildings built between the 1950s and 2000 are visually intrusive; however, an effort has been made since 2000 to build infill houses in a style that is compatible with the character of the district. The district contains 542 contributing buildings and 172 non-contributing buildings.

Union Hill Historic District is in the east end of the City of Richmond. Union Hill is primarily a residential district with a few churches and commercial buildings concentrated along 25th Street and Venable Street. The buildings, constructed of frame and brick, are modest working-class houses, many of which were built prior to 1867 when Union Hill was annexed from Henrico County. Today, Union Hill Historic District is fragile as thirty-nine houses have been lost since the district was surveyed in 1993 and another forty-eight antebellum houses identified in the 1940s have been demolished. Despite this, Union Hill Historic District still possesses a high level of integrity and conveys the sense of its historic environment. The district contains a park and 369 buildings. Twelve of the buildings are non-contributing and one, the Hasker and Marcuse Factory was previously listed in the NRHP.

The Hasker Marcuse Factory is a 4-to 5-story brick masonry building constructed between 1893 and about 1915. Situated at the western edge of Union Hill Historic District, the factory contrasts with neighboring structures in use, overall character, and scale. It was built to house the Hasker & Marcuse Manufacturing Company, manufacturers of printed, polychromatic tin boxes and tin tags (labels) for plugs of chewing tobacco. The factory has a distinct industrial character, typical of the late nineteenth century, characterized by the exterior, running-bond-brickwork, the heavy massing of the structure, and the rhythmic patterning of the segmental-arched six-over-six, double-hung wood sash windows with rough-faced stone sills. While a degree of integrity of association has been lost due to the removal of the machinery in 1951, the structure itself sufficiently conveys the associative values and the integrity of materials, workmanship, setting, location, and feeling of the building remain intact.

Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, the identification effort for previously unidentified above-ground historic properties focused on identifying properties that are susceptible to the vibration effects of pipeline replacement and could experience diminished integrity as a result of the Undertaking. A review of the APE found no additional above-ground resources that have the potential to be affected by the Undertaking.

Archeology

VCRIS was examined to identify the presence of previously recorded archeological sites and previously conducted archeological surveys within the APE. The APE is comprised of five general areas within the greater Richmond area. The four northernmost areas are in Henrico County and the southernmost in Chesterfield County. As a result of the VCRIS search, two previous surveys were identified as intersecting the APE, and no previously recorded archeological sites were identified within the APE (Table 1). The two surveys intersecting the APE are associated with the same Virginia Department of Transportation project. In 2019, Dovetail Cultural Resources Group conducted a Phase I cultural resources survey for street and sidewalk alterations and upgrades near I-95 and Broad Street and Oliver Way. During the survey, two archeological sites were identified. The initial Phase I survey document was followed by an addendum survey of a slightly expanded APE (McCloskey et al. 2020).

Table 1. Previously Conducted Archeological Surveys within the APE

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Addendum: Phase I Archaeological Survey of Impervious Surface Areas for the Shockoe Valley Streets Improvement Project, Richmond, Virginia	McCloskey et al. 2020	HE-429

A quarter of a mile search radius was also examined for previously recorded archeological sites and surveys. In addition to the two surveys conducted within the APE, five archeological surveys have been conducted within a quarter of a mile of the APE. Mouer et al. (1978) conducted a large-scale archaeological survey and inventory of sites for various parts of Henrico County. The survey identified 19 sites, but none are within a quarter of a mile of the APE. Browning's 2005 monitoring survey of the Belmont Golf Course identified no sites. Both Browning (2008) and Reid and Southerlin (2008) conducted surveys of the Cedar and Broad block in downtown Richmond ahead of proposed development. One site, 44HE591, was investigated and is located within a quarter of a mile of the APE. Funk et al. (2022) conducted a cultural resource survey of a proposed trail in the Lakeside community. None of the sites identified through the survey are located within a quarter of mile of the APE.

Table 2. Previously Conducted Archeological Surveys within a Quarter of Mile of the APE

Report	Citation	Report Number
Archeology in Henrico, Volume 1: Identification and Evaluation of Archaeological and Historic Resources for the Henrico County, Virginia Regional Wastewater System	Mouer et al. 1978	HE-013
Belmont Golf Course Storm Damage Rebuilding, Henrico County, Virginia, Archaeological Monitoring	Browning 2005	HE-199
Cedar & Broad Block, Richmond City, Virginia Phase I Intensive Cultural Resources Survey	Browning 2008	HE-258
Phase I Archaeological Study of the Cedar and Broad Block, Richmond, Virginia	Reid and Southerlin 2008	HE-260
Cultural Resource Survey, Proposed Lakeside Community Trail Phase 1, Henrico County, Virginia	Funk et al. 2022	HE-451

While no previously recorded archeological sites were identified within the APE, seven sites (Table 3) were identified within a quarter of a mile of the APE. All sites have unknown eligibilities for listing in the NRHP except site 44HE0591, which is recommended eligible.

Table 3. Previously Recorded Archeological Sites within a Quarter of Mile of the APE

Site Number	Type	NRHP	Citation
44HE0413	Precontact townsite	Unknown	Martha McCartney 1981 (no associated report)
44HE0422	Historic tavern site	Unknown	Martha McCartney 1981 (no associated report)
44HE0423	Historic artifact scatter	Unknown	Martha McCartney 1981 (no associated report)
44HE0433	Historic toll house site	Unknown	Martha McCartney 1981 (no associated report)

Site Number	Type	NRHP	Citation
44HE0440	Precontact artifact scatter and historic house site	Unknown	Johnson and Kessler 1981 (no associated report)
44HE0591	Historic trash pit and domestic site	Eligible	Browning 2008
44HE0774	Historic railroad tunnel	Unknown	Chesapeake and Ohio Historical Society (1990)

An examination of Web Soil Survey data within the APE reveals 16 soil classes within the APE (Table 4). Well drained and moderately well drained soils can be indicative of human habitation during both the pre-contact and historic periods. All soils within the APE are well drained or moderately well-draining soil types. Typically slopes greater than 15 percent are not suitable for human occupation, and the majority of the APE falls in this range. Much of the APE is comprised of soils indicating suitable conditions for human habitation in both the pre-contact and historic periods. However, the APE is comprised mostly of urban land (76.3 percent) with impervious surfaces such as buildings and pavement and is largely part of a built environment.

Table 4. Soil Types within the APE

Map Unit Name	Drainage Class	Slope	Percent of APE
Bourne fine sandy loam	Moderately well drained	2-6%	5.2
Bourne-Colfax complex	Moderately well drained	2-6%	1.5
Varina fine sandy loam	Well drained	0-4%	<1
Norfolk fine sandy loam	Well drained	0-6%	1.6
Faceville-Gritney gravelly fine sandy loams	Well drained	2-6%	<1
Dunbar fine sandy loam	Somewhat poorly drained	0-4%	2.4
Myatt loam	Poorly drained	0-2%	1.5
Edgehill very gravelly fine sandy loam	Well drained	2-20%	4.2
Appling-Wedowee complex	Well drained	12-20%	<1
Atlee-Urban land complex	Moderately well drained	0-4%	22.5
Turbeville-Urban land complex	Well drained	2-6%	31.4
Urban land	-		22.4
Wateree-Wedowee complex	Well drained	20-45%	<1
Chewacla and Riverview soils	Somewhat poorly drained	0-2%	1.9
Duplin very fine sandy loam	Moderately well drained	2-15%	2.7
Rains very fine sandy loam	Poorly drained	0-2%	<1

Historic topographic maps from 1894, 1934, 1938 and 1959 and historic aerial photographs from 1950s were examined for archeological resource potential within the APE. The presence of structures on historic maps and aerial photography may indicate the likelihood of historic period archeological deposits associated with the occupation of these structures. The APE is comprised of five distinct areas across Richmond. All segments of the APE are located in either dense urban or dense suburban areas. The 1894 Richmond topographic map shows central Richmond as a heavily dense area spanning the north and south sides of the James River. The 1894 Bermuda Hundred map, displaying the area south of downtown

Richmond that includes the southernmost APE segment, shows less building density but a well-connected transportation system and moderately dense residential areas along the main roads. The 1934 Richmond topographic map shows greater detail near the APE segments, including various churches, schools, parks and other municipal buildings. While several churches are shown adjacent to the APE segments, the historic maps do not note any cemeteries. The 1938 Drewrys Bluff topographic map displays the area south of Richmond where the southernmost APE segment is located. This map shows small roads and a handful of residential structures near the APE, but no other indications of notable historic architectural resources. Aerial imagery from 1952, 1955, and 1959 shows the APE segments nearest Richmond to be densely developed in residences and commercial structures. The 1955 aerial shows the area surrounding the southernmost APE segment to be rural and containing a single house with an attached agricultural field and wooded area. An aerial from 1968 shows residential street development reflecting the current road layout of this part of the APE.

The Find a Grave online database was examined to identify the presence of historic cemeteries within the APE. No cemeteries were noted as being located within the APE, though the Richmond National Cemetery, containing more than 11,000 graves, is located adjacent to the APE segment along Williamsburg Road. The Richmond National Cemetery is located more than 400 feet from the APE and will not be affected by the Undertaking. Three battlefield study areas are located within a quarter of mile of the APE: Beaver Dam Creek Battlefield (Mechanicsville/Ellersons Mill), Seven Pines Battlefield, and Chaffin's Farm/New Market Heights Battlefield. Only Seven Pines Battlefield has a study area boundary that intersects the APE, and none of the core battlefield areas intersect the APE; however, this portion of the Seven Pines Battlefield study area encompasses the Richmond National Cemetery.

Background research revealed two archeological surveys and no archeological sites within the APE. No known historic cemeteries are located within the APE, and no archeologically significant NRHP districts intersect the APE. Examination of soils within the APE indicates suitable conditions for human habitation in both precontact and historic contexts, and the prominence of the James River through Richmond was likely a key factor in both precontact and historic period human occupation. While three battlefield study areas are located within a quarter of a mile of the APE, the Seven Pines Battlefield study area is the only one that intersects the APE. The core battlefield area is located more than half a mile from the APE and will not be affected by the Undertaking. Historic topographic maps and aerial imagery also show heavy development and building density in the nineteenth century. Historic development of Richmond indicates a high probability for archeological deposits to exist within the APE. However, since the APE segments are in urban or suburban parts of Richmond that have experienced moderate to heavy development, construction of roads, sidewalks, and underground utility corridors have likely disturbed any archeological deposits located within the APE. The Undertaking will occur entirely within the existing ROW near or within previous road construction and utility installation corridors that lack soil integrity. Due to the limited scope of work and likelihood of disturbed context within the APE, an archeological survey is not recommended at this time.

Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are three historic properties as defined in 36 CFR 800.16(l) within the APE: the NRHP-listed Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory. The Undertaking will not alter any of the characteristics or contributing features of these historic properties that qualify them for inclusion in the NRHP in a manner that would diminish their integrity. The replacement of pipelines within the existing ROW and utility easements will take place under paved surfaces and will not result in lasting physical, visual, or audible effects to historic properties. No character-defining materials or features of any of these historic properties will be removed or altered as a result of the Undertaking. The Undertaking also does not include land acquisition, nor would it limit access to or change the use of any of the historic properties.

Project work is limited to areas that demonstrate a low probability for intact significant archaeological resources.

Therefore, the Undertaking does not have the potential to adversely affect any of the identified historic properties. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Based on this assessment, in accordance with 36 CFR Part 800.5, PHMSA has determined the Undertaking will have No Adverse Effect on historic properties.

Request for Section 106 Concurrence

PHMSA requests that you provide any information you have regarding historic properties of religious or cultural significance to your Tribe/Nation that may be present in the APE and affected by the Undertaking. If your Tribe/Nation is unaware of any historic properties beyond what we have identified to date, PHMSA is notifying your Tribe/Nation of our intention to make a No Adverse Effect to Historic Properties finding. Please notify us within 30 days from the date of receipt of this letter if you have any concerns about the Undertaking's effects to historic properties. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,



Matt Fuller
Senior Environmental Protection Specialist

MF/kg

cc: Elizabeth Williams, Environmental Protection Specialist, USDOT Volpe Center
Renee Taylor, PHMSA Grant Specialist

Enclosures:

Attachment A: Project Location and APE Maps
Attachment B: Project Area Photographs



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

March 14, 2024

Stephen R. Adkins
Chief
Chickahominy Indian Tribe
8200 Lott Cary Road
Providence Forge, VA – 23140

Section 106 Consultation: PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear Chief Adkins:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) for the replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The purpose of this letter is to initiate Section 106 consultation for the Undertaking to determine if there are historic properties of cultural or religious significance to your Tribe/Nation that may be affected by the Undertaking, to determine if you want to be a consulting party, and to notify your Tribe/Nation of PHMSA's intention to make a finding of No Adverse Effect to Historic Properties. PHMSA is also available for Government-to-Government consultation on this Program.

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Table 4. Soil Types within the APE

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Atlee-Urban land complex	Moderately well drained	0-4%	22.5
Turbeville-Urban land complex	Well drained	2-6%	31.4
Urban land	-		22.4
Wateree-Wedowee complex	Well drained	20-45%	<1
Chewacla and Riverview soils	Somewhat poorly drained	0-2%	1.9
Duplin very fine sandy loam	Moderately well drained	2-15%	2.7
Rains very fine sandy loam	Poorly drained	0-2%	<1

Historic topographic maps from 1894, 1934, 1938 and 1959 and historic aerial photographs from 1950s were examined for archeological resource potential within the APE. The presence of structures on historic maps and aerial photography may indicate the likelihood of historic period archeological deposits associated with the occupation of these structures. The APE is comprised of five distinct areas across Richmond. All segments of the APE are located in either dense urban or dense suburban areas. The 1894 Richmond topographic map shows central Richmond as a heavily dense area spanning the north and south sides of the James River. The 1894 Bermuda Hundred map, displaying the area south of downtown

Richmond that includes the southernmost APE segment, shows less building density but a well-connected transportation system and moderately dense residential areas along the main roads. The 1934 Richmond topographic map shows greater detail near the APE segments, including various churches, schools, parks and other municipal buildings. While several churches are shown adjacent to the APE segments, the historic maps do not note any cemeteries. The 1938 Drewrys Bluff topographic map displays the area south of Richmond where the southernmost APE segment is located. This map shows small roads and a handful of residential structures near the APE, but no other indications of notable historic architectural resources. Aerial imagery from 1952, 1955, and 1959 shows the APE segments nearest Richmond to be densely developed in residences and commercial structures. The 1955 aerial shows the area surrounding the southernmost APE segment to be rural and containing a single house with an attached agricultural field and wooded area. An aerial from 1968 shows residential street development reflecting the current road layout of this part of the APE.

The Find a Grave online database was examined to identify the presence of historic cemeteries within the APE. No cemeteries were noted as being located within the APE, though the Richmond National Cemetery, containing more than 11,000 graves, is located adjacent to the APE segment along Williamsburg Road. The Richmond National Cemetery is located more than 400 feet from the APE and will not be affected by the Undertaking. Three battlefield study areas are located within a quarter of mile of the APE: Beaver Dam Creek Battlefield (Mechanicsville/Ellersons Mill), Seven Pines Battlefield, and Chaffin's Farm/New Market Heights Battlefield. Only Seven Pines Battlefield has a study area boundary that intersects the APE, and none of the core battlefield areas intersect the APE; however, this portion of the Seven Pines Battlefield study area encompasses the Richmond National Cemetery.

Background research revealed two archeological surveys and no archeological sites within the APE. No known historic cemeteries are located within the APE, and no archeologically significant NRHP districts intersect the APE. Examination of soils within the APE indicates suitable conditions for human habitation in both precontact and historic contexts, and the prominence of the James River through Richmond was likely a key factor in both precontact and historic period human occupation. While three battlefield study areas are located within a quarter of a mile of the APE, the Seven Pines Battlefield study area is the only one that intersects the APE. The core battlefield area is located more than half a mile from the APE and will not be affected by the Undertaking. Historic topographic maps and aerial imagery also show heavy development and building density in the nineteenth century. Historic development of Richmond indicates a high probability for archeological deposits to exist within the APE. However, since the APE segments are in urban or suburban parts of Richmond that have experienced moderate to heavy development, construction of roads, sidewalks, and underground utility corridors have likely disturbed any archeological deposits located within the APE. The Undertaking will occur entirely within the existing ROW near or within previous road construction and utility installation corridors that lack soil integrity. Due to the limited scope of work and likelihood of disturbed context within the APE, an archeological survey is not recommended at this time.

Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are three historic properties as defined in 36 CFR 800.16(l) within the APE: the NRHP-listed Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory. The Undertaking will not alter any of the characteristics or contributing features of these historic properties that qualify them for inclusion in the NRHP in a manner that would diminish their integrity. The replacement of pipelines within the existing ROW and utility easements will take place under paved surfaces and will not result in lasting physical, visual, or audible effects to historic properties. No character-defining materials or features of any of these historic properties will be removed or altered as a result of the Undertaking. The Undertaking also does not include land acquisition, nor would it limit access to or change the use of any of the historic properties.

Project work is limited to areas that demonstrate a low probability for intact significant archaeological resources.

Therefore, the Undertaking does not have the potential to adversely affect any of the identified historic properties. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Based on this assessment, in accordance with 36 CFR Part 800.5, PHMSA has determined the Undertaking will have No Adverse Effect on historic properties.

Request for Section 106 Concurrence

PHMSA requests that you provide any information you have regarding historic properties of religious or cultural significance to your Tribe/Nation that may be present in the APE and affected by the Undertaking. If your Tribe/Nation is unaware of any historic properties beyond what we have identified to date, PHMSA is notifying your Tribe/Nation of our intention to make a No Adverse Effect to Historic Properties finding. Please notify us within 30 days from the date of receipt of this letter if you have any concerns about the Undertaking's effects to historic properties. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,



Matt Fuller
Senior Environmental Protection Specialist

MF/kg

cc: Elizabeth Williams, Environmental Protection Specialist, USDOT Volpe Center
Renee Taylor, PHMSA Grant Specialist

Enclosures:

Attachment A: Project Location and APE Maps
Attachment B: Project Area Photographs



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

March 14, 2024

Deborah Dotson
President
Delaware Nation
31064 State Highway 281, Building 100
Anadarko, OK – 73005

Section 106 Consultation: PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear President Dotson:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) for the replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The above referenced project is related to the emergency work submitted to your office on February 9, 2024. On the same day, the Virginia Department of Historic Resources concurred with a finding of No Historic Properties Affected for the emergency work. The emergency work is therefore not included in this consultation.

The purpose of this letter is to initiate Section 106 consultation for the Undertaking to determine if there are historic properties of cultural or religious significance to your Tribe/Nation that may be affected by the Undertaking, to determine if you want to be a consulting party, and to notify your Tribe/Nation of PHMSA's intention to make a finding of No Adverse Effect to Historic Properties. PHMSA is also available for Government-to-Government consultation on this Program.

Project Description/Background

The Grant Recipient will be replacing 13.2 miles (60,447 linear feet (LF)) of 2-inch to 12-inch cast iron, ductile iron, steel, and vintage polyethylene pipes with new polyethylene gas mains to address aging infrastructure, legacy pipe material, and leaks in the City of Richmond. Replacement of pipelines will enhance safety, improve operations, and reduce methane emissions of natural gas. The methods of construction will include open cut excavation (trenching) as well as directional drilling. The Undertaking is located throughout the City of Richmond:

Work Package: 107991, Henrico County

- Lakeside Avenue (Parkside Avenue to Hilliard Road) - total 2,902 LF

Work Package: 107990, Henrico County

- Lakeside Avenue (Dumbarton Road to Parkside Avenue)- total 3,317 LF

Work Package: 108024, Chesterfield County

- Dalebrook Drive (Applewood Road to Frankmont Road)- total 12,646 LF

Work Package: 108023, Henrico County

- Mechanicsville Turnpike at Byron Street- total 4,366 LF

Work Package: 108020, Henrico County

- Mechanicsville Turnpike and Euclid Road- total 3,104 LF

Work Package: 108061, City of Richmond

- Mosby Street, Fairmont Street, 25th Street, and Venable Street- total 10,998 LF

Work Package: 108062, City of Richmond and Henrico County

- Northampton Street, Williamsburg Road, Parker Street, and Haig Street– total 18,499 LF

Work Package: 107989, City of Richmond and Henrico County

- Phaup Street, 19th Street, and Brauers Lane – total 4,615 LF

All work will take place within the existing, paved, right-of-way (ROW) and will not require new ROW or easements. The new pipes will be placed adjacent to the existing pipes and the existing pipe will be abandoned in place. Abandonment of the existing pipeline (versus excavation and removal) will minimize ground disturbance. It is anticipated that ground disturbance will be limited to the roadway/sidewalk. All gas main replacements proposed are within moderately developed urban and suburban areas that are primarily commercial and residential. The entire roadway has been previously disturbed by pipeline work and several other utilities. The expected maximum depth of excavation for this Undertaking is 42 inches below grade by 24 inches wide. The staging areas for the project have not been identified. Project location maps are enclosed in **Attachment A**. Photographs showing the overall character of the project areas are included in **Attachment B**.

