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Draft Environmental Impact Statement for Washington Union Station Expansion Project

Appendix C2 - Affected Environment Technical Report

U.S. Department of Transportation
Federal Railroad Administration

July 20, 2018 (Updated April 2019 and April 2020)

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Acronyms and Abbreviations

AADT	Average Annual Daily Traffic
AAI	All Appropriate Inquiries
ACHP	Advisory Council on Historic Preservation
ACM	Asbestos Containing Material
ACS	American Community Survey
ADA	Americans with Disabilities Act
AHERA	Asbestos Hazard Emergency Response Action
AOC	Architect of the Capitol
APC	Automatic Passenger Count
APD	Amtrak Police
APE	Area of Potential Effect
APS	Accessible Pedestrian Signal
AST	Above Storage Tank
ASTM	American Society for Testing Materials
BMP	Best Management Practice
BTU	British Thermal Unit
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CCTV	Closed-Circuit Television
CFA	Commission of Fine Arts
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CERCLIS	Comprehensive Emergency Response, Compensation, and Liability Information System

CH_4	Methane
CID	Community Improvement District
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CORRACTS	Corrective Action
CWA	Clean Water Act
CWR	Continuously Welded Rail
CZMA	Coastal Zone Management Act
D	Downtown
dBA	A-weighted sound level / decibel notation
dBV	Vibration expressed as decibel
DC	District of Columbia
DC Inventory	District of Columbia Inventory of Historic Sites
DCMR	District of Columbia Municipal Regulations
DCFD	DC Fire Department
DC GIS	District of Columbia Geographic Information System
DCOP	DC Office of Planning
DCPR	DC Parks and Recreation
DCPS	DC Public Schools
DC WASA	District of Columbia Water and Sewer Authority
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DDOT	District Department of Transportation
DEIS	Draft Environmental Impact Statement
DHS	Department of Homeland Security
DO-12	Director's Order 12
DOE	Determination of Eligibility

DOEE	District Department of Energy and Environment
DOH	District Department of Health
ECC	Energy Conservation Code
E. coli	*Escherichia coli*
EIS	Environmental Impact Statement
EISA	Energy Independence and Security Act
EJ	Environmental Justice
EMS	Emergency Management Services
EMU	Electric Multiple Unit
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
EPA	Environmental Protection Agency
ERNS	Emergency Response Notification System
ESA	Endangered Species Act
EUI	Energy Use Intensity
FAR	Floor Area Ratio
FBI	Federal Bureau of Investigation
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FINDS	Facility Index System
FMCSA	Federal Motor Carrier Safety Administration
FOIA	Freedom of Information Act
FPS	Federal Protective Services
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GDP	Gross Domestic Product
GHG	Greenhouse gas
GIS	Geographic Information System

gpd	Gallons per Day
GPO	Government Publishing Office
GSA	General Services Administration
HAP	Hazardous Air Pollutants
HCM	*Highway Capacity Manual*
HHS	United States Department of Health and Human Services
HSEMA	Homeland Security and Emergency Management Agency
HPP	Historic Preservation Plan
HVAC	Heating, Ventilation, and Air Conditioning
HUST	Historical Underground Storage Tank
Hz	Hertz
IPaC	Information for Planning and Conservation
IPCC	Intergovernmental Panel on Climate Change
IRIS	Integrated Risk Information System
kWh	Kilowatt hours
Ldn	Day-night average level
LEED	Leadership in Energy and Environmental Design
Leq	Energy-equivalent level
LCT	Loudoun County Transit
LIDAR	Light Detection and Ranging
Lmax	Maximum A-weighted Level
LOD	Limit of Disturbance
LOS	Level of Service
LRT	Light Rail Transit
LTCP	Long-Term Control Plan
LUST	Leaking Underground Storage Tank
MARC	Maryland Area Regional Commuter
MBTA	Migratory Bird Treaty Act of 1918