Area of Potential Effects (APE)

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the Undertaking may directly or indirectly affect historic resources. Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, PHMSA has delineated the APE for this Undertaking to encompass the existing ROW, which includes the limits of disturbance. The APE extends to the depth of proposed ground disturbance of up to 42 inches below grade. The Undertaking does not have the potential to cause visual or audible effects after the completion of construction. The existing ROW includes the roadway, parking lanes, sidewalk, light poles, overhead power lines, overhead streetlights, fire hydrants, bike lanes, bus stops, benches, signs, trees, and bushes. The APE is shown on the maps in **Attachment A**.

Identification and Evaluation

To identify historic properties in the APE, individuals who meet the Secretary of the Interior's (SOI) Professional Qualification Standards reviewed available information on previously identified historic properties in the APE, including the National Register of Historic Places (NRHP) database and data gathered from the Virginia Cultural Resources Information System (VCRIS) database and the USDA Web Soil Survey. Historic topographic maps and historic aerial photographs were also examined. SOI-qualified individuals conducted research to determine if there are any previously unidentified properties within the APE that are 45 years of age or older and may be eligible for listing in the NRHP and assessed the archaeological sensitivity of the APE.

Historic Architecture

The Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory are NRHP-listed historic properties located within the APE.

The Fairmont Historic District comprises a ten-block-by-seven-block nearly level hilltop area. As a whole, Fairmont Historic District is a unified urban neighborhood that is made up of rows of small, frame town houses, rows of bungalows in repeated designs, and only a few other buildings. The district retains integrity because most of the extant buildings date from the 1890s, the neighborhood's first decade of existence, and about half of these resources retain original wooden ornamental details. In a large percentage of the houses, the original exterior siding has been covered with replacement siding, but the ornamental details remain intact. Many of the buildings built between 1900 and 1946 also retain a high degree of integrity. Some of the non-contributing buildings built between the 1950s and 2000 are visually intrusive; however, an effort has been made since 2000 to build infill houses in a style that is compatible with the character of the district. The district contains 542 contributing buildings and 172 non-contributing buildings.

Union Hill Historic District is in the east end of the City of Richmond. Union Hill is primarily a residential district with a few churches and commercial buildings concentrated along 25th Street and Venable Street. The buildings, constructed of frame and brick, are modest working-class houses, many of which were built prior to 1867 when Union Hill was annexed from Henrico County. Today, Union Hill Historic District is fragile as thirty-nine houses have been lost since the district was surveyed in 1993 and another forty-eight antebellum houses identified in the 1940s have been demolished. Despite this, Union Hill Historic District still possesses a high level of integrity and conveys the sense of its historic environment. The district contains a park and 369 buildings. Twelve of the buildings are non-contributing and one, the Hasker and Marcuse Factory was previously listed in the NRHP.

The Hasker Marcuse Factory is a 4-to 5-story brick masonry building constructed between 1893 and about 1915. Situated at the western edge of Union Hill Historic District, the factory contrasts with neighboring structures in use, overall character, and scale. It was built to house the Hasker & Marcuse Manufacturing Company, manufacturers of printed, polychromatic tin boxes and tin tags (labels) for plugs of chewing tobacco. The factory has a distinct industrial character, typical of the late nineteenth century, characterized by the exterior, running-bond-brickwork, the heavy massing of the structure, and the rhythmic patterning of the segmental-arched six-over-six, double-hung wood sash windows with rough-faced stone sills. While a degree of integrity of association has been lost due to the removal of the machinery in 1951, the structure itself sufficiently conveys the associative values and the integrity of materials, workmanship, setting, location, and feeling of the building remain intact.

Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, the identification effort for previously unidentified above-ground historic properties focused on identifying properties that are susceptible to the vibration effects of pipeline replacement and could experience diminished integrity as a result of the Undertaking. A review of the APE found no additional above-ground resources that have the potential to be affected by the Undertaking.

Archeology

VCRIS was examined to identify the presence of previously recorded archeological sites and previously conducted archeological surveys within the APE. The APE is comprised of five general areas within the greater Richmond area. The four northernmost areas are in Henrico County and the southernmost in Chesterfield County. As a result of the VCRIS search, two previous surveys were identified as intersecting the APE, and no previously recorded archeological sites were identified within the APE (Table 1). The two surveys intersecting the APE are associated with the same Virginia Department of Transportation project. In 2019, Dovetail Cultural Resources Group conducted a Phase I cultural resources survey for street and sidewalk alterations and upgrades near I-95 and Broad Street and Oliver Way. During the survey, two

archeological sites were identified. The initial Phase I survey document was followed by an addendum survey of a slightly expanded APE (McCloskey et al. 2020).

Table 1. Previously Conducted Archeological Surveys within the APE

Report	Citation	Report Number
Phase I Cultural Resource Survey of the Shockoe Valley Streets Improvement Project, Richmond, Virginia	McCloskey et al. 2019	HE-393
Addendum: Phase I Archaeological Survey of Impervious Surface Areas for the Shockoe Valley Streets Improvement Project, Richmond, Virginia	McCloskey et al. 2020	HE-429

A quarter of a mile search radius was also examined for previously recorded archeological sites and surveys. In addition to the two surveys conducted within the APE, five archeological surveys have been conducted within a quarter of a mile of the APE. Mouer et al. (1978) conducted a large-scale archaeological survey and inventory of sites for various parts of Henrico County. The survey identified 19 sites, but none are within a quarter of a mile of the APE. Browning's 2005 monitoring survey of the Belmont Golf Course identified no sites. Both Browning (2008) and Reid and Southerlin (2008) conducted surveys of the Cedar and Broad block in downtown Richmond ahead of proposed development. One site, 44HE591, was investigated and is located within a quarter of a mile of the APE. Funk et al. (2022) conducted a cultural resource survey of a proposed trail in the Lakeside community. None of the sites identified through the survey are located within a quarter of mile of the APE.

Table 2. Previously Conducted Archeological Surveys within a Quarter of Mile of the APE

Report	Citation	Report Number
Archeology in Henrico, Volume 1: Identification and Evaluation of Archaeological and Historic Resources for the Henrico County, Virginia Regional Wastewater System	Mouer et al. 1978	HE-013
Belmont Golf Course Storm Damage Rebuilding, Henrico County, Virginia, Archaeological Monitoring	Browning 2005	HE-199
Cedar & Broad Block, Richmond City, Virginia Phase I Intensive Cultural Resources Survey	Browning 2008	HE-258
Phase I Archaeological Study of the Cedar and Broad Block, Richmond, Virginia	Reid and Southerlin 2008	HE-260
Cultural Resource Survey, Proposed Lakeside Community Trail Phase 1, Henrico County, Virginia	Funk et al. 2022	HE-451

While no previously recorded archeological sites were identified within the APE, seven sites (Table 3) were identified within a quarter of a mile of the APE. All sites have unknown eligibilities for listing in the NRHP except site 44HE0591, which is recommended eligible.

Table 3. Previously Recorded Archeological Sites within a Quarter of Mile of the APE

Site Number	Type	NRHP	Citation
44HE0413	Precontact townsite	Unknown	Martha McCartney 1981 (no associated report)
44HE0422	Historic tavern site	Unknown	Martha McCartney 1981 (no associated report)

Site Number	Type	NRHP	Citation
44HE0423	Historic artifact scatter	Unknown	Martha McCartney 1981 (no associated report)
44HE0433	Historic toll house site	Unknown	Martha McCartney 1981 (no associated report)
44HE0440	Precontact artifact scatter and historic house site	Unknown	Johnson and Kessler 1981 (no associated report)
44HE0591	Historic trash pit and domestic site	Eligible	Browning 2008
44HE0774	Historic railroad tunnel	Unknown	Chesapeake and Ohio Historical Society (1990)

An examination of Web Soil Survey data within the APE reveals 16 soil classes within the APE (Table 4). Well drained and moderately well drained soils can be indicative of human habitation during both the pre-contact and historic periods. All soils within the APE are well drained or moderately well-draining soil types. Typically slopes greater than 15 percent are not suitable for human occupation, and the majority of the APE falls in this range. Much of the APE is comprised of soils indicating suitable conditions for human habitation in both the pre-contact and historic periods. However, the APE is comprised mostly of urban land (76.3 percent) with impervious surfaces such as buildings and pavement and is largely part of a built environment.

Table 4. Soil Types within the APE

Map Unit Name	Drainage Class	Slope	Percent of APE
Bourne fine sandy loam	Moderately well drained	2-6%	5.2
Bourne-Colfax complex	Moderately well drained	2-6%	1.5
Varina fine sandy loam	Well drained	0-4%	<1
Norfolk fine sandy loam	Well drained	0-6%	1.6
Faceville-Gritney gravelly fine sandy loams	Well drained	2-6%	<1
Dunbar fine sandy loam	Somewhat poorly drained	0-4%	2.4
Myatt loam	Poorly drained	0-2%	1.5
Edgehill very gravelly fine sandy loam	Well drained	2-20%	4.2
Appling-Wedowee complex	Well drained	12-20%	<1
Atlee-Urban land complex	Moderately well drained	0-4%	22.5
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Rains very fine sandy loam	Poorly drained	0-2%	<1

Historic topographic maps from 1894, 1934, 1938 and 1959 and historic aerial photographs from 1950s were examined for archeological resource potential within the APE. The presence of structures on historic maps and aerial photography may indicate the likelihood of historic period archeological deposits

associated with the occupation of these structures. The APE is comprised of five distinct areas across Richmond. All segments of the APE are located in either dense urban or dense suburban areas. The 1894 Richmond topographic map shows central Richmond as a heavily dense area spanning the north and south sides of the James River. The 1894 Bermuda Hundred map, displaying the area south of downtown Richmond that includes the southernmost APE segment, shows less building density but a well-connected transportation system and moderately dense residential areas along the main roads. The 1934 Richmond topographic map shows greater detail near the APE segments, including various churches, schools, parks and other municipal buildings. While several churches are shown adjacent to the APE segments, the historic maps do not note any cemeteries. The 1938 Drewrys Bluff topographic map displays the area south of Richmond where the southernmost APE segment is located. This map shows small roads and a handful of residential structures near the APE, but no other indications of notable historic architectural resources. Aerial imagery from 1952, 1955, and 1959 shows the APE segments nearest Richmond to be densely developed in residences and commercial structures. The 1955 aerial shows the area surrounding the southernmost APE segment to be rural and containing a single house with an attached agricultural field and wooded area. An aerial from 1968 shows residential street development reflecting the current road layout of this part of the APE.

The Find a Grave online database was examined to identify the presence of historic cemeteries within the APE. No cemeteries were noted as being located within the APE, though the Richmond National Cemetery, containing more than 11,000 graves, is located adjacent to the APE segment along Williamsburg Road. The Richmond National Cemetery is located more than 400 feet from the APE and will not be affected by the Undertaking. Three battlefield study areas are located within a quarter of a mile of the APE: Beaver Dam Creek Battlefield (Mechanicsville/Ellersons Mill), Seven Pines Battlefield, and Chaffin's Farm/New Market Heights Battlefield. Only Seven Pines Battlefield has a study area boundary that intersects the APE, and none of the core battlefield areas intersect the APE; however, this portion of the Seven Pines Battlefield study area encompasses the Richmond National Cemetery.

Background research revealed two archeological surveys and no archeological sites within the APE. No known historic cemeteries are located within the APE, and no archeologically significant NRHP districts intersect the APE. Examination of soils within the APE indicates suitable conditions for human habitation in both precontact and historic contexts, and the prominence of the James River through Richmond was likely a key factor in both precontact and historic period human occupation. While three battlefield study areas are located within a quarter of a mile of the APE, the Seven Pines Battlefield study area is the only one that intersects the APE. The core battlefield area is located more than half a mile from the APE and will not be affected by the Undertaking. Historic topographic maps and aerial imagery also show heavy development and building density in the nineteenth century. Historic development of Richmond indicates a high probability for archeological deposits to exist within the APE. However, since the APE segments are in urban or suburban parts of Richmond that have experienced moderate to heavy development, construction of roads, sidewalks, and underground utility corridors have likely disturbed any archeological deposits located within the APE. The Undertaking will occur entirely within the existing ROW near or within previous road construction and utility installation corridors that lack soil integrity. Due to the limited scope of work and likelihood of disturbed context within the APE, an archeological survey is not recommended at this time.

Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are three historic properties as defined in 36 CFR 800.16(l) within the APE: the NRHP-listed Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory. The Undertaking will not alter any of the characteristics or contributing features of these historic properties that qualify them for inclusion in the NRHP in a manner that would diminish their integrity. The replacement of pipelines within the existing

ROW and utility easements will take place under paved surfaces and will not result in lasting physical, visual, or audible effects to historic properties. No character-defining materials or features of any of these historic properties will be removed or altered as a result of the Undertaking. The Undertaking also does not include land acquisition, nor would it limit access to or change the use of any of the historic properties. Project work is limited to areas that demonstrate a low probability for intact significant archaeological resources.

Therefore, the Undertaking does not have the potential to adversely affect any of the identified historic properties. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Based on this assessment, in accordance with 36 CFR Part 800.5, PHMSA has determined the Undertaking will have No Adverse Effect on historic properties.

Request for Section 106 Concurrence

PHMSA requests that you provide any information you have regarding historic properties of religious or cultural significance to your Tribe/Nation that may be present in the APE and affected by the Undertaking. If your Tribe/Nation is unaware of any historic properties beyond what we have identified to date, PHMSA is notifying your Tribe/Nation of our intention to make a No Adverse Effect to Historic Properties finding. Please notify us within 30 days from the date of receipt of this letter if you have any concerns about the Undertaking's effects to historic properties. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,



Matt Fuller
Senior Environmental Protection Specialist

MF/kg

cc: Elizabeth Williams, Environmental Protection Specialist, USDOT Volpe Center
Renee Taylor, PHMSA Grant Specialist
Katelyn Lucas, Tribal Historic Preservation Officer

Enclosures:

Attachment A: Project Location and APE Maps
Attachment B: Project Area Photographs



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

March 14, 2024

Robert Gray
Chief
Pamunkey Indian Tribe
1 054 Pocahontas Trail
King William, VA - 23086

Section 106 Consultation: PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear Chief Gray:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) for the replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The above referenced project is related to the emergency work submitted to your office on February 9, 2024. On the same day, the Virginia Department of Historic Resources concurred with a finding of No Historic Properties Affected for the emergency work. The emergency work is therefore not included in this consultation.

The purpose of this letter is to initiate Section 106 consultation for the Undertaking to determine if there are historic properties of cultural or religious significance to your Tribe/Nation that may be affected by the Undertaking, to determine if you want to be a consulting party, and to notify your Tribe/Nation of PHMSA's intention to make a finding of No Adverse Effect to Historic Properties. PHMSA is also available for Government-to-Government consultation on this Program.

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The Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory are NRHP-listed historic properties located within the APE.

The Fairmont Historic District comprises a ten-block-by-seven-block nearly level hilltop area. As a whole, Fairmont Historic District is a unified urban neighborhood that is made up of rows of small, frame town houses, rows of bungalows in repeated designs, and only a few other buildings. The district retains integrity because most of the extant buildings date from the 1890s, the neighborhood's first decade of existence, and about half of these resources retain original wooden ornamental details. In a large percentage of the houses, the original exterior siding has been covered with replacement siding, but the ornamental details remain intact. Many of the buildings built between 1900 and 1946 also retain a high degree of integrity. Some of the non-contributing buildings built between the 1950s and 2000 are visually intrusive; however, an effort has been made since 2000 to build infill houses in a style that is compatible with the character of the district. The district contains 542 contributing buildings and 172 non-contributing buildings.

Union Hill Historic District is in the east end of the City of Richmond. Union Hill is primarily a residential district with a few churches and commercial buildings concentrated along 25th Street and Venable Street. The buildings, constructed of frame and brick, are modest working-class houses, many of which were built prior to 1867 when Union Hill was annexed from Henrico County. Today, Union Hill Historic District is fragile as thirty-nine houses have been lost since the district was surveyed in 1993 and another forty-eight antebellum houses identified in the 1940s have been demolished. Despite this, Union Hill Historic District still possesses a high level of integrity and conveys the sense of its historic environment. The district contains a park and 369 buildings. Twelve of the buildings are non-contributing and one, the Hasker and Marcuse Factory was previously listed in the NRHP.

The Hasker Marcuse Factory is a 4-to 5-story brick masonry building constructed between 1893 and about 1915. Situated at the western edge of Union Hill Historic District, the factory contrasts with neighboring structures in use, overall character, and scale. It was built to house the Hasker & Marcuse Manufacturing Company, manufacturers of printed, polychromatic tin boxes and tin tags (labels) for plugs of chewing tobacco. The factory has a distinct industrial character, typical of the late nineteenth century, characterized by the exterior, running-bond-brickwork, the heavy massing of the structure, and the rhythmic patterning of the segmental-arched six-over-six, double-hung wood sash windows with rough-faced stone sills. While a degree of integrity of association has been lost due to the removal of the machinery in 1951, the structure itself sufficiently conveys the associative values and the integrity of materials, workmanship, setting, location, and feeling of the building remain intact.

Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, the identification effort for previously unidentified above-ground historic properties focused on identifying properties that are susceptible to the vibration effects of pipeline replacement and could experience diminished integrity as a result of the Undertaking. A review of the APE found no additional above-ground resources that have the potential to be affected by the Undertaking.

Archeology

VCRIS was examined to identify the presence of previously recorded archeological sites and previously conducted archeological surveys within the APE. The APE is comprised of five general areas within the greater Richmond area. The four northernmost areas are in Henrico County and the southernmost in Chesterfield County. As a result of the VCRIS search, two previous surveys were identified as intersecting the APE, and no previously recorded archeological sites were identified within the APE (Table 1). The two surveys intersecting the APE are associated with the same Virginia Department of Transportation project. In 2019, Dovetail Cultural Resources Group conducted a Phase I cultural resources survey for street and sidewalk alterations and upgrades near I-95 and Broad Street and Oliver Way. During the survey, two

archeological sites were identified. The initial Phase I survey document was followed by an addendum survey of a slightly expanded APE (McCloskey et al. 2020).

Table 1. Previously Conducted Archeological Surveys within the APE

Report	Citation	Report Number
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Addendum: Phase I Archaeological Survey of Impervious Surface Areas for the Shockoe Valley Streets Improvement Project, Richmond, Virginia	McCloskey et al. 2020	HE-429

A quarter of a mile search radius was also examined for previously recorded archeological sites and surveys. In addition to the two surveys conducted within the APE, five archeological surveys have been conducted within a quarter of a mile of the APE. Mouer et al. (1978) conducted a large-scale archaeological survey and inventory of sites for various parts of Henrico County. The survey identified 19 sites, but none are within a quarter of a mile of the APE. Browning's 2005 monitoring survey of the Belmont Golf Course identified no sites. Both Browning (2008) and Reid and Southerlin (2008) conducted surveys of the Cedar and Broad block in downtown Richmond ahead of proposed development. One site, 44HE591, was investigated and is located within a quarter of a mile of the APE. Funk et al. (2022) conducted a cultural resource survey of a proposed trail in the Lakeside community. None of the sites identified through the survey are located within a quarter of mile of the APE.

Table 2. Previously Conducted Archeological Surveys within a Quarter of Mile of the APE

Report	Citation	Report Number
Archeology in Henrico, Volume 1: Identification and Evaluation of Archaeological and Historic Resources for the Henrico County, Virginia Regional Wastewater System	Mouer et al. 1978	HE-013
Belmont Golf Course Storm Damage Rebuilding, Henrico County, Virginia, Archaeological Monitoring	Browning 2005	HE-199
Cedar & Broad Block, Richmond City, Virginia Phase I Intensive Cultural Resources Survey	Browning 2008	HE-258
Phase I Archaeological Study of the Cedar and Broad Block, Richmond, Virginia	Reid and Southerlin 2008	HE-260
Cultural Resource Survey, Proposed Lakeside Community Trail Phase 1, Henrico County, Virginia	Funk et al. 2022	HE-451

While no previously recorded archeological sites were identified within the APE, seven sites (Table 3) were identified within a quarter of a mile of the APE. All sites have unknown eligibilities for listing in the NRHP except site 44HE0591, which is recommended eligible.