MBT	Metropolitan Branch Trail
MGD	Million Gallons per Day
MMBtus	Million British Thermal Units
MOA	Memorandum of Agreement
MODF	Mineral Oil Dielectric Fluid
MPD	Metropolitan Police Department
mph	Miles per Hour
MPO	Metropolitan Planning Organization
MWCOG	Metropolitan Washington Council of Governments
MSAT	Mobile Source Air Toxics
MS4	Municipal Separate Storm Sewer System
MTA	Maryland Transit Administration
MU	Mixed Use
MWh	Megawatt Hours
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NAICS	North American Industry Classification System
NATA	National Air Toxics Assessment
NAVD88	North American Vertical Datum of 1988
NCA	National Climate Assessment
NCPC	National Capital Planning Commission
NEBT	Northeast Boundary Tunnel
NEC	Northeast Corridor
NEPA	National Environmental Policy Act
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFRAP	No Further Remedial Action Planned
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration

NoMa	North of Massachusetts Avenue
NO_x	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NPS	National Park Service
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWS	National Weather Service
O_3	Ozone
OHM	Oil and Hazardous Materials
OSHA	Occupational Health and Safety Administration
PAH	Polycyclic aromatic hydrocarbon
Pb	Lead
PCB	Polychlorinated Biphenyl
PDR	Production, Distribution, Repair
PIVS	Property Information Verification System
$PM_{2.5}$	Particulate matter sized 2.5 micrometers or less
PM_{10}	Particulate Matter sized 10 micrometers or less
ppb	Parts per Billion
PPE	Personal Protective Equipment
ppm	Parts per Million
PSA	Police Service Area
PUD	Planned Urban District
RCRA	Resource Conservation and Recovery Act
RCRA-CESQG	Resource Conservation and Recovery Act-Conditional Exempt Small Quantity Generator
RF	Residential Flat
REA	Railway Express Agency

ROW	Right of Way
SDWA	Safe Drinking Water Act
SEL	Sound Exposure Level
SEMS	Safety and Environmental Management System
SHPO	State Historic Preservation Officer
SIP	State Implementation Plan
SLOSH	Sea, Lake, and Overland Surges from Hurricanes
SPCC	Spills Prevention, Control and Countermeasures
SSG	Sustainable Solutions Group
SO_2	Sulfur Dioxide
SOx	Sulfur Oxides
SWRv	Stormwater Retention Volume
TDM	Transportation Demand Management
The District	Washington, D.C.
The Station	Washington Union Station
The Project	Washington Union Station Expansion Project
TMDL	Total Maximum Daily Load
TNC	Transportation Networking Companies
TNM	Traffic Noise Model
TSA	Transportation Security Administration
TSCA	Toxic Substances Control Act
TSD	Treated, Stored, and Disposed
TTS	Total Suspended Solids
UCR	Uniform Crime Reporting
U.S.	United States
USDOT	United States Department of Transportation
USC	United States Code
USG	Washington Union Station to Georgetown

USGS	United States Geologic Survey
USN	Union Station North
USPG	Union Station Parking Garage
USPP	United States Park Police
USPS	United Stated Postal Service
USRC	Union Station Redevelopment Corporation
USFWS	United States Fish and Wildlife Service
USSS	United States Secret Service
UST	Underground Storage Tank
VCP	Voluntary Cleanup Program
VdB	Vibration Level
VOC	Volatile Organic Compound
VRE	Virginia Railway Express
VSQG	Very Small Quantity Generator
WIOA	Workforce Innovation and Opportunity Act
WMATA	Washington Metropolitan Area Transit Authority
WUS	Washington Union Station

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1 Introduction

1.1 Introduction

This report describes the existing conditions (Affected Environment) associated with the Washington Union Station (WUS) Expansion Project (the Project). This chapter describes the environment in which the Project would be constructed and operated. Characteristics of the surrounding area provide the Environmental Impact Statement (EIS) reader with the geography, land use, demographics and economics, and the physical and natural environment. The Council on Environmental Quality (CEQ) regulations at 40 Code of Federal Regulations (CFR) § 1502.15 require that an EIS:

"shall succinctly describe the environment of the area(s) to be affected or created by the alternatives under consideration. The descriptions shall be no longer than is necessary to understand the effects of the alternatives. Data and analyses in a statement shall be commensurate with the importance of the impact, with less important material summarized, consolidated, or simply referenced."

The level of information provided in this report for each resource provides the full results of the technical analysis of the Affected Environment, to allow the Federal Railroad Administration (FRA) and the Cooperating Agencies to review the methodology and results of the analysis. As appropriate and as required by the CEQ regulations, this information will be condensed or summarized in the Draft Environmental Impact Statement (DEIS) Affected Environment chapter, proportionate to that resource's potential to be affected by the Project.

The following resource categories are included:

- Natural Ecological Systems
- Water Resources and Water Quality
- Solid Waste Disposal and Hazardous Materials
- Transportation
- Air Quality
- Greenhouse Gas Emissions and Resilience
- Energy Resources
- Land Use, Land Planning, and Property
- Noise and Vibration

- Aesthetics and Visual Quality

- Cultural Resources

- Parks and Recreation Areas

- Social and Economic

- Public Safety and Security

- Public Health, Elderly, and Persons with Disabilities

- Environmental Justice

1.1.1   WUS Expansion Project Overview

The purpose of the Project is to support current and future long-term growth in rail service and operational needs; achieve compliance with the Americans with Disabilities Act (ADA) and emergency egress requirements; facilitate intermodal travel; provide a positive customer experience; enhance integration with the adjacent neighborhoods, businesses, and planned land uses; sustain WUS's economic viability; and support continued preservation and use of the historic station building.

The Project is needed to improve rail capacity, reliability, safety, efficiency, accessibility, and security, for both current and future long-term railroad operations at this historic station.

The Project includes the following program elements:

- Tracks and Platforms – The tracks and platforms provide space for trains and their passengers and are the core function of WUS.

- Buses – Intercity and tour/charter buses are important parts of the programming at WUS.

- Train Hall – A monumental train hall would be an architectural feature to add air and light to the main train concourse and train platforms and is a common feature at large train stations across the globe.

- Parking – Parking has been a component of WUS since the Union Station Redevelopment Act of 1981 and benefits Amtrak and retail users at WUS.

- Concourses and Retail – Concourses provide circulation space for passengers, and retail helps to pay for the maintenance and operations of the station while enhancing the passenger experience.

- Taxi/Shared Ride – For-hire vehicle facilities provide WUS visitors with a range of transportation options.

- Historic Station – The historic station building is a national historic landmark and an important part of the urban fabric of Washington, DC (the District).

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- ▪ Bicycle and Pedestrian Access – Quality bicycle and pedestrian access is essential for a multimodal facility in a downtown environment.

1.2   Study Areas

Covering approximately 53 acres, the Project Area is the direct footprint of the WUS Expansion Project (**Figure 1-1**), which includes all areas that will be disturbed during construction. Study Areas are larger areas that are potentially indirectly affected by the Project and boundaries will vary by environmental resource. The extent of the Study Area is a function of the characteristics of a given resource and the potential scope of impacts on the resource from the Proposed Action and its alternatives. Depending on the resource, a Local Study Area and a larger Regional Study Area may be defined. The impact analysis for the Project uses a single time frame: Planning Year 2040. The baseline year used to assess the Affected Environment is 2017. This year was chosen because the EIS was initiated in 2015 and the majority of existing conditions data was collected in 2017. The baseline conditions presented in this chapter reflect 2017 Existing Conditions or the most recent year for which data are available.

1.3   Affected Environment

The Affected Environment is the existing natural, cultural, and social conditions of an area that are subject to change, both directly and indirectly, as a result of a proposed Federal action. This report uses a wide range of data sources to describe the existing conditions within the Study Area of each resource. The data sources used to describe the existing conditions are summarized for each resource.

Evaluating and documenting existing conditions is a multi-step process that includes:

- ▪ **Regulatory Review** – Identifying Federal, state, and local laws and regulations relevant to the scope and focus of the assessment of existing conditions. Pertinent laws and regulations are identified and described in each resource section of the EIS.