Table 3. Previously Recorded Archeological Sites within a Quarter of Mile of the APE

Site Number	Type	NRHP	Citation
44HE0413	Precontact townsite	Unknown	Martha McCartney 1981 (no associated report)
44HE0422	Historic tavern site	Unknown	Martha McCartney 1981 (no associated report)

Site Number	Type	NRHP	Citation
44HE0423	Historic artifact scatter	Unknown	Martha McCartney 1981 (no associated report)
44HE0433	Historic toll house site	Unknown	Martha McCartney 1981 (no associated report)
44HE0440	Precontact artifact scatter and historic house site	Unknown	Johnson and Kessler 1981 (no associated report)
44HE0591	Historic trash pit and domestic site	Eligible	Browning 2008
44HE0774	Historic railroad tunnel	Unknown	Chesapeake and Ohio Historical Society (1990)

An examination of Web Soil Survey data within the APE reveals 16 soil classes within the APE (Table 4). Well drained and moderately well drained soils can be indicative of human habitation during both the pre-contact and historic periods. All soils within the APE are well drained or moderately well-draining soil types. Typically slopes greater than 15 percent are not suitable for human occupation, and the majority of the APE falls in this range. Much of the APE is comprised of soils indicating suitable conditions for human habitation in both the pre-contact and historic periods. However, the APE is comprised mostly of urban land (76.3 percent) with impervious surfaces such as buildings and pavement and is largely part of a built environment.

Table 4. Soil Types within the APE

Map Unit Name	Drainage Class	Slope	Percent of APE
Bourne fine sandy loam	Moderately well drained	2-6%	5.2
Bourne-Colfax complex	Moderately well drained	2-6%	1.5
Varina fine sandy loam	Well drained	0-4%	<1
Norfolk fine sandy loam	Well drained	0-6%	1.6
Faceville-Gritney gravelly fine sandy loams	Well drained	2-6%	<1
Dunbar fine sandy loam	Somewhat poorly drained	0-4%	2.4
Myatt loam	Poorly drained	0-2%	1.5
Edgehill very gravelly fine sandy loam	Well drained	2-20%	4.2
Appling-Wedowee complex	Well drained	12-20%	<1
Atlee-Urban land complex	Moderately well drained	0-4%	22.5
Turbeville-Urban land complex	Well drained	2-6%	31.4
Urban land	-		22.4
Wateree-Wedowee complex	Well drained	20-45%	<1
Chewacla and Riverview soils	Somewhat poorly drained	0-2%	1.9
Duplin very fine sandy loam	Moderately well drained	2-15%	2.7
Rains very fine sandy loam	Poorly drained	0-2%	<1

Historic topographic maps from 1894, 1934, 1938 and 1959 and historic aerial photographs from 1950s were examined for archeological resource potential within the APE. The presence of structures on historic maps and aerial photography may indicate the likelihood of historic period archeological deposits

associated with the occupation of these structures. The APE is comprised of five distinct areas across Richmond. All segments of the APE are located in either dense urban or dense suburban areas. The 1894 Richmond topographic map shows central Richmond as a heavily dense area spanning the north and south sides of the James River. The 1894 Bermuda Hundred map, displaying the area south of downtown Richmond that includes the southernmost APE segment, shows less building density but a well-connected transportation system and moderately dense residential areas along the main roads. The 1934 Richmond topographic map shows greater detail near the APE segments, including various churches, schools, parks and other municipal buildings. While several churches are shown adjacent to the APE segments, the historic maps do not note any cemeteries. The 1938 Drewrys Bluff topographic map displays the area south of Richmond where the southernmost APE segment is located. This map shows small roads and a handful of residential structures near the APE, but no other indications of notable historic architectural resources. Aerial imagery from 1952, 1955, and 1959 shows the APE segments nearest Richmond to be densely developed in residences and commercial structures. The 1955 aerial shows the area surrounding the southernmost APE segment to be rural and containing a single house with an attached agricultural field and wooded area. An aerial from 1968 shows residential street development reflecting the current road layout of this part of the APE.

The Find a Grave online database was examined to identify the presence of historic cemeteries within the APE. No cemeteries were noted as being located within the APE, though the Richmond National Cemetery, containing more than 11,000 graves, is located adjacent to the APE segment along Williamsburg Road. The Richmond National Cemetery is located more than 400 feet from the APE and will not be affected by the Undertaking. Three battlefield study areas are located within a quarter of a mile of the APE: Beaver Dam Creek Battlefield (Mechanicsville/Ellersons Mill), Seven Pines Battlefield, and Chaffin's Farm/New Market Heights Battlefield. Only Seven Pines Battlefield has a study area boundary that intersects the APE, and none of the core battlefield areas intersect the APE; however, this portion of the Seven Pines Battlefield study area encompasses the Richmond National Cemetery.

Background research revealed two archeological surveys and no archeological sites within the APE. No known historic cemeteries are located within the APE, and no archeologically significant NRHP districts intersect the APE. Examination of soils within the APE indicates suitable conditions for human habitation in both precontact and historic contexts, and the prominence of the James River through Richmond was likely a key factor in both precontact and historic period human occupation. While three battlefield study areas are located within a quarter of a mile of the APE, the Seven Pines Battlefield study area is the only one that intersects the APE. The core battlefield area is located more than half a mile from the APE and will not be affected by the Undertaking. Historic topographic maps and aerial imagery also show heavy development and building density in the nineteenth century. Historic development of Richmond indicates a high probability for archeological deposits to exist within the APE. However, since the APE segments are in urban or suburban parts of Richmond that have experienced moderate to heavy development, construction of roads, sidewalks, and underground utility corridors have likely disturbed any archeological deposits located within the APE. The Undertaking will occur entirely within the existing ROW near or within previous road construction and utility installation corridors that lack soil integrity. Due to the limited scope of work and likelihood of disturbed context within the APE, an archeological survey is not recommended at this time.

Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are three historic properties as defined in 36 CFR 800.16(l) within the APE: the NRHP-listed Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory. The Undertaking will not alter any of the characteristics or contributing features of these historic properties that qualify them for inclusion in the NRHP in a manner that would diminish their integrity. The replacement of pipelines within the existing

ROW and utility easements will take place under paved surfaces and will not result in lasting physical, visual, or audible effects to historic properties. No character-defining materials or features of any of these historic properties will be removed or altered as a result of the Undertaking. The Undertaking also does not include land acquisition, nor would it limit access to or change the use of any of the historic properties. Project work is limited to areas that demonstrate a low probability for intact significant archaeological resources.

Therefore, the Undertaking does not have the potential to adversely affect any of the identified historic properties. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Based on this assessment, in accordance with 36 CFR Part 800.5, PHMSA has determined the Undertaking will have No Adverse Effect on historic properties.

Request for Section 106 Concurrence

PHMSA requests that you provide any information you have regarding historic properties of religious or cultural significance to your Tribe/Nation that may be present in the APE and affected by the Undertaking. If your Tribe/Nation is unaware of any historic properties beyond what we have identified to date, PHMSA is notifying your Tribe/Nation of our intention to make a No Adverse Effect to Historic Properties finding. Please notify us within 30 days from the date of receipt of this letter if you have any concerns about the Undertaking's effects to historic properties. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,



Matt Fuller
Senior Environmental Protection Specialist

MF/kg

cc: Elizabeth Williams, Environmental Protection Specialist, USDOT Volpe Center
Renee Taylor, PHMSA Grant Specialist

Enclosures:

Attachment A: Project Location and APE Maps
Attachment B: Project Area Photographs



U.S. Department
of Transportation
**Pipeline and Hazardous
Materials Safety
Administration**

1200 New Jersey Avenue, SE
Washington, DC 20590

March 14, 2024

W. Frank Adams
Chief
Upper Mattaponi Tribe
Upper Mattaponi Tribal Grounds
13476 King William Road
King William, VA - 23086

Section 106 Consultation: PHMSA Pipeline Replacement Project in the City of Richmond
Grant Recipient: City of Richmond
Project Location: City of Richmond, Henrico and Chesterfield Counties, Virginia

Dear Chief Adams:

The Pipeline and Hazardous Materials Safety Administration (PHMSA) provides funds authorized under the Natural Gas Distribution Infrastructure Safety and Modernization Grant Program. PHMSA proposes to provide funds to the City of Richmond (Grant Recipient) for the replacement of pipeline (Undertaking). PHMSA is initiating consultation for the above referenced Undertaking in accordance with Section 106 of the National Historic Preservation Act of 1966, as amended, and the associated implementing regulations, 36 CFR Part 800 (Section 106). The purpose of this letter is to initiate Section 106 consultation for the Undertaking to determine if there are historic properties of cultural or religious significance to your Tribe/Nation that may be affected by the Undertaking, to determine if you want to be a consulting party, and to notify your Tribe/Nation of PHMSA's intention to make a finding of No Adverse Effect to Historic Properties. PHMSA is also available for Government-to-Government consultation on this Program.

Project Description/Background

The Grant Recipient will be replacing 13.2 miles (60,447 linear feet (LF)) of 2-inch to 12-inch cast iron, ductile iron, steel, and vintage polyethylene pipes with new polyethylene gas mains to address aging infrastructure, legacy pipe material, and leaks in the City of Richmond. Replacement of pipelines will enhance safety, improve operations, and reduce methane emissions of natural gas. The methods of construction will include open cut excavation (trenching) as well as directional drilling. The Undertaking is located throughout the City of Richmond:

- Work Package: 107991, Henrico County
- Lakeside Avenue (Parkside Avenue to Hilliard Road)- total 2,902 LF
- Work Package: 107990, Henrico County
- Lakeside Avenue (Dumbarton Road to Parkside Avenue)- total 3,317 LF
- Work Package: 108024, Chesterfield County
- Dalebrook Drive (Applewood Road to Frankmont Road)- total 12,646 LF
- Work Package: 108023, Henrico County

- Mechanicsville Turnpike at Byron Street- total 4,366 LF

Work Package: 108020, Henrico County

- Mechanicsville Turnpike and Euclid Road- total 3,104 LF

Work Package: 108061, City of Richmond

- Mosby Street, Fairmont Street, 25th Street, and Venable Street- total 10,998 LF

Work Package: 108062, City of Richmond and Henrico County

- Northampton Street, Williamsburg Road, Parker Street, and Haig Street– total 18,499 LF

Work Package: 107989, City of Richmond and Henrico County

- Phaup Street, 19th Street, and Brauers Lane – total 4,615 LF

All work will take place within the existing, paved, right-of-way (ROW) and will not require new ROW or easements. The new pipes will be placed adjacent to the existing pipes and the existing pipe will be abandoned in place. Abandonment of the existing pipeline (versus excavation and removal) will minimize ground disturbance. It is anticipated that ground disturbance will be limited to the roadway/sidewalk. All gas main replacements proposed are within moderately developed urban and suburban areas that are primarily commercial and residential. The entire roadway has been previously disturbed by pipeline work and several other utilities. The expected maximum depth of excavation for this Undertaking is 42 inches below grade by 24 inches wide. The staging areas for the project have not been identified. Project location maps are enclosed in **Attachment A**. Photographs showing the overall character of the project areas are included in **Attachment B**.

Area of Potential Effects (APE)

Pursuant to 36 CFR 800.4(a)(1), the Area of Potential Effects (APE) is defined as the geographic area(s) within which the Undertaking may directly or indirectly affect historic resources. Due to the scale and nature of the Undertaking, which is limited to the replacement of pipelines within existing ROW, PHMSA has delineated the APE for this Undertaking to encompass the existing ROW, which includes the limits of disturbance. The APE extends to the depth of proposed ground disturbance of up to 42 inches below grade. The Undertaking does not have the potential to cause visual or audible effects after the completion of construction. The existing ROW includes the roadway, parking lanes, sidewalk, light poles, overhead power lines, overhead streetlights, fire hydrants, bike lanes, bus stops, benches, signs, trees, and bushes. The APE is shown on the maps in **Attachment A**.

Identification and Evaluation

To identify historic properties in the APE, individuals who meet the Secretary of the Interior's (SOI) Professional Qualification Standards reviewed available information on previously identified historic properties in the APE, including the National Register of Historic Places (NRHP) database and data gathered from the Virginia Cultural Resources Information System (VCRIS) database and the USDA Web Soil Survey. Historic topographic maps and historic aerial photographs were also examined. SOI-qualified individuals conducted research to determine if there are any previously unidentified properties within the APE that are 45 years of age or older and may be eligible for listing in the NRHP and assessed the archaeological sensitivity of the APE.

Historic Architecture

The Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory are NRHP-listed historic properties located within the APE.

The Fairmont Historic District comprises a ten-block-by-seven-block nearly level hilltop area. As a whole, Fairmont Historic District is a unified urban neighborhood that is made up of rows of small, frame town houses, rows of bungalows in repeated designs, and only a few other buildings. The district retains integrity because most of the extant buildings date from the 1890s, the neighborhood's first decade of existence, and about half of these resources retain original wooden ornamental details. In a large percentage of the houses, the original exterior siding has been covered with replacement siding, but the ornamental details remain intact. Many of the buildings built between 1900 and 1946 also retain a high degree of integrity. Some of the non-contributing buildings built between the 1950s and 2000 are visually intrusive; however, an effort has been made since 2000 to build infill houses in a style that is compatible with the character of the district. The district contains 542 contributing buildings and 172 non-contributing buildings.

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A quarter of a mile search radius was also examined for previously recorded archeological sites and surveys. In addition to the two surveys conducted within the APE, five archeological surveys have been conducted within a quarter of a mile of the APE. Mouer et al. (1978) conducted a large-scale archaeological survey and inventory of sites for various parts of Henrico County. The survey identified 19 sites, but none are within a quarter of a mile of the APE. Browning's 2005 monitoring survey of the Belmont Golf Course identified no sites. Both Browning (2008) and Reid and Southerlin (2008) conducted surveys of the Cedar and Broad block in downtown Richmond ahead of proposed development. One site, 44HE591, was investigated and is located within a quarter of a mile of the APE. Funk et al. (2022) conducted a cultural resource survey of a proposed trail in the Lakeside community. None of the sites identified through the survey are located within a quarter of mile of the APE.

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While no previously recorded archeological sites were identified within the APE, seven sites (Table 3) were identified within a quarter of a mile of the APE. All sites have unknown eligibilities for listing in the NRHP except site 44HE0591, which is recommended eligible.

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An examination of Web Soil Survey data within the APE reveals 16 soil classes within the APE (Table 4). Well drained and moderately well drained soils can be indicative of human habitation during both the pre-contact and historic periods. All soils within the APE are well drained or moderately well-draining soil types. Typically slopes greater than 15 percent are not suitable for human occupation, and the majority of the APE falls in this range. Much of the APE is comprised of soils indicating suitable conditions for human habitation in both the pre-contact and historic periods. However, the APE is comprised mostly of urban land (76.3 percent) with impervious surfaces such as buildings and pavement and is largely part of a built environment.

Table 4. Soil Types within the APE

Map Unit Name	Drainage Class	Slope	Percent of APE
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Richmond that includes the southernmost APE segment, shows less building density but a well-connected transportation system and moderately dense residential areas along the main roads. The 1934 Richmond topographic map shows greater detail near the APE segments, including various churches, schools, parks and other municipal buildings. While several churches are shown adjacent to the APE segments, the historic maps do not note any cemeteries. The 1938 Drewrys Bluff topographic map displays the area south of Richmond where the southernmost APE segment is located. This map shows small roads and a handful of residential structures near the APE, but no other indications of notable historic architectural resources. Aerial imagery from 1952, 1955, and 1959 shows the APE segments nearest Richmond to be densely developed in residences and commercial structures. The 1955 aerial shows the area surrounding the southernmost APE segment to be rural and containing a single house with an attached agricultural field and wooded area. An aerial from 1968 shows residential street development reflecting the current road layout of this part of the APE.

The Find a Grave online database was examined to identify the presence of historic cemeteries within the APE. No cemeteries were noted as being located within the APE, though the Richmond National Cemetery, containing more than 11,000 graves, is located adjacent to the APE segment along Williamsburg Road. The Richmond National Cemetery is located more than 400 feet from the APE and will not be affected by the Undertaking. Three battlefield study areas are located within a quarter of mile of the APE: Beaver Dam Creek Battlefield (Mechanicsville/Ellersons Mill), Seven Pines Battlefield, and Chaffin's Farm/New Market Heights Battlefield. Only Seven Pines Battlefield has a study area boundary that intersects the APE, and none of the core battlefield areas intersect the APE; however, this portion of the Seven Pines Battlefield study area encompasses the Richmond National Cemetery.

Background research revealed two archeological surveys and no archeological sites within the APE. No known historic cemeteries are located within the APE, and no archeologically significant NRHP districts intersect the APE. Examination of soils within the APE indicates suitable conditions for human habitation in both precontact and historic contexts, and the prominence of the James River through Richmond was likely a key factor in both precontact and historic period human occupation. While three battlefield study areas are located within a quarter of a mile of the APE, the Seven Pines Battlefield study area is the only one that intersects the APE. The core battlefield area is located more than half a mile from the APE and will not be affected by the Undertaking. Historic topographic maps and aerial imagery also show heavy development and building density in the nineteenth century. Historic development of Richmond indicates a high probability for archeological deposits to exist within the APE. However, since the APE segments are in urban or suburban parts of Richmond that have experienced moderate to heavy development, construction of roads, sidewalks, and underground utility corridors have likely disturbed any archeological deposits located within the APE. The Undertaking will occur entirely within the existing ROW near or within previous road construction and utility installation corridors that lack soil integrity. Due to the limited scope of work and likelihood of disturbed context within the APE, an archeological survey is not recommended at this time.

Determination of Effect

Based on the aforementioned identification and evaluation, PHMSA finds that there are three historic properties as defined in 36 CFR 800.16(l) within the APE: the NRHP-listed Fairmont Historic District, Union Hill Historic District and the Hasker and Marcuse Factory. The Undertaking will not alter any of the characteristics or contributing features of these historic properties that qualify them for inclusion in the NRHP in a manner that would diminish their integrity. The replacement of pipelines within the existing ROW and utility easements will take place under paved surfaces and will not result in lasting physical, visual, or audible effects to historic properties. No character-defining materials or features of any of these historic properties will be removed or altered as a result of the Undertaking. The Undertaking also does not include land acquisition, nor would it limit access to or change the use of any of the historic properties.

Project work is limited to areas that demonstrate a low probability for intact significant archaeological resources.

Therefore, the Undertaking does not have the potential to adversely affect any of the identified historic properties. While the exact staging areas for the Undertaking are currently unknown, staging should be confined to paved areas; if staging cannot be confined to paved areas, geotextile fabric or other similar protective measures (such as pressure distributing mats) must be laid in any affected unpaved area to minimize ground disturbance, prevent soil compaction, and protect potential archaeological features and artifacts.

Based on this assessment, in accordance with 36 CFR Part 800.5, PHMSA has determined the Undertaking will have No Adverse Effect on historic properties.

Request for Section 106 Concurrence

PHMSA requests that you provide any information you have regarding historic properties of religious or cultural significance to your Tribe/Nation that may be present in the APE and affected by the Undertaking. If your Tribe/Nation is unaware of any historic properties beyond what we have identified to date, PHMSA is notifying your Tribe/Nation of our intention to make a No Adverse Effect to Historic Properties finding. Please notify us within 30 days from the date of receipt of this letter if you have any concerns about the Undertaking's effects to historic properties. Should you need additional information please contact Kat Giraldo, Section 106 specialist, at PHMSASection106@dot.gov or 857-320-1359.

Sincerely,



Matt Fuller
Senior Environmental Protection Specialist

MF/kg

cc: Elizabeth Williams, Environmental Protection Specialist, USDOT Volpe Center
Renee Taylor, PHMSA Grant Specialist

Enclosures:

Attachment A: Project Location and APE Maps
Attachment B: Project Area Photographs

Appendix I

Environmental Justice

EJ Green Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Richmond, VA

0.5 miles Ring Centered at 37.548630,-77.411512

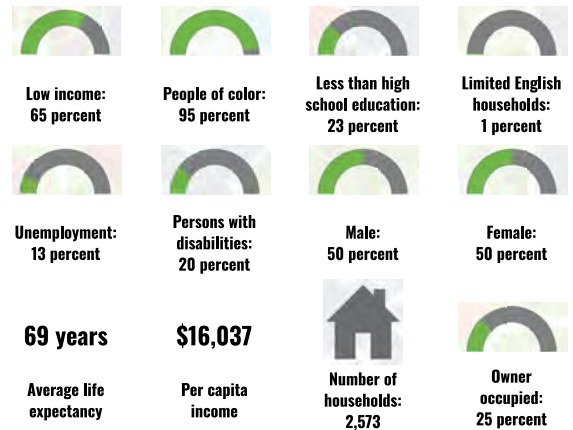
Population: 6,846

Area in square miles: 0.79

A3 Landscape



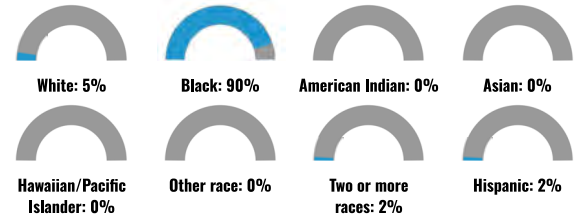
COMMUNITY IDENTIFI



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	97%
Spanish	1%
French, Haitian, or Cajun	1%
German or other West Germanic	1%
Total Non-English	3%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

Environmental Justice & Supplemental Indexes 0

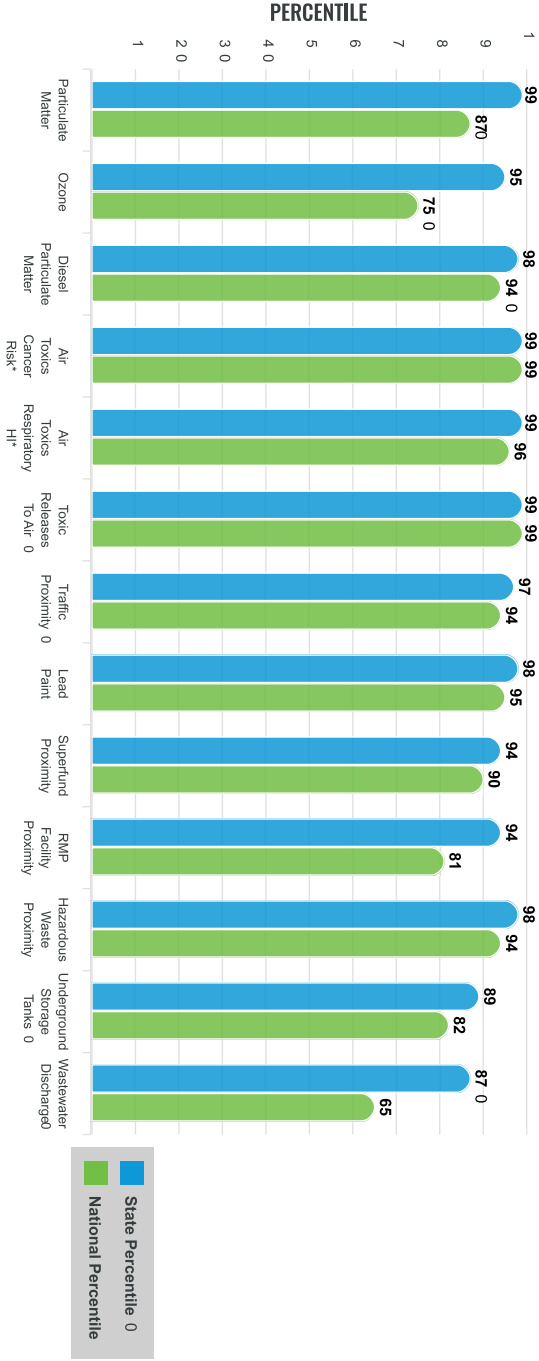
The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the [EJScreen website](#).

EJ INDEXES 0

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.



EJ INDEXES FOR THE SELECTED LOCATION

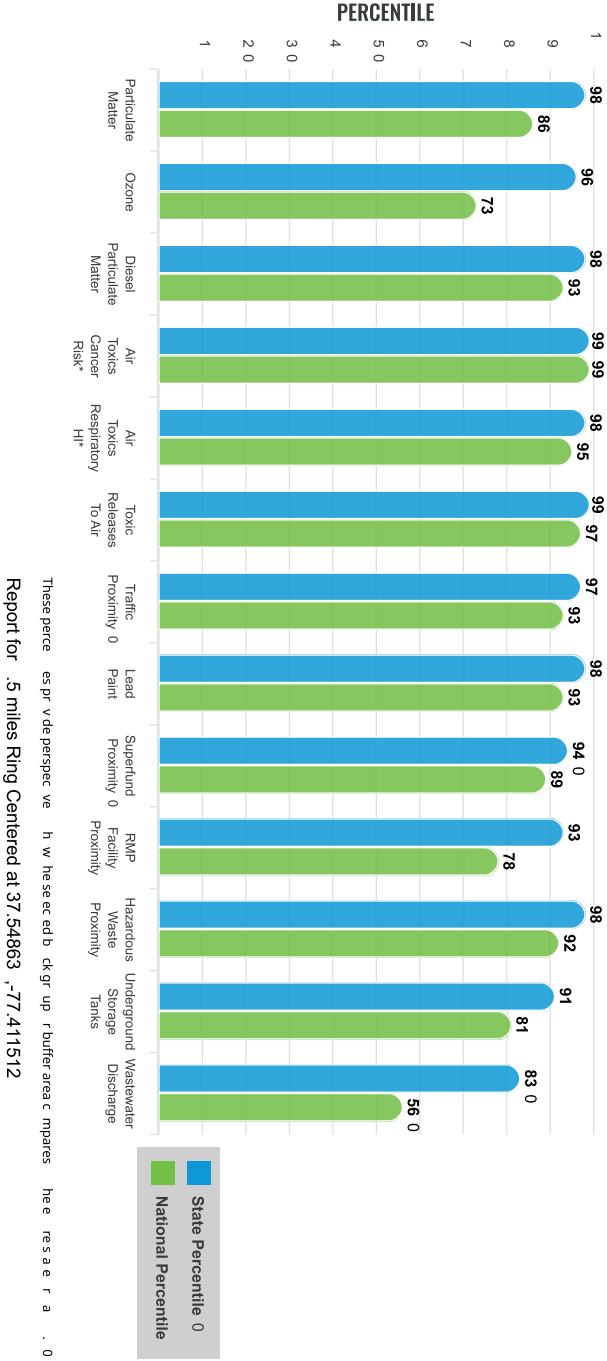


SUPPLEMENTAL INDEXES 0

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.



SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles are based on the perspective of the selected location. The report for .5 miles Ring Centered at 37.54863, -77.411512

EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.28	7.53	87	8.08	52
Ozone (ppb)	59.3	59.1	59	61.6	34
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.336	0.209	86	0.261	75
Air Toxics Cancer Risk* (lifetime risk per million)	50	29	97	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	30,000	4,300	97	4,600	97
Traffic Proximity (daily traffic count/distance to road)	240	150	82	210	78
Lead Paint (% Pre-1960 Housing)	0.51	0.22	86	0.3	74
Superfund Proximity (site count/km distance)	0.079	0.11	60	0.13	58
RMP Facility Proximity (facility count/km distance)	0.14	0.21	64	0.43	43
Hazardous Waste Proximity (facility count/km distance)	1.8	0.61	91	1.9	72
Underground Storage Tanks (count/km ²)	2	1.9	66	3.9	59
Wastewater Discharge (toxicity-weighted concentration/m distance)	8.7E-05	7.2	49	22	29
SOCIOECONOMIC INDICATORS					
Demographic Index	80%	31%	98	35%	95
Supplemental Demographic Index	27%	12%	97	14%	92
People of Color	95%	38%	97	39%	92
Low Income	65%	25%	95	31%	91
Unemployment Rate	13%	5%	92	6%	87
Limited English Speaking Households	1%	2%	64	5%	57
Less Than High School Education	23%	10%	90	12%	84
Under Age 5	16%	6%	97	6%	97
Over Age 64	9%	17%	27	17%	24
Low Life Expectancy	29%	20%	98	20%	98

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	0
Air Pollution	3
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	1
Places of Worship	12

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	No

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring Centered at 37.548630,-77.411512 w

EJS ,ree , E ,vir , me tal a ,d S , i e , mi l di,at rs Data ,

HEALTH INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	29%	20%	98	20%	98
Heart Disease	8.1	5.5	88	6.1	85
Asthma	15.3	9.6	99	10	99
Cancer	4.6	6.1	21	6.1	18
Persons with Disabilities	20.2%	12.6%	88	13.4%	86

CLIMATE INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	2%	9%	22	12%	24
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	34%	13%	91	14%	91
Lack of Health Insurance	8%	8%	56	9%	56
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Footnotes ,

Re f 0.5 miles Ring Cen e d a 37.548630 -77.411512 ,



EJ Green Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Richmond, VA

0.5 miles Ring Centered at 37.540103,-77.414625

Population: 6,917

Area in square miles: 0.79

A3 Landscape



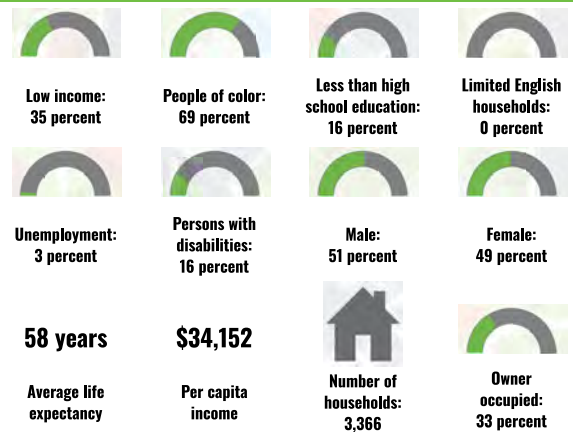
November 9, 2023
Project 9 Project 7 Project 5 Project 3 108061
Project 8 Project 6 Project 4 Project 2 108061

1:9,026
0 0.07 0.15 0.3 mi
0 0.13 0.25 0.5 km
Data provided by Esri, City of Richmond, Google, Microsoft, OpenStreetMap, Mapbox, and others. © 2023 Esri. All rights reserved.

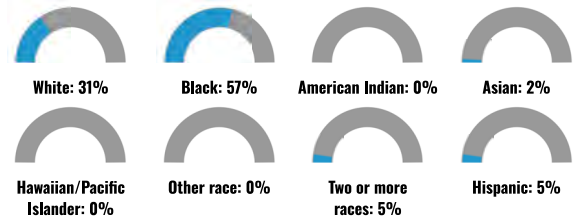
LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	95%
Spanish	2%
French, Haitian, or Cajun	1%
Other Indo-European	1%
Chinese (including Mandarin, Cantonese)	1%
Total Non-English	5%

COMMUNITY IDENTIFI



BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

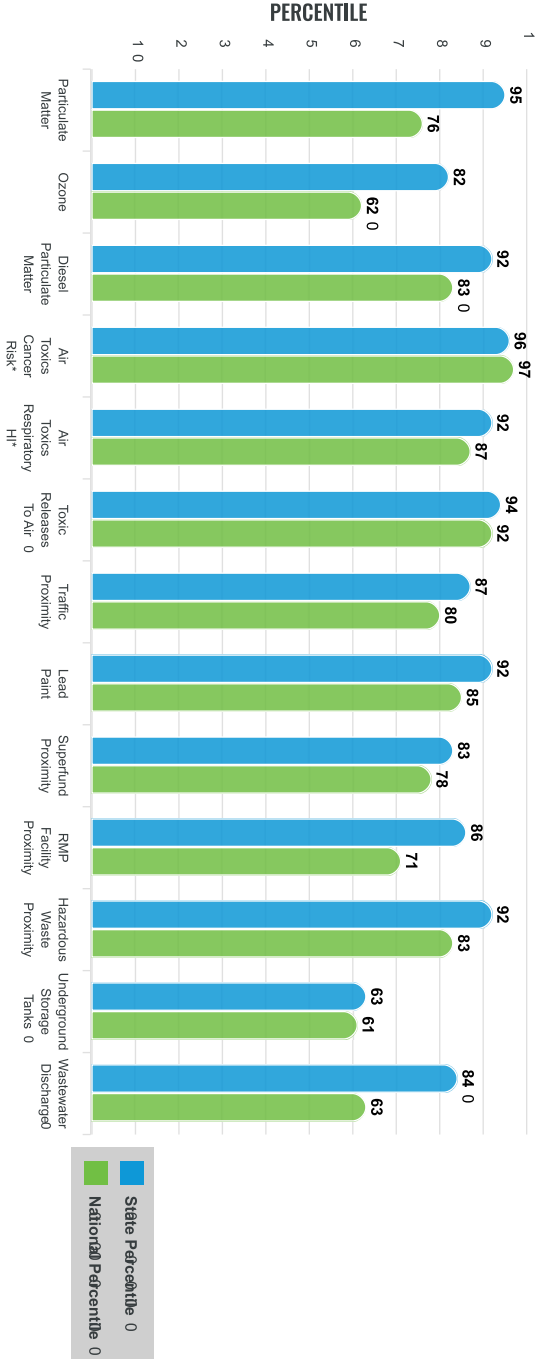
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the [EJScreen website](#).

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

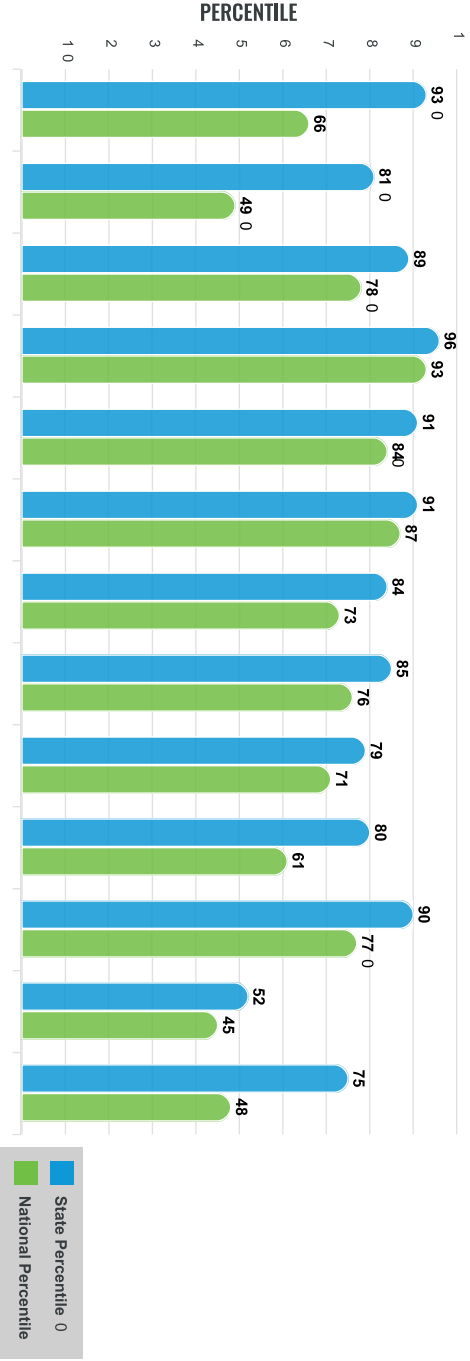
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.31	7.53	92	8.08	53
Ozone (ppb)	59.4	59.1	59	61.6	34
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.324	0.209	85	0.261	73
Air Toxics Cancer Risk* (lifetime risk per million)	52	29	97	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	27,000	4,300	96	4,600	97
Traffic Proximity (daily traffic count/distance to road)	330	150	88	210	85
Lead Paint (% Pre-1960 Housing)	0.51	0.22	86	0.3	74
Superfund Proximity (site count/km distance)	0.076	0.11	59	0.13	57
RMP Facility Proximity (facility count/km distance)	0.16	0.21	69	0.43	49
Hazardous Waste Proximity (facility count/km distance)	2.1	0.61	92	1.9	74
Underground Storage Tanks (count/km ²)	0.81	1.9	47	3.9	45
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.00033	7.2	63	22	39
SOCIOECONOMIC INDICATORS					
Demographic Index	52%	31%	85	35%	76
Supplemental Demographic Index	15%	12%	72	14%	62
People of Color	69%	38%	84	39%	77
Low Income	35%	25%	72	31%	63
Unemployment Rate	3%	5%	45	6%	39
Limited English Speaking Households	0%	2%	0	5%	57
Less Than High School Education	16%	10%	78	12%	74
Under Age 5	9%	6%	81	6%	80
Over Age 64	13%	17%	41	17%	39
Low Life Expectancy	20%	20%	59	20%	60

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	0
Air Pollution	6
Brownfields	6
Toxic Release Inventory	0

Other community features within defined area:

Schools	3
Hospitals	1
Places of Worship	22

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	No

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring Centered at 37.540103,-77.414625 w

EJScreen-Environmental and Socioeconomic Indicators Data -

HEALTH INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	20%	20%	59	20%	60
Heart Disease	5.9	5.5	59	6.1	48
Asthma	11.8	9.6	92	10	88
Cancer	4.5	6.1	19	6.1	16
Persons with Disabilities	16.6%	12.6%	76	13.4%	73

CLIMATE INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	6%	9%	57	12%	49
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	27%	13%	84	14%	85
Lack of Health Insurance	7%	8%	54	9%	54
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Footnotes -

Refer to 0.5 miles Ring Center at 37.540103, 77.414625 -



EJ Green Communities Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

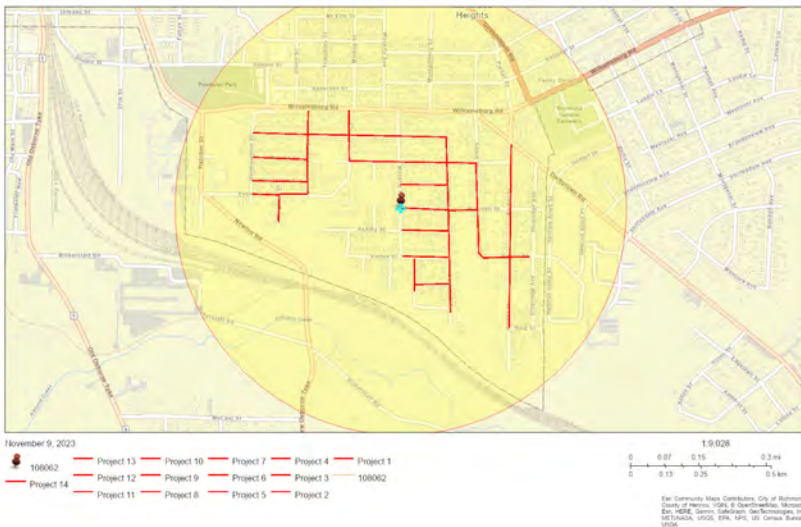
Richmond, VA

0.5 miles Ring Centered at 37.511441,-77.399616

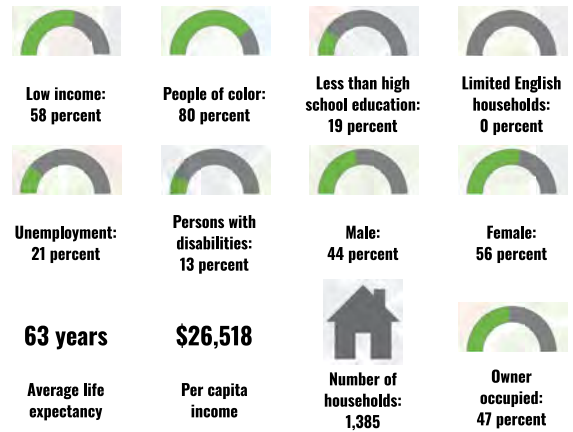
Population: 2,879

Area in square miles: 0.79

A3 Landscape



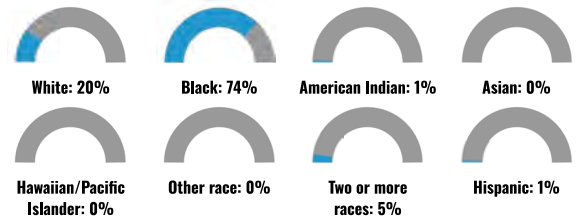
COMMUNITY IDENTIFI



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	98%
Spanish	2%
Total Non-English	2%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

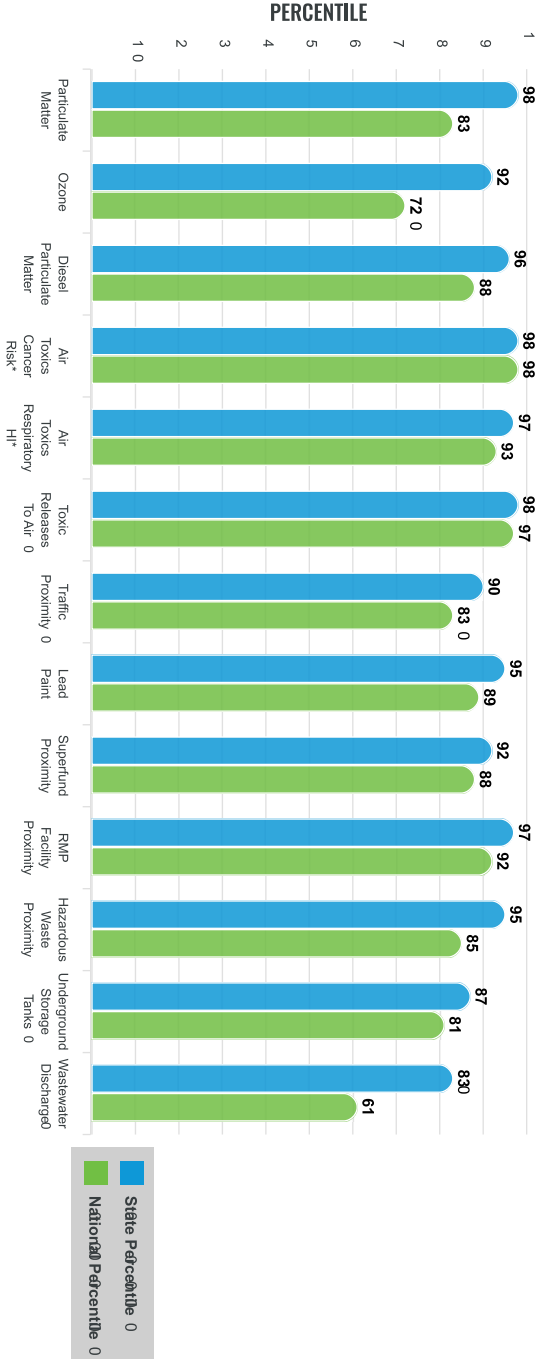
Environmental Justice & Supplemental Indexes 0

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the [EJScreen website](#).