- ▪ **Data Review** – Reviewing the available data sources for the Study Area for each environmental resource to develop an understanding of environmental conditions.

- ▪ **Description of Affected Environment –** Describing the existing conditions within the Study Area for each resource.

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Figure 1-1. Washington Union Station Project Area

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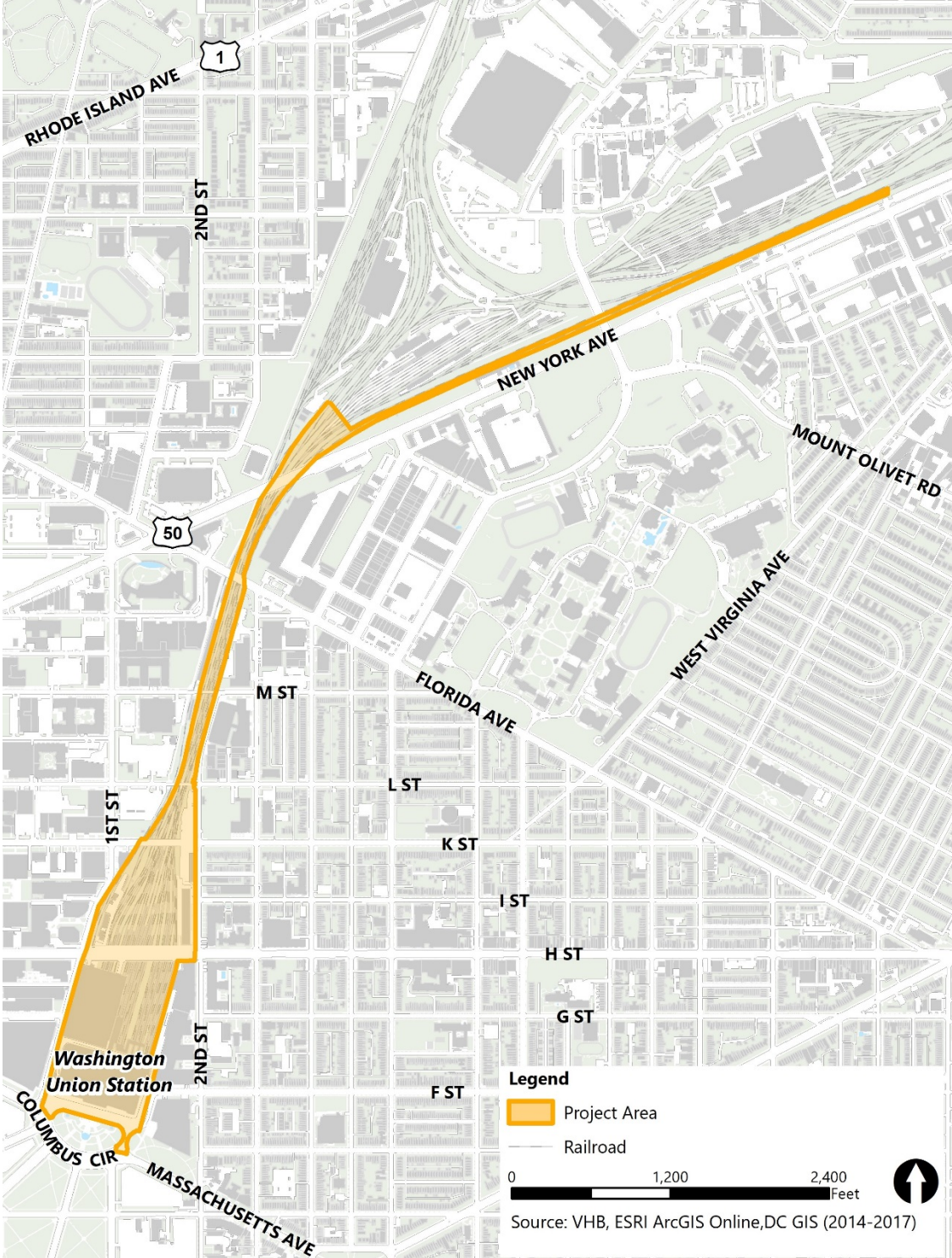
2 Natural Ecological Systems