EJ INDEXES 0

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

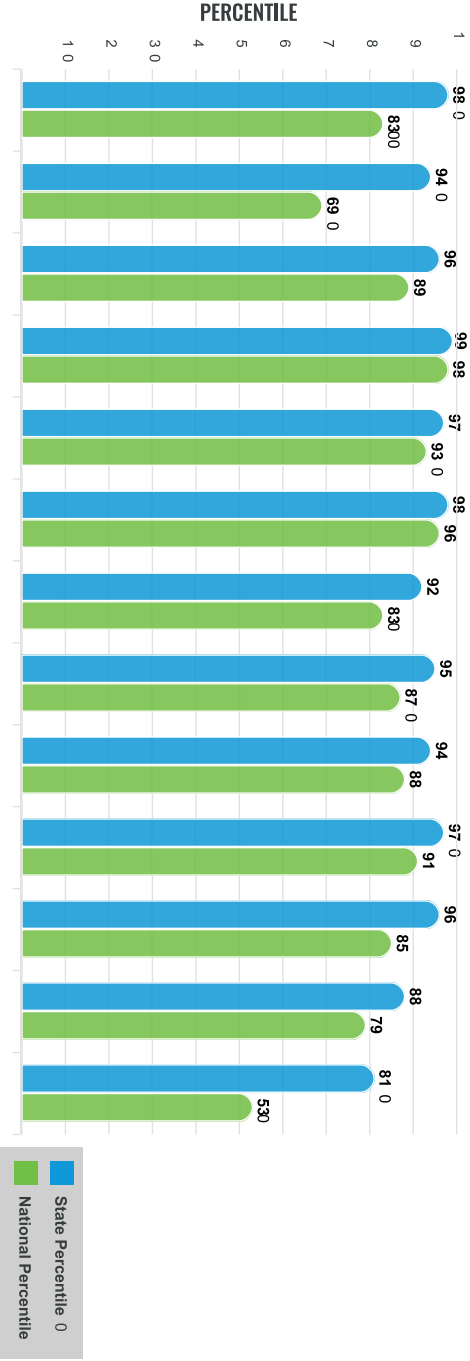
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES 0

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.3	7.53	90	8.08	52
Ozone (ppb)	59.4	59.1	60	61.6	35
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.307	0.209	82	0.261	70
Air Toxics Cancer Risk* (lifetime risk per million)	72	29	99	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	30,000	4,300	97	4,600	97
Traffic Proximity (daily traffic count/distance to road)	100	150	63	210	58
Lead Paint (% Pre-1960 Housing)	0.4	0.22	79	0.3	66
Superfund Proximity (site count/km distance)	0.089	0.11	65	0.13	62
RMP Facility Proximity (facility count/km distance)	0.54	0.21	91	0.43	78
Hazardous Waste Proximity (facility count/km distance)	1	0.61	83	1.9	61
Underground Storage Tanks (count/km ²)	1.4	1.9	57	3.9	52
Wastewater Discharge (toxicity-weighted concentration/m distance)	8.5E-05	7.2	49	22	29
SOCIOECONOMIC INDICATORS					
Demographic Index	69%	31%	95	35%	89
Supplemental Demographic Index	24%	12%	94	14%	87
People of Color	80%	38%	91	39%	83
Low Income	58%	25%	92	31%	87
Unemployment Rate	21%	5%	98	6%	96
Limited English Speaking Households	0%	2%	0	5%	0
Less Than High School Education	19%	10%	85	12%	80
Under Age 5	5%	6%	55	6%	54
Over Age 64	19%	17%	63	17%	62
Low Life Expectancy	24%	20%	88	20%	88

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	1
Air Pollution	6
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	2

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring Centered at 37.511441,-77.399616 w

EJScreen-Environmental and Socioeconomic Indicators Data -

HEALTH INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	24%	20%	88	20%	88
Heart Disease	6.8	5.5	71	6.1	64
Asthma	13.2	9.6	97	10	96
Cancer	5.1	6.1	30	6.1	27
Persons with Disabilities	12%	12.6%	51	13.4%	46

CLIMATE INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	3%	9%	31	12%	31
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	27%	13%	85	14%	85
Lack of Health Insurance	10%	8%	73	9%	69
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Footnotes -

Refer to 0.5 miles Ring Center data 37.511441, 77.399616-

EJ Green Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

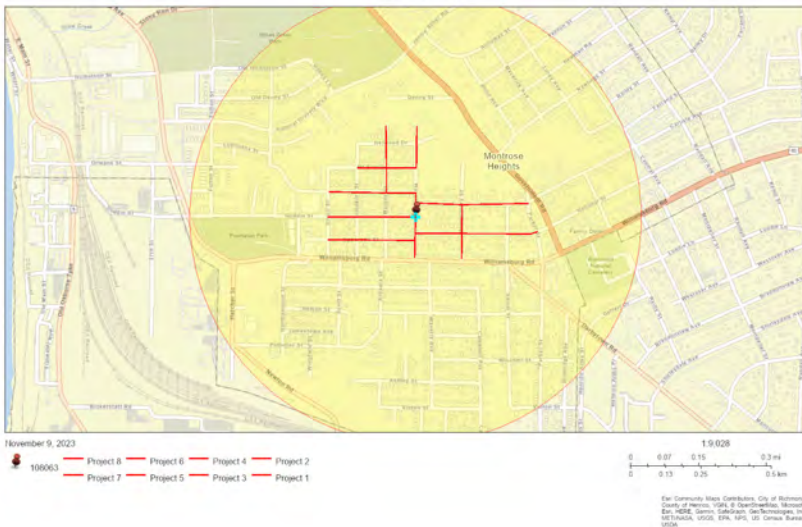
Richmond, VA

0.5 miles Ring Centered at 37.515993,-77.400277

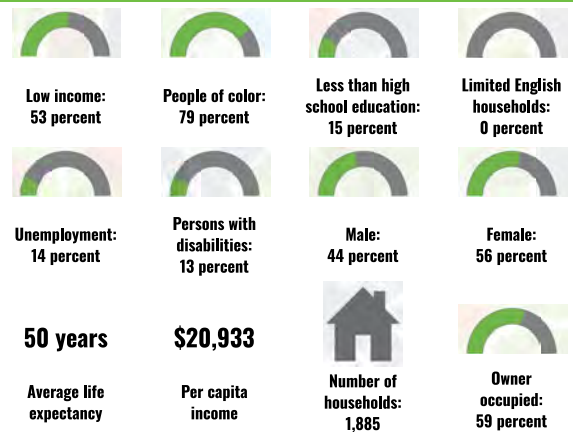
Population: 4,007

Area in square miles: 0.79

A3 Landscape



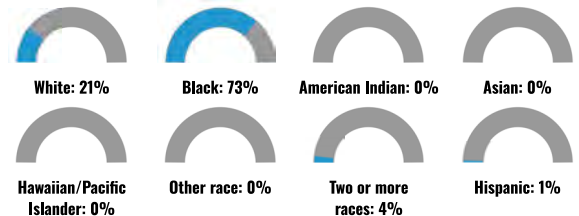
COMMUNITY IDENTIFI



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	92%
Spanish	2%
French, Haitian, or Cajun	5%
Total Non-English	8%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

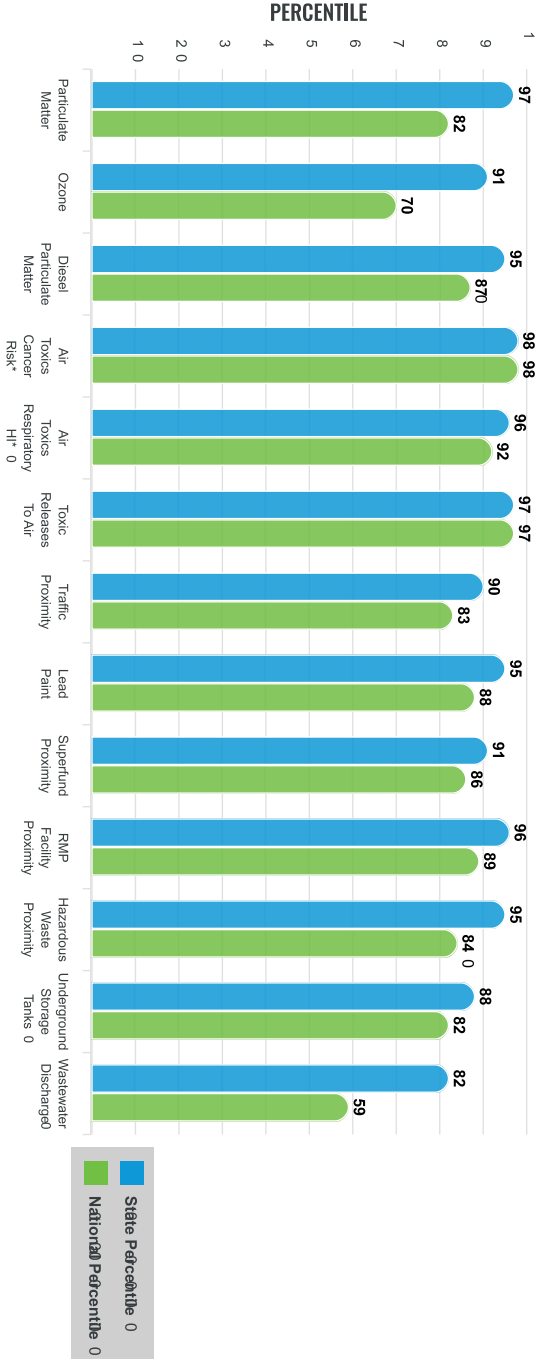
Environmental Justice & Supplemental Indexes 0

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the [EJScreen website](#).

EJ INDEXES 0

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

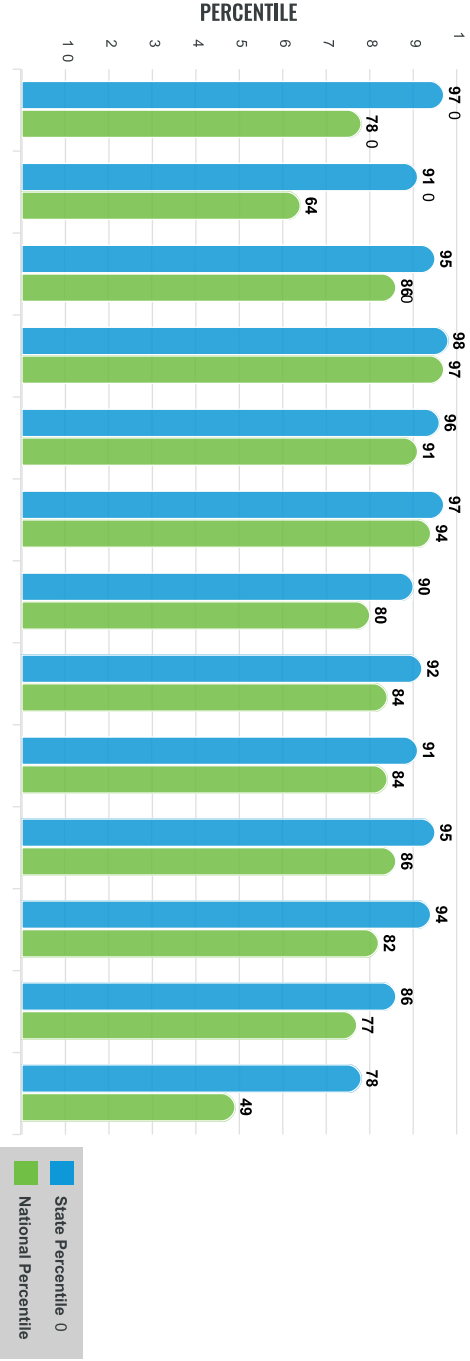
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES 0

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.3	7.53	91	8.08	52
Ozone (ppb)	59.4	59.1	60	61.6	35
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.297	0.209	79	0.261	67
Air Toxics Cancer Risk* (lifetime risk per million)	66	29	99	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	29,000	4,300	97	4,600	97
Traffic Proximity (daily traffic count/distance to road)	120	150	66	210	61
Lead Paint (% Pre-1960 Housing)	0.4	0.22	79	0.3	66
Superfund Proximity (site count/km distance)	0.086	0.11	64	0.13	62
RMP Facility Proximity (facility count/km distance)	0.45	0.21	88	0.43	74
Hazardous Waste Proximity (facility count/km distance)	1.1	0.61	84	1.9	62
Underground Storage Tanks (count/km ²)	1.6	1.9	61	3.9	55
Wastewater Discharge (toxicity-weighted concentration/m distance)	6.7E-05	7.2	47	22	28
SOCIOECONOMIC INDICATORS					
Demographic Index	66%	31%	93	35%	87
Supplemental Demographic Index	21%	12%	90	14%	82
People of Color	79%	38%	90	39%	83
Low Income	53%	25%	89	31%	83
Unemployment Rate	14%	5%	93	6%	89
Limited English Speaking Households	0%	2%	0	5%	0
Less Than High School Education	15%	10%	77	12%	72
Under Age 5	7%	6%	67	6%	67
Over Age 64	15%	17%	47	17%	46
Low Life Expectancy	21%	20%	60	20%	61

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	0
Air Pollution	7
Brownfields	1
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	4

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring Centered at 37.515993,-77.400277 w

EJScreen-Environmental and Socioeconomic Indicators Data -

HEALTH INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	21%	20%	60	20%	61
Heart Disease	6.6	5.5	68	6.1	60
Asthma	13.5	9.6	98	10	97
Cancer	4.9	6.1	25	6.1	22
Persons with Disabilities	12%	12.6%	51	13.4%	46

CLIMATE INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	3%	9%	29	12%	29
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	23%	13%	79	14%	80
Lack of Health Insurance	10%	8%	72	9%	68
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Footnotes -

Refer to 0.5 miles Ring Center at 37.515993, 77.400277 -

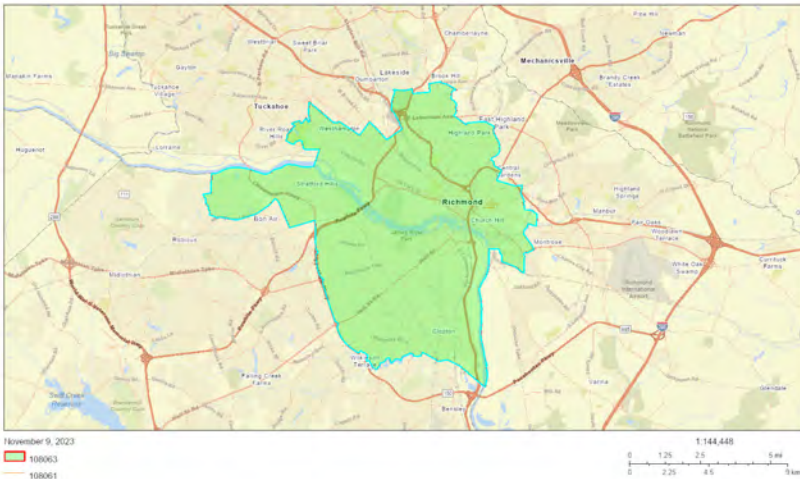
JScr n Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Richmond City, VA

County: Richmond city
Population: 225,676
Area in square miles: 62.57

A3 Landscape



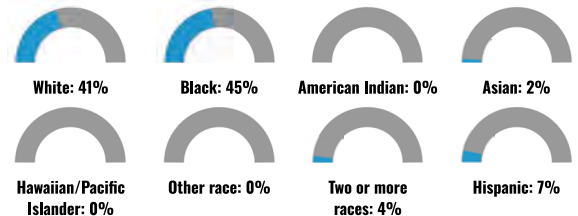
COMMUNITY INFORMATION



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	90%
Spanish	6%
French, Haitian, or Cajun	1%
Other Indo-European	1%
Other and Unspecified	1%
Total Non-English	10%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

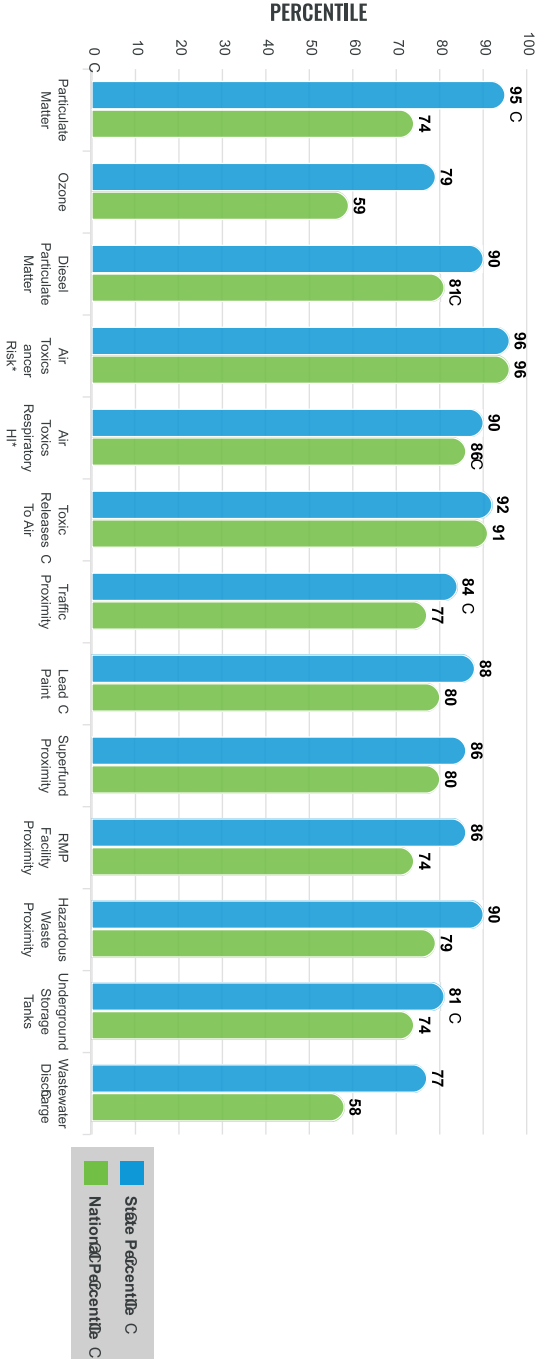
Environmental Justice & Supplemental Index Scores

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J Index Score

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

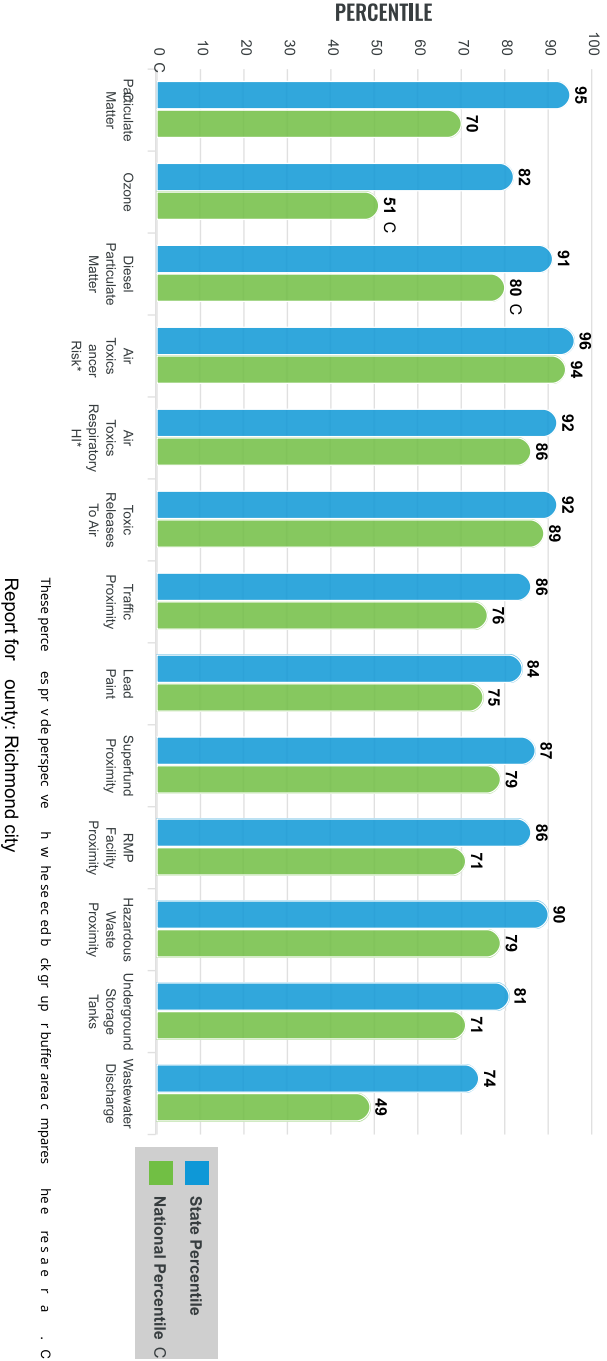
EJ INDEXES FOR THE SELECTED LOCATION



Supplemental Index Scores

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.34	7.53	96	8.08	53
Ozone (ppb)	59.2	59.1	56	61.6	33
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.331	0.209	86	0.261	74
Air Toxics Cancer Risk* (lifetime risk per million)	47	29	89	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	17,000	4,300	94	4,600	95
Traffic Proximity (daily traffic count/distance to road)	310	150	87	210	83
Lead Paint (% Pre-1960 Housing)	0.53	0.22	87	0.3	76
Superfund Proximity (site count/km distance)	0.1	0.11	72	0.13	68
RMP Facility Proximity (facility count/km distance)	0.3	0.21	83	0.43	67
Hazardous Waste Proximity (facility count/km distance)	2.2	0.61	93	1.9	75
Underground Storage Tanks (count/km ²)	3.3	1.9	79	3.9	68
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.00078	7.2	70	22	46
SOCIOECONOMIC INDICATORS					
Demographic Index	49%	31%	82	35%	73
Supplemental Demographic Index	17%	12%	77	14%	68
People of Color	59%	38%	77	39%	71
Low Income	38%	25%	76	31%	67
Unemployment Rate	6%	5%	71	6%	64
Limited English Speaking Households	3%	2%	75	5%	67
Less Than High School Education	12%	10%	69	12%	65
Under Age 5	6%	6%	58	6%	58
Over Age 64	13%	17%	42	17%	40
Low Life Expectancy	19%	20%	44	20%	45

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	13
Water Dischargers	42
Air Pollution	
.	378
Brownfields	92
Toxic Release Inventory	49

Other community features within defined area:

Schools	60
Hospitals	33
Places of Worship	293

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for County: Richmond city w

ES&S Environmental Justice Indicators

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	19%	20%	44	20%	45
Heart Disease	5.6	5.5	51	6.1	39
Asthma	11.5	9.6	91	10	85
Cancer	4.9	6.1	27	6.1	24
Persons with Disabilities	14.2%	12.6%	64	13.4%	61

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	6%	9%	58	12%	50
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	19%	13%	72	14%	71
Lack of Health Insurance	11%	8%	74	9%	70
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Footnotes

Reference County: Richmond City

E Screen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Meadowbrook, VA W

0.5 miles Ring Centered at 37.442683,-77.463162

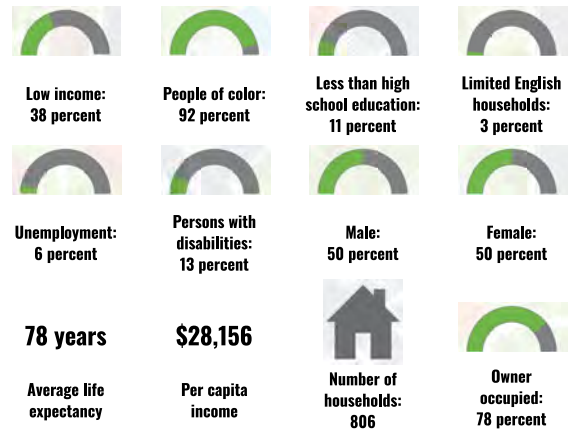
Population: 2,051

Area in square miles: 0.79

A3 Landscape



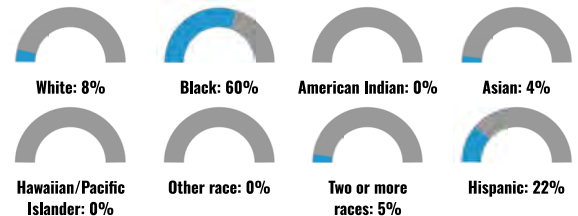
COMMUNITY INDENTIFI



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	69%
Spanish	24%
Other Indo-European	3%
Chinese (including Mandarin, Cantonese)	1%
Other Asian and Pacific Island	1%
Arabic	1%
Total Non-English	31%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

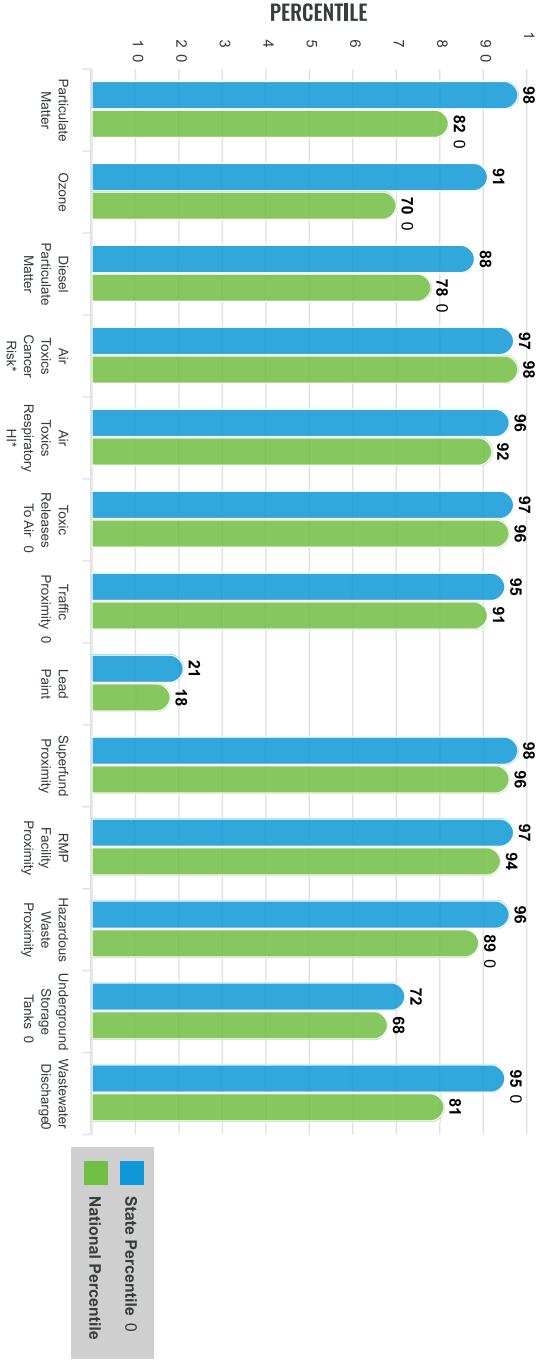
Environmental Justice & Supplemental Indexes 0

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EJ INDEXES 0

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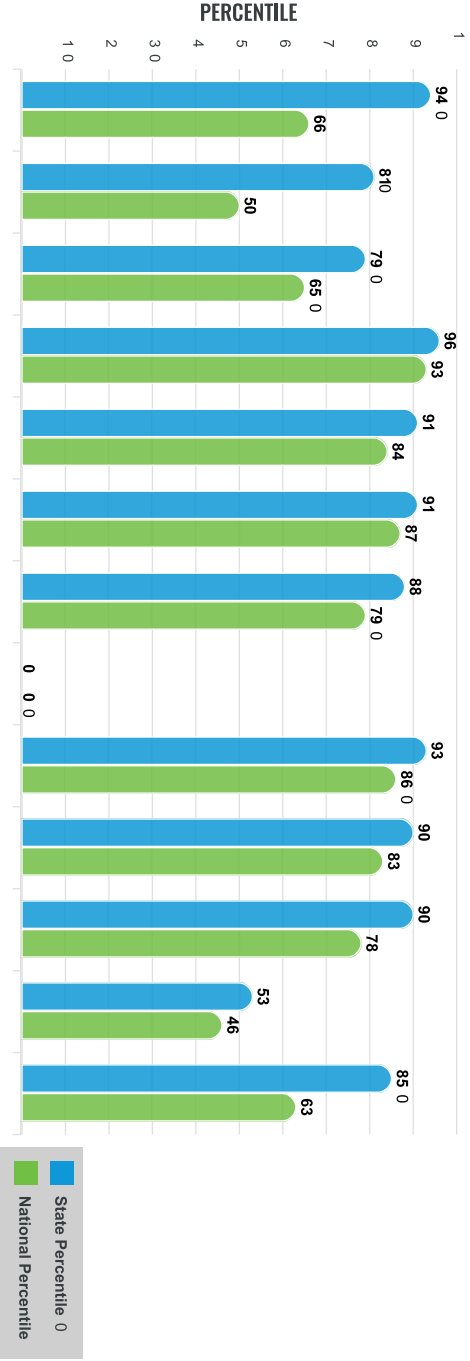
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES 0

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.33	7.53	95	8.08	53
Ozone (ppb)	59.4	59.1	60	61.6	35
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.218	0.209	58	0.261	50
Air Toxics Cancer Risk* (lifetime risk per million)	40	29	89	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	17,000	4,300	94	4,600	95
Traffic Proximity (daily traffic count/distance to road)	260	150	84	210	80
Lead Paint (% Pre-1960 Housing)	0.018	0.22	22	0.3	18
Superfund Proximity (site count/km distance)	0.38	0.11	96	0.13	93
RMP Facility Proximity (facility count/km distance)	1.2	0.21	97	0.43	90
Hazardous Waste Proximity (facility count/km distance)	2.1	0.61	92	1.9	74
Underground Storage Tanks (count/km ²)	0.67	1.9	44	3.9	42
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.0014	7.2	75	22	51
SOCIOECONOMIC INDICATORS					
Demographic Index	65%	31%	93	35%	86
Supplemental Demographic Index	15%	12%	73	14%	63
People of Color	92%	38%	96	39%	90
Low Income	38%	25%	75	31%	66
Unemployment Rate	6%	5%	73	6%	66
Limited English Speaking Households	3%	2%	78	5%	69
Less Than High School Education	11%	10%	65	12%	61
Under Age 5	6%	6%	58	6%	57
Over Age 64	22%	17%	74	17%	74
Low Life Expectancy	18%	20%	34	20%	36

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	0
Air Pollution	0
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	0

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring Centered at 37.442683,-77.463162 w

HEALTH INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	18%	20%	34	20%	36
Heart Disease	6.4	5.5	65	6.1	56
Asthma	10.5	9.6	78	10	69
Cancer		6.1	49	6.1	50
Persons with Disabilities	12.6%	12.6%	54	13.4%	50

CLIMATE INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	3%	9%	28	12%	28
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	8%	13%	46	14%	40
Lack of Health Insurance	18%	8%	94	9%	89
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Food Deserts

Re f 0.5 miles Ring Cen e ed a 37.442683,-77.4631628



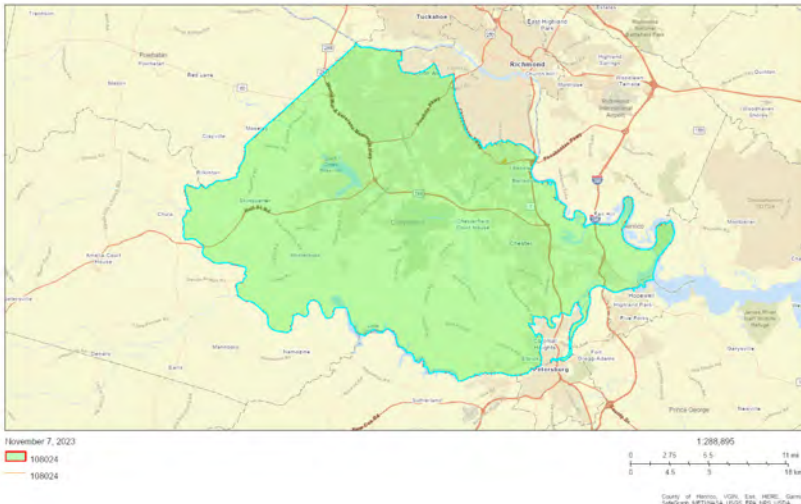
Environmental Justice Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Chesterfield Y County, VA

County: Chesterfield
Population: 359,798
Area in square miles: 437.00

A3 Landscape



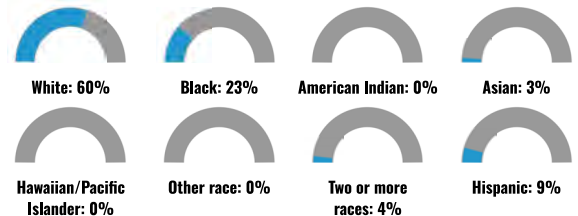
COMMUNITY INDICATORS



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	87%
Spanish	8%
French, Haitian, or Cajun	1%
Other Indo-European	1%
Total Non-English	13%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

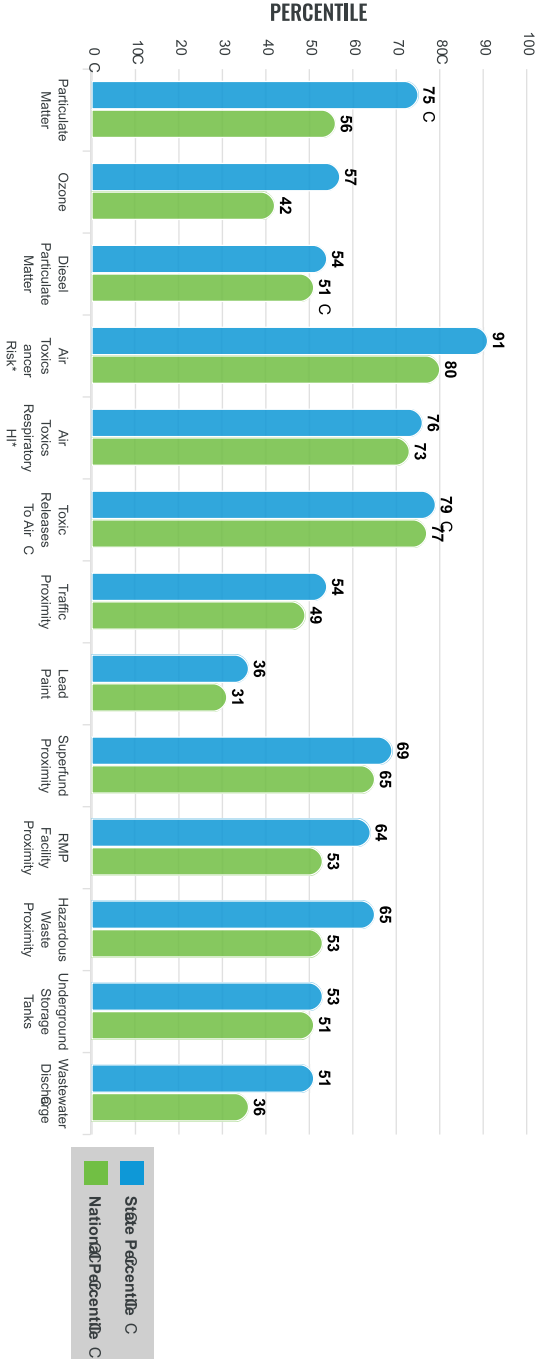
Environmental Justice & Supplemental Indexes

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J I D O X S C

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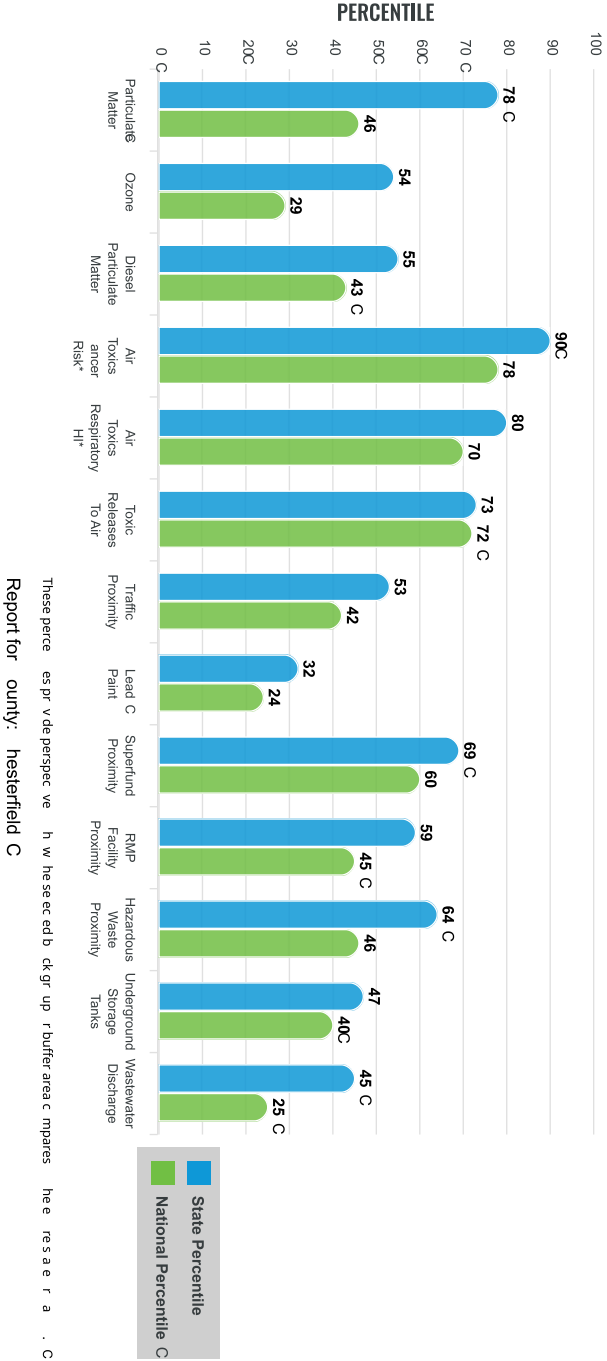
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.17	7.53	78	8.08	49
Ozone (ppb)	58.7	59.1	50	61.6	29
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.184	0.209	45	0.261	41
Air Toxics Cancer Risk* (lifetime risk per million)	36	29	26	25	52
Air Toxics Respiratory HI*	0.39	0.33	9	0.31	31
Toxic Releases to Air	9,800	4,300	88	4,600	92
Traffic Proximity (daily traffic count/distance to road)	66	150	52	210	46
Lead Paint (% Pre-1960 Housing)	0.059	0.22	35	0.3	28
Superfund Proximity (site count/km distance)	0.12	0.11	78	0.13	73
RMP Facility Proximity (facility count/km distance)	0.27	0.21	81	0.43	65
Hazardous Waste Proximity (facility count/km distance)	0.67	0.61	76	1.9	54
Underground Storage Tanks (count/km ²)	1.1	1.9	52	3.9	49
Wastewater Discharge (toxicity-weighted concentration/m distance)	0.0002	7.2	59	22	35
SOCIOECONOMIC INDICATORS					
Demographic Index	29%	31%	52	35%	49
Supplemental Demographic Index	10%	12%	44	14%	35
People of Color	40%	38%	57	39%	58
Low Income	18%	25%	44	31%	34
Unemployment Rate	5%	5%	63	6%	56
Limited English Speaking Households	2%	2%	74	5%	66
Less Than High School Education	7%	10%	51	12%	47
Under Age 5	6%	6%	61	6%	60
Over Age 64	15%	17%	49	17%	48
Low Life Expectancy	17%	20%	19	20%	21

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	1
Hazardous Waste, Treatment, Storage, and Disposal Facilities	21
Water Dischargers	117
Air Pollution	
.	220
Brownfields	0
Toxic Release Inventory	48

Other community features within defined area:

Schools	72
Hospitals	3
Places of Worship	89

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for County: Chesterfield w

ES&S Environmental Health & Safety vs. Local, State, and National Indicators

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	17%	20%	19	20%	21
Heart Disease	4.9	5.5	40	6.1	26
Asthma	9.7	9.6	52	10	43
Cancer	6.1	6.1	45	6.1	45
Persons with Disabilities	11.8%	12.6%	50	13.4%	45

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	5%	9%	51	12%	44
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	8%	13%	45	14%	38
Lack of Health Insurance	8%	8%	55	9%	55
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Footnotes

Reference County: Chesapeake

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Lakeside, VA J

0.5 miles Ring around the Corridor

Population: 4,767

Area in square miles: 1.26



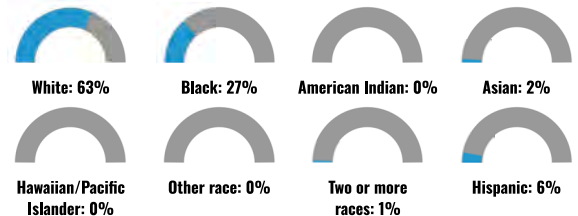
COMMUNITY INDIJATI



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	87%
Spanish	8%
Other Indo-European	1%
Vietnamese	2%
Other Asian and Pacific Island	1%
Arabic	1%
Total Non-English	13%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN NJ



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

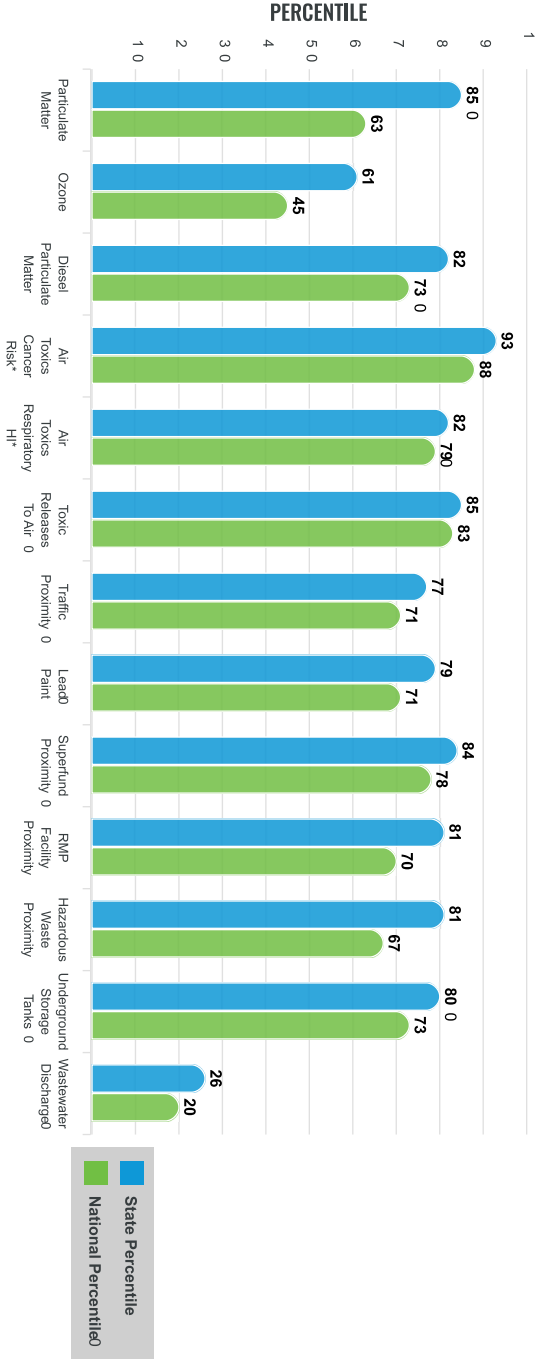
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the [EJScreen website](#).

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

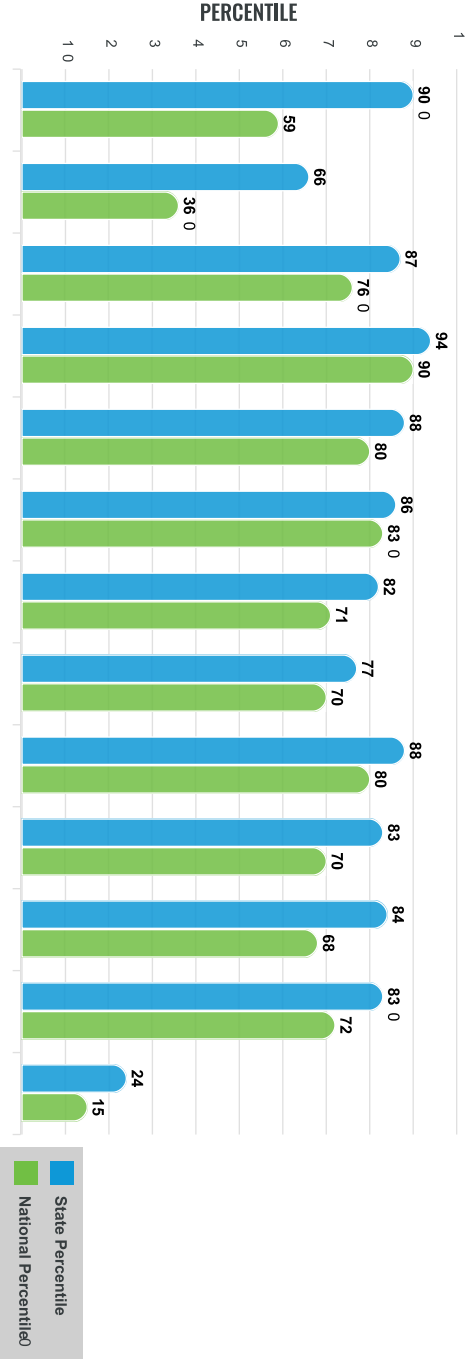
EJ INDEXES FOR THE SELECTED LOCATION



E E E

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide a perspective on how the selected buffer area compares to other areas in the state.

Report for .5 miles Ring around the Corridor

EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.3	7.53	90	8.08	52
Ozone (ppb)	58.6	59.1	48	61.6	28
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.354	0.209	88	0.261	77
Air Toxics Cancer Risk* (lifetime risk per million)	40	29	89	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	16,000	4,300	93	4,600	95
Traffic Proximity (daily traffic count/distance to road)	310	150	87	210	84
Lead Paint (% Pre-1960 Housing)	0.6	0.22	90	0.3	80
Superfund Proximity (site count/km distance)	0.23	0.11	92	0.13	88
RMP Facility Proximity (facility count/km distance)	0.4	0.21	87	0.43	72
Hazardous Waste Proximity (facility count/km distance)	1.3	0.61	86	1.9	65
Underground Storage Tanks (count/km ²)	4.7	1.9	88	3.9	76
Wastewater Discharge (toxicity-weighted concentration/m distance)	3.4E-06	7.2	19	22	12
SOCIOECONOMIC INDICATORS					
Demographic Index	35%	31%	64	35%	58
Supplemental Demographic Index	13%	12%	62	14%	53
People of Color	37%	38%	53	39%	56
Low Income	33%	25%	69	31%	59
Unemployment Rate	4%	5%	56	6%	48
Limited English Speaking Households	0%	2%	0	5%	57
Less Than High School Education	6%	10%	45	12%	41
Under Age 5	6%	6%	61	6%	61
Over Age 64	17%	17%	58	17%	57
Low Life Expectancy	24%	20%	87	20%	86

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	0
Air Pollution	3
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	4

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	No
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring around the Corridor w

Essential Environmental and Socioeconomic Indicator Data

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	24%	20%	87	20%	86
Heart Disease	8.5	5.5	91	6.1	88
Asthma	9.6	9.6	49	10	40
Cancer	9.3	6.1	98	6.1	97
Persons with Disabilities	19.4%	12.6%	85	13.4%	84

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	5%	9%	49	12%	43
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	11%	13%	55	14%	51
Lack of Health Insurance	11%	8%	76	9%	72
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	No	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Footnotes

Refer to 0.5 miles Ring around the Community



EJS Green Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

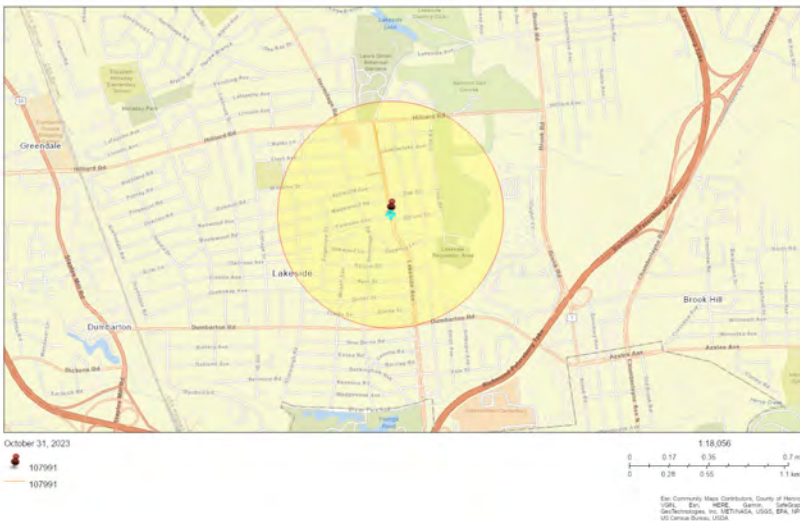
Lakeside, VA J

0.5 miles Ring Centered at 37.610919,-77.469421

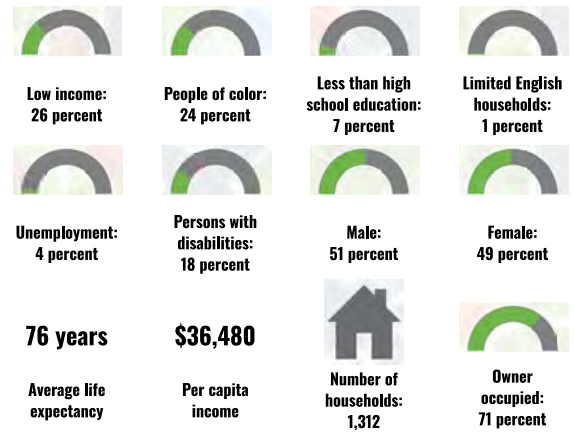
Population: 2,879

Area in square miles: 0.79

A3 Landscape



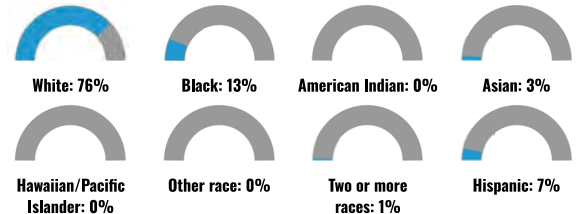
COMMUNITY INDICATORS



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	88%
Spanish	7%
Other Indo-European	1%
Vietnamese	2%
Other Asian and Pacific Island	1%
Arabic	1%
Total Non-English	12%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

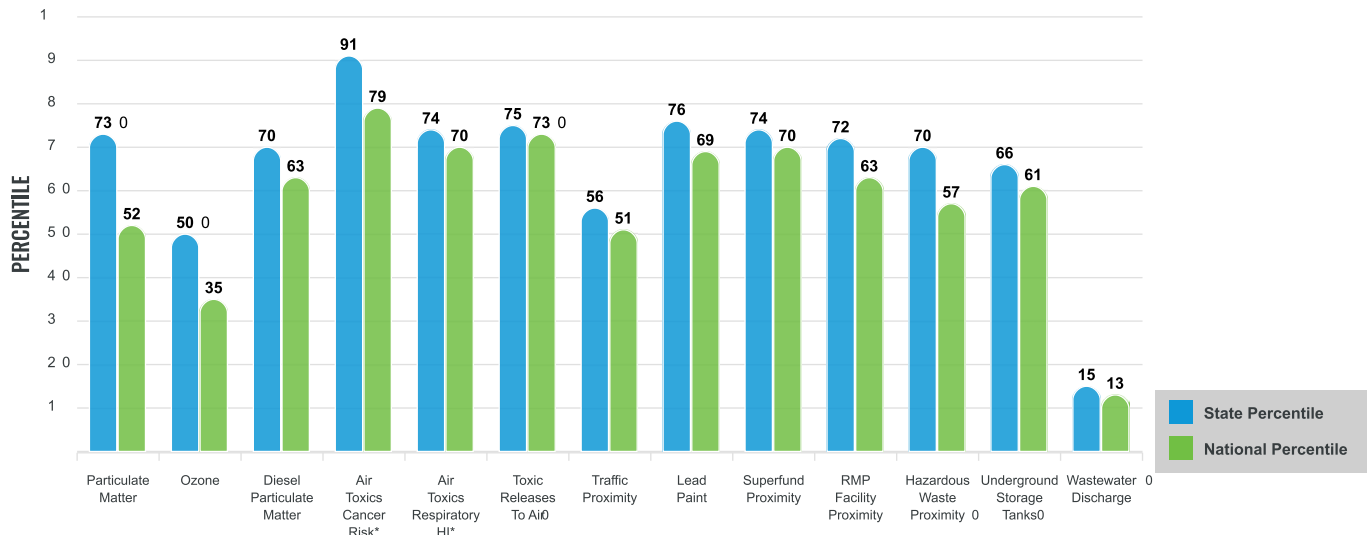
Environmental Justice & Supplemental Indexes 0

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the [EJScreen website](#).

EJ INDEXES 0

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

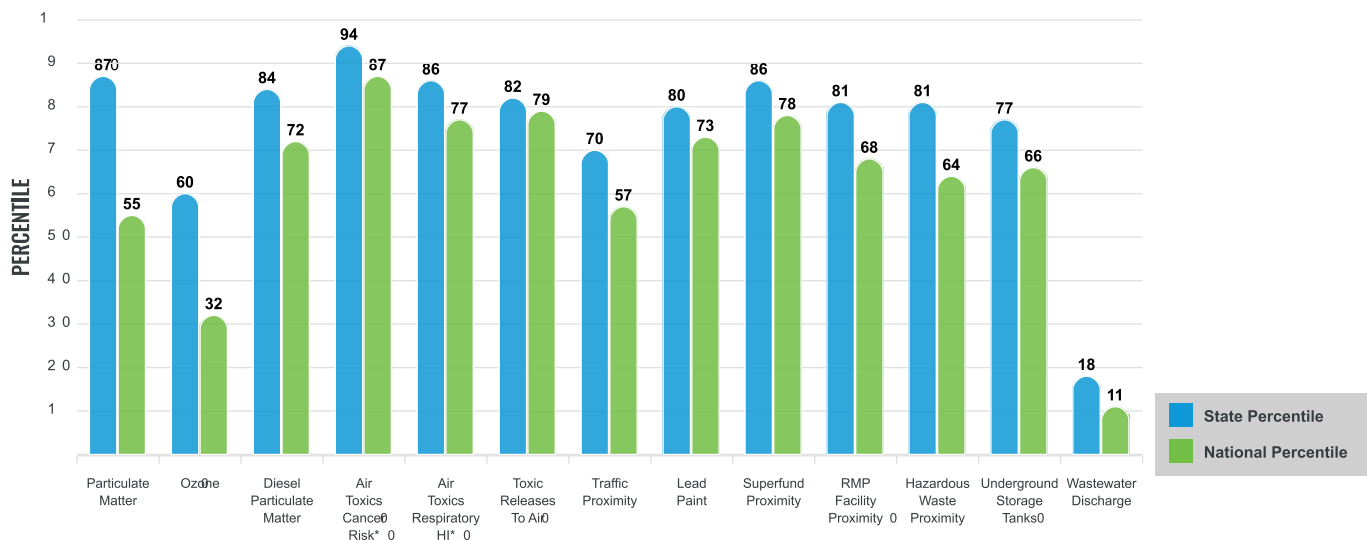
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES 0

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide perspective on how the selected background buffer area compares to the rest of the state.

Report for .5 miles Ring Centered at 37.61919,-77.469421

EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.3	7.53	90	8.08	52
Ozone (ppb)	58.6	59.1	48	61.6	28
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.352	0.209	88	0.261	77
Air Toxics Cancer Risk* (lifetime risk per million)	40	29	89	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	15,000	4,300	93	4,600	95
Traffic Proximity (daily traffic count/distance to road)	120	150	68	210	62
Lead Paint (% Pre-1960 Housing)	0.72	0.22	94	0.3	87
Superfund Proximity (site count/km distance)	0.26	0.11	93	0.13	89
RMP Facility Proximity (facility count/km distance)	0.47	0.21	89	0.43	75
Hazardous Waste Proximity (facility count/km distance)	1.2	0.61	86	1.9	65
Underground Storage Tanks (count/km ²)	3.7	1.9	82	3.9	71
Wastewater Discharge (toxicity-weighted concentration/m distance)	2.5E-06	7.2	17	22	11
SOCIOECONOMIC INDICATORS					
Demographic Index	25%	31%	43	35%	42
Supplemental Demographic Index	12%	12%	56	14%	46
People of Color	24%	38%	37	39%	43
Low Income	26%	25%	59	31%	48
Unemployment Rate	4%	5%	56	6%	49
Limited English Speaking Households	1%	2%	64	5%	58
Less Than High School Education	7%	10%	47	12%	44
Under Age 5	5%	6%	49	6%	48
Over Age 64	17%	17%	58	17%	57
Low Life Expectancy	23%	20%	80	20%	79

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	0
Air Pollution	1
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	3

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	No
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring Centered at 37.610919,-77.469421 w

EJS ,ree , E ,vir , me tal a ,d S , i e , mi l di ,at rs Data ,

HEALTH INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	23%	20%	80	20%	79
Heart Disease	7.6	5.5	82	6.1	77
Asthma	9.5	9.6	49	10	40
Cancer	8.5	6.1	93	6.1	92
Persons with Disabilities	18%	12.6%	81	13.4%	79

CLIMATE INDICATORS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	7%	9%	63	12%	55
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	12%	13%	55	14%	51
Lack of Health Insurance	12%	8%	79	9%	75
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	No	N/A	N/A	N/A	N/A
Food Desert	No	N/A	N/A	N/A	N/A

Footnotes ,

Re f 0.5 miles Ring Cen e ed a 37.610919 -77.469421,

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

East Highland Park, R VA

0.5 miles Ring around the Corridor

Population: 4,513

Area in square miles: 1.22

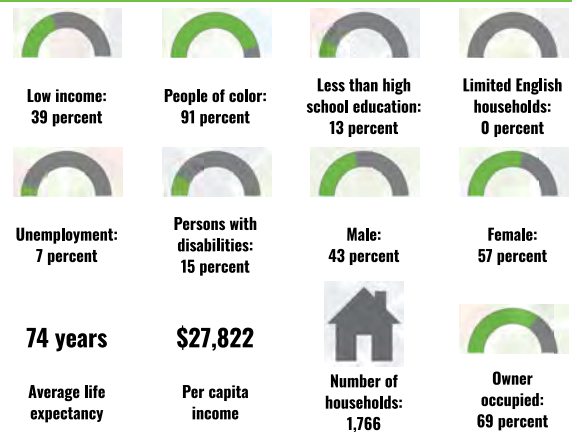
A3 Landscape



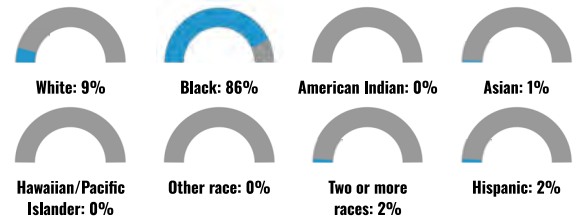
LANGUAGES SPOKEN AT H E R

LANGUAGE	PERCENT
English	98%
Other Indo-European	2%
Total Non-English	2%

COMMUNITY INDEPENDENTI



BREAKDOWN BY RACE



BREAKDOWN BY AGER



LIMITED ENGLISH SPEAKING BREAKDOWN NR



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control. **R**

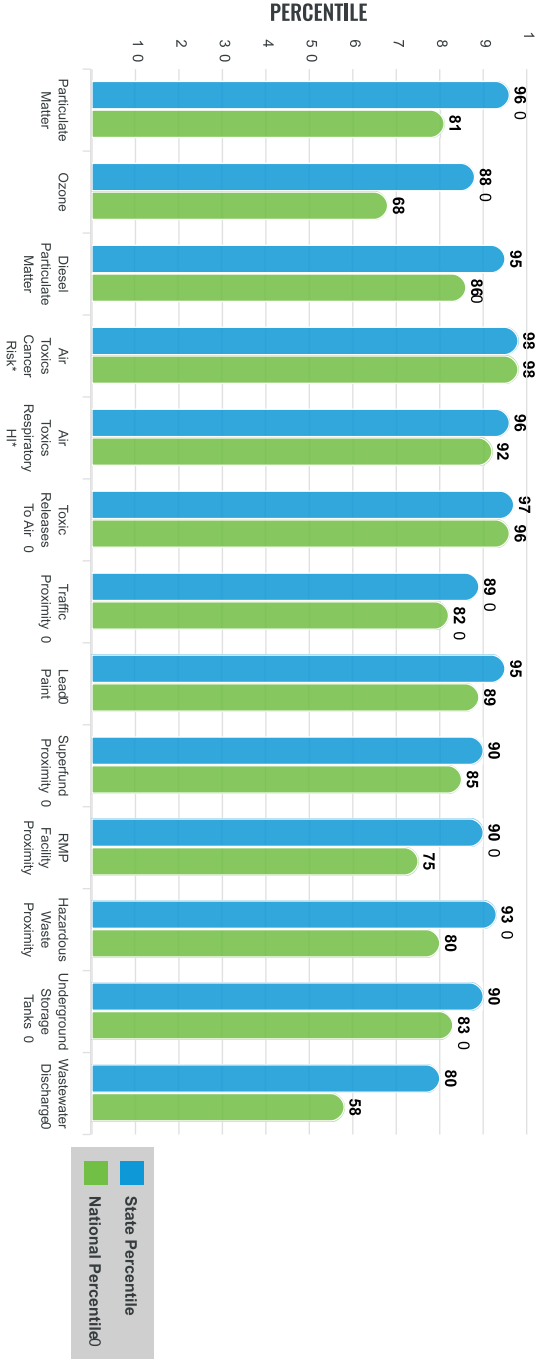
Environmental Justice & Supplemental Indexes

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EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

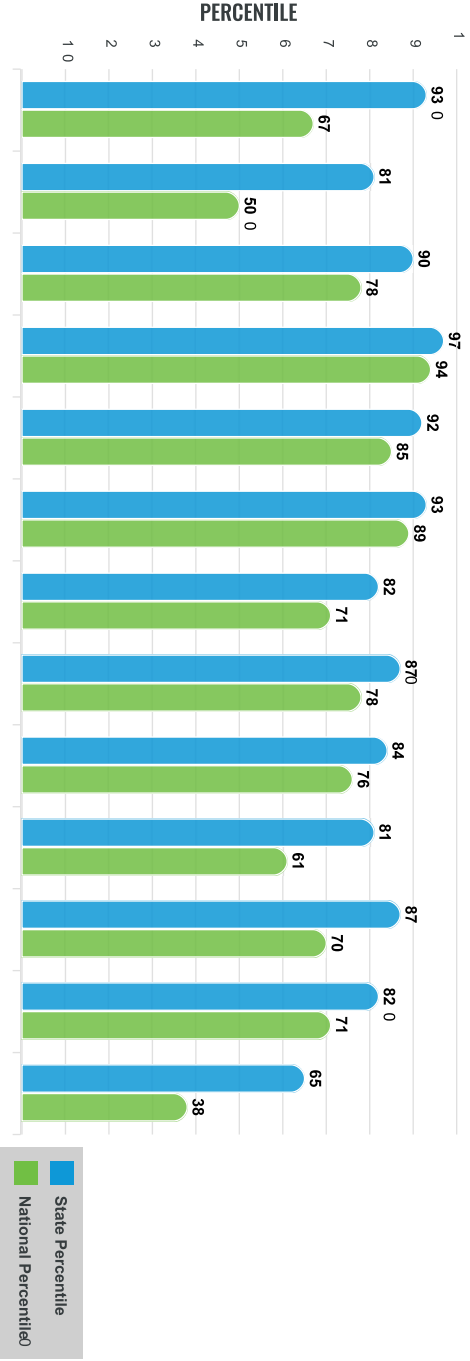
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



These percentiles provide a perspective on how the selected location compares to other locations in the state and nation. Report for .5 miles Ring around the Corridor

EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.25	7.53	83	8.08	51
Ozone (ppb)	59.2	59.1	56	61.6	33
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.295	0.209	79	0.261	67
Air Toxics Cancer Risk* (lifetime risk per million)	50	29	97	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	36,000	4,300	97	4,600	97
Traffic Proximity (daily traffic count/distance to road)	120	150	68	210	62
Lead Paint (% Pre-1960 Housing)	0.48	0.22	84	0.3	72
Superfund Proximity (site count/km distance)	0.084	0.11	63	0.13	61
RMP Facility Proximity (facility count/km distance)	0.15	0.21	65	0.43	45
Hazardous Waste Proximity (facility count/km distance)	0.72	0.61	77	1.9	55
Underground Storage Tanks (count/km ²)	2.2	1.9	68	3.9	60
Wastewater Discharge (toxicity-weighted concentration/m distance)	3.9E-05	7.2	41	22	24
SOCIOECONOMIC INDICATORS					
Demographic Index	65%	31%	93	35%	86
Supplemental Demographic Index	16%	12%	77	14%	67
People of Color	91%	38%	95	39%	89
Low Income	39%	25%	76	31%	67
Unemployment Rate	7%	5%	75	6%	68
Limited English Speaking Households	0%	2%	0	5%	0
Less Than High School Education	13%	10%	71	12%	66
Under Age 5	5%	6%	50	6%	50
Over Age 64	14%	17%	47	17%	45
Low Life Expectancy	24%	20%	88	20%	87

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	0
Air Pollution	4
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	6

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring around the Corridor w

Essential Environmental Indicators Data

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	24%	20%	88	20%	87
Heart Disease	6.5	5.5	68	6.1	60
Asthma	12.2	9.6	95	10	92
Cancer	5.6	6.1	38	6.1	37
Persons with Disabilities	14.5%	12.6%	65	13.4%	62

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	3%	9%	26	12%	27
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS					
INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	19%	13%	72	14%	71
Lack of Health Insurance	6%	8%	44	9%	46
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Footnotes

Refer to 0.5 miles Ring around the City



EJS Free RCommunity Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

East Highland Park, VA

0.5 miles Ring Centered at 37.573588,-77.395598

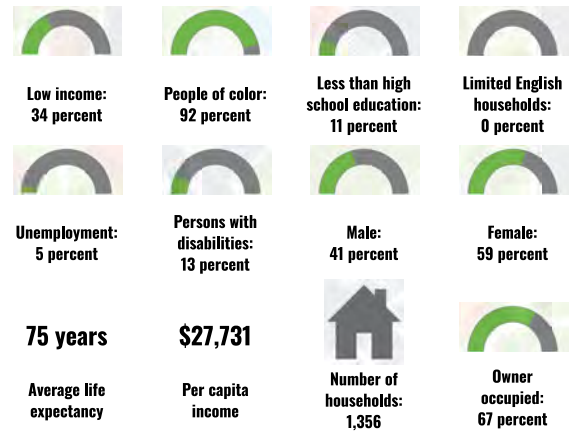
Population: 3,360

Area in square miles: 0.79

A3 Landscape



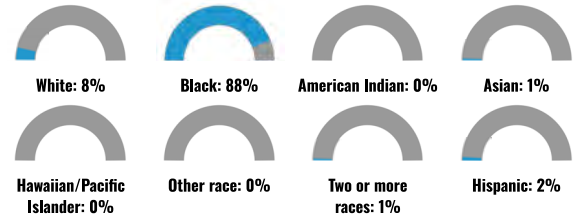
COMMUNITY INDICATORS



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	97%
Other Indo-European	1%
Other and Unspecified	1%
Total Non-English	3%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control. R

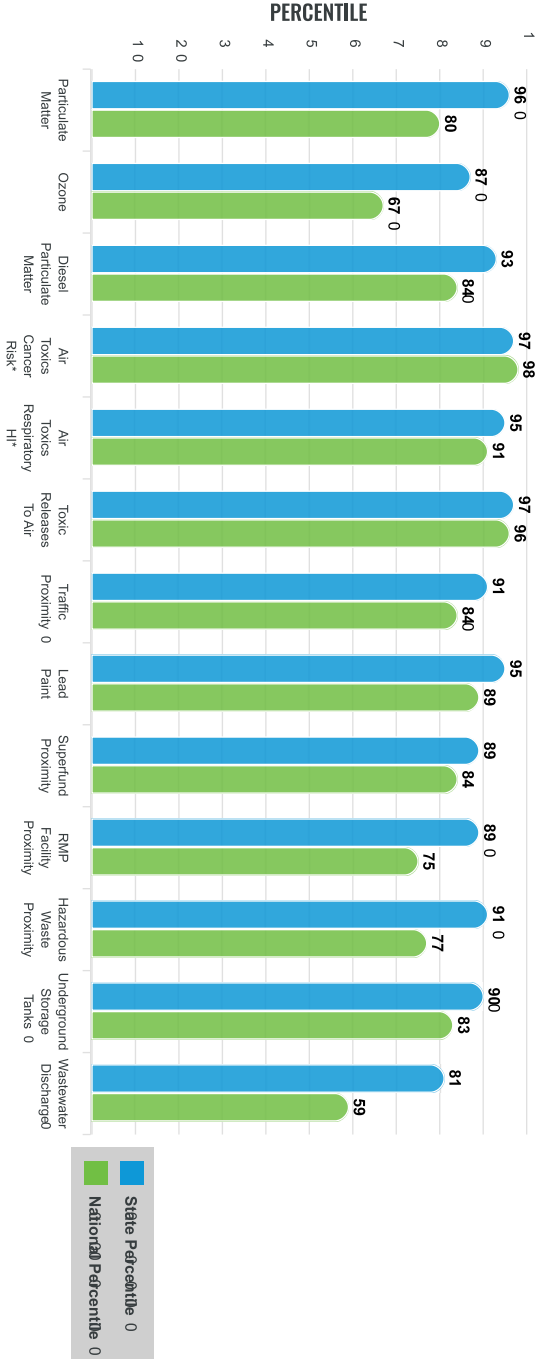
Environmental Justice & Supplemental Indexes

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EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

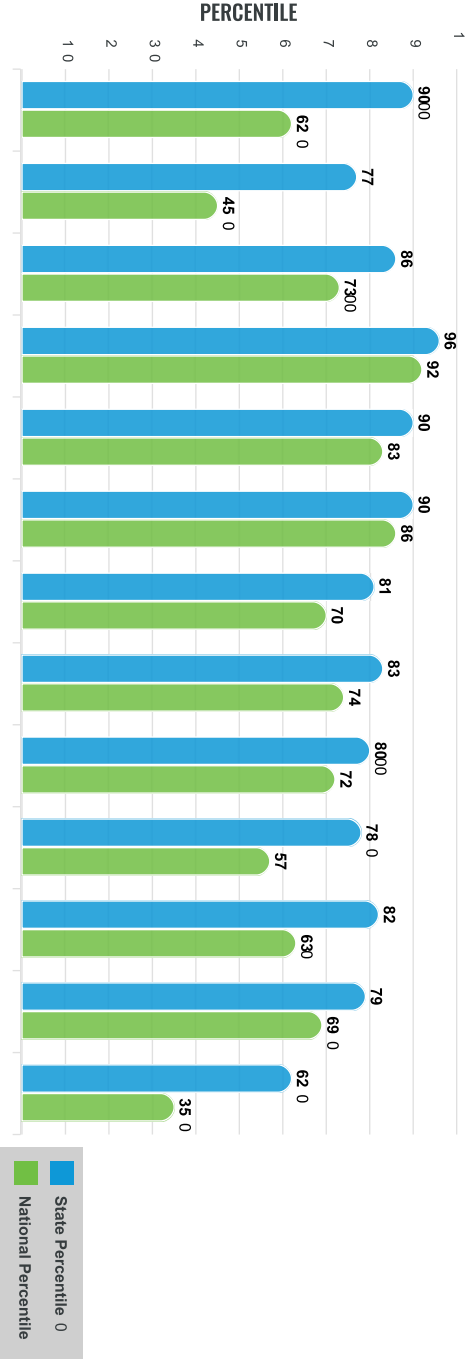
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	8.24	7.53	82	8.08	51
Ozone (ppb)	59.1	59.1	55	61.6	32
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	0.283	0.209	76	0.261	65
Air Toxics Cancer Risk* (lifetime risk per million)	52	29	97	25	94
Air Toxics Respiratory HI*	0.4	0.33	62	0.31	70
Toxic Releases to Air	36,000	4,300	97	4,600	97
Traffic Proximity (daily traffic count/distance to road)	160	150	74	210	68
Lead Paint (% Pre-1960 Housing)	0.48	0.22	84	0.3	72
Superfund Proximity (site count/km distance)	0.084	0.11	63	0.13	60
RMP Facility Proximity (facility count/km distance)	0.15	0.21	66	0.43	45
Hazardous Waste Proximity (facility count/km distance)	0.55	0.61	72	1.9	51
Underground Storage Tanks (count/km ²)	2.4	1.9	71	3.9	62
Wastewater Discharge (toxicity-weighted concentration/m distance)	4.4E-05	7.2	43	22	25
SOCIOECONOMIC INDICATORS					
Demographic Index	63%	31%	92	35%	85
Supplemental Demographic Index	15%	12%	69	14%	60
People of Color	92%	38%	96	39%	90
Low Income	34%	25%	70	31%	61
Unemployment Rate	5%	5%	68	6%	61
Limited English Speaking Households	0%	2%	0	5%	0
Less Than High School Education	11%	10%	64	12%	60
Under Age 5	5%	6%	50	6%	49
Over Age 64	15%	17%	48	17%	47
Low Life Expectancy	23%	20%	83	20%	83

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	0
Water Dischargers	0
Air Pollution	5
Brownfields	0
Toxic Release Inventory	0

Other community features within defined area:

Schools	0
Hospitals	0
Places of Worship	4

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 0.5 miles Ring Centered at 37.573588,-77.395598 w

Health Indicators					
Indicator	Health Value	State Average	State Percentile	US Average	US Percentile
Low Life Expectancy	23%	20%	83	20%	83
Heart Disease	5.9	5.5	59	6.1	48
Asthma	11.7	9.6	92	10	88
Cancer	5.5	6.1	36	6.1	35
Persons with Disabilities	12.8%	12.6%	55	13.4%	51

Climate Indicators					
Indicator	Health Value	State Average	State Percentile	US Average	US Percentile
Flood Risk	2%	9%	20	12%	22
Wildfire Risk	0%	2%	0	14%	0

Critical Service Gaps					
Indicator	Health Value	State Average	State Percentile	US Average	US Percentile
Broadband Internet	20%	13%	74	14%	74
Lack of Health Insurance	6%	8%	40	9%	42
Housing Burden	No	N/A	N/A	N/A	N/A
Transportation Access	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Focus 9

Re f 0.5 miles Ring Cen e ed a 37.573588,-77.3 55 8 9



EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

XX o

County: Henrico
Population: 331,924
Area in square miles: 244.85

A3 Landscape



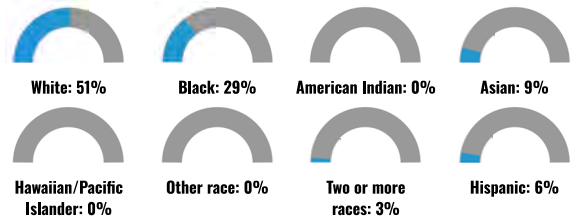
COMMUNITY INFORMATION



LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	85%
Spanish	4%
Russian, Polish, or Other Slavic	1%
Other Indo-European	3%
Chinese (including Mandarin, Cantonese)	1%
Vietnamese	1%
Other Asian and Pacific Island	3%
Arabic	1%
Other and Unspecified	1%
Total Non-English	15%

BREAKDOWN BY RACE



BREAKDOWN BY AGE



LIMITED ENGLISH SPEAKING BREAKDOWN



Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race. Source: U.S. Census Bureau, American Community Survey (ACS) 2017-2021. Life expectancy data comes from the Centers for Disease Control.

Environment | Justice & Supplement | Indexes | County

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the [EJScreen website](#).

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low-income, percent linguistically isolated, percent less than high school education, percent unemployed, and low life expectancy with a single environmental indicator.

These percentages provide perspective on how the selected background buffer area compares to the rest of the state or nation.

Report for County: Henrico

EJScreen Environmental and Socioeconomic Indicators Data w

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
POLLUTION AND SOURCES					
Particulate Matter ($\mu\text{g}/\text{m}^3$)	XX	XX	XX	XX	XX
Ozone (ppb)	XX	XX	XX	XX	XX
Diesel Particulate Matter ($\mu\text{g}/\text{m}^3$)	XX	XX	XX	XX	XX
Air Toxics Cancer Risk* (lifetime risk per million)	XX	XX	XX	XX	XX
Air Toxics Respiratory HI*	XX	XX	XX	XX	XX
Toxic Releases to Air	XX	XX	XX	XX	XX
Traffic Proximity (daily traffic count/distance to road)	XX	XX	XX	XX	XX
Lead Paint (% Pre-1960 Housing)	XX	XX	XX	XX	XX
Superfund Proximity (site count/km distance)	XX	XX	XX	XX	XX
RMP Facility Proximity (facility count/km distance)	XX	XX	XX	XX	XX
Hazardous Waste Proximity (facility count/km distance)	XX	XX	XX	XX	XX
Underground Storage Tanks (count/km ²)	XX	XX	XX	XX	XX
Wastewater Discharge (toxicity-weighted concentration/m distance)	XX	XX	XX	XX	XX
SOCIOECONOMIC INDICATORS					
Demographic Index	XX%	XX%	XX	XX%	XX
Supplemental Demographic Index	XX%	XX%	XX	XX%	XX
People of Color	XX%	XX%	XX	XX%	XX
Low Income	XX%	XX%	XX	XX%	XX
Unemployment Rate	XX%	XX%	XX	XX%	XX
Limited English Speaking Households	XX%	XX%	XX	XX%	XX
Less Than High School Education	XX%	XX%	XX	XX%	XX
Under Age 5	XX%	XX%	XX	XX%	XX
Over Age 64	XX%	XX%	XX	XX%	XX
Low Life Expectancy	XX%	XX%	XX	XX%	XX

*Diesel particulate matter, air toxics cancer risk, and air toxics respiratory hazard index are from the EPA's Air Toxics Data Update. It is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. Cancer risks and hazard indices from the Air Toxics Data Update are reported to one significant figure and any additional significant figures here are due to rounding. More information on the Air Toxics Data Update can be found at: <https://www.epa.gov/haps/air-toxics-data-update>.

Sites reporting to EPA within defined area:

Superfund	XX
Hazardous Waste, Treatment, Storage, and Disposal Facilities	XX
Water Dischargers	XX
Air Pollution	XX
Brownfields	XX
Toxic Release Inventory	XX

Other community features within defined area:

Schools	XX
Hospitals	XX
Places of Worship	XX

Other environmental data:

Air Non-attainment	XX
Impaired Waters	XX

Selected location contains American Indian Reservation Lands*	XX
Selected location contains a "Justice40 (CEJST)" disadvantaged community	XX
Selected location contains an EPA IRA disadvantaged community	XX

Report for County: Henrico w

EJScreen Environmental and Socioeconomic Indicator Data

HEALTH INDICATORS

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	18%	20%	31	20%	33
Heart Disease	5	5.5	40	6.1	26
Asthma	9.4	9.6	42	10	33
Cancer	6.2	6.1	47	6.1	48
Persons with Disabilities	11.4%	12.6%	48	13.4%	42

CLIMATE INDICATORS

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	4%	9%	42	12%	38
Wildfire Risk	0%	2%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	HEALTH VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	10%	13%	53	14%	48
Lack of Health Insurance	7%	8%	50	9%	51
Housing Burden	XX	N/A	N/A	N/A	N/A
Transportation Access	XX	N/A	N/A	N/A	N/A
Food Desert	XX	N/A	N/A	N/A	N/A

Footnotes

Revised County: Henrico