2.1 Overview

Natural ecological systems include those resources such as vegetation, soils, fish, wildlife, wetlands, surface waters, and floodplains. As part of the Environmental Impact Statement (EIS) process, it is important to inventory these elements of the natural environment in the context of the quality/quantity of the resources and their protection in adherence to applicable laws and regulations. The Study Area for natural ecological systems includes the physical limits of the proposed Project (the Local Study Area) and adjacent lands of sufficient distance to include all locations where secondary impacts to natural ecological systems could occur (Regional Study Area).

Data collection and analysis are intended to document compliance with appropriate laws and regulations protecting natural resources such as wetlands and waters of the United States, threatened and endangered species, floodplains, and coastal zone management areas.

2.2 Regulatory Context and Guidance

Federal policies, regulations and guidance that may pertain to natural ecological resources include:

- Endangered Species Act of 1973 (16 United States Code [USC] 1531) and implementing regulations (50 Code of Federal Regulations [CFR] 402);

- Bald and Golden Eagle Protection Act of 1940 (16 USC 668);

- Migratory Bird Treaty Act of 1918 (16 USC 703-711) and implementing regulations (50 CFR 10);

- Clean Water Act (CWA) (22 USC 1251) and implementing regulations (40 CFR 110-112);

- CWA Section 404 (33 USC 1344) and implementing regulations (33 CFR 320-330, 40 CFR 230);

- Coastal Zone Management Act of 1972 (16 USC 1451-1464).

- Executive Order (EO) 11990, Protection of Wetlands (42 FR 26961);

- EO 11988, Floodplain Management (42 Federal Register [FR] 26951);

- EO 13807, Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure; and

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- ■ Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federally Landscaped Grounds (60 FR 40837).

2.3   Study Area

The Local Study Area related to ecological systems includes the Washington Union Station (WUS) Project Area, as shown in **Figure 1-1** and an area within 150 feet of the Project Area. The Local Study Area includes all areas in which natural resources could be directly or indirectly affected by construction or operation of the Project. This area consists entirely of transportation and building infrastructure with no natural ecosystems. Likewise, properties adjacent to the Project Area that may additionally be considered part of an overall study area include dense, urban uses such as commercial buildings, paved parking areas, streets, high-density residential, and row housing.

The Regional Study Area includes the central area of the District surrounding the Project Area where natural ecological systems may occur and reaching out as far as those areas potentially affected within the immediate drainage area. The adjacent properties making up the Regional Study Area are also absent of any natural ecosystems.

2.4   Methodology

Information available from the Department of Energy and Environment (DOEE), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), and field observations were used to inform the Affected Environment for natural resources.

2.5   Affected Environment

As documented below, there are no natural ecological systems within the Local Study Area.

2.5.1   Wetlands and Waters of the United States

Wetlands and other waters of the United States are defined in the Code of Federal Regulations (33 CFR 328), and generally includes all estuaries, rivers, lakes, tributary streams, and adjacent wetlands. The Local Study Area is fully developed, and there are no surface water bodies or wetlands within the Local Study Area. As confirmed by the National Wetlands Inventory map (**Figure 2-2**), the closest jurisdictional waterbody to WUS is the Tidal Basin and Washington Channel 1.6 miles southwest of the Local Study Area and adjacent to the Potomac River near the Jefferson Memorial. Historically, Tiber Creek once flowed near WUS as shown on a map from 1861 (**Figure 2-3**).

Figure 2-1. Natural Ecological Systems Local Study Area

Figure 2-2. Wetlands Inventory Map for the WUS Study Area

Legend

- Project Area
- Riverine, Tidal, Unconsolidated Bottom (R1UB)
- Open/Recreation Space
- Surface Water
- Railroad

0   2,600   5,200 Feet

Source: VHB, ESRI ArcGIS Online, DC GIS (2014-2016), VGIN (2018)

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Figure 2-3. 1861 Historic Map of Washington Union Station and the Location of Tiber Creek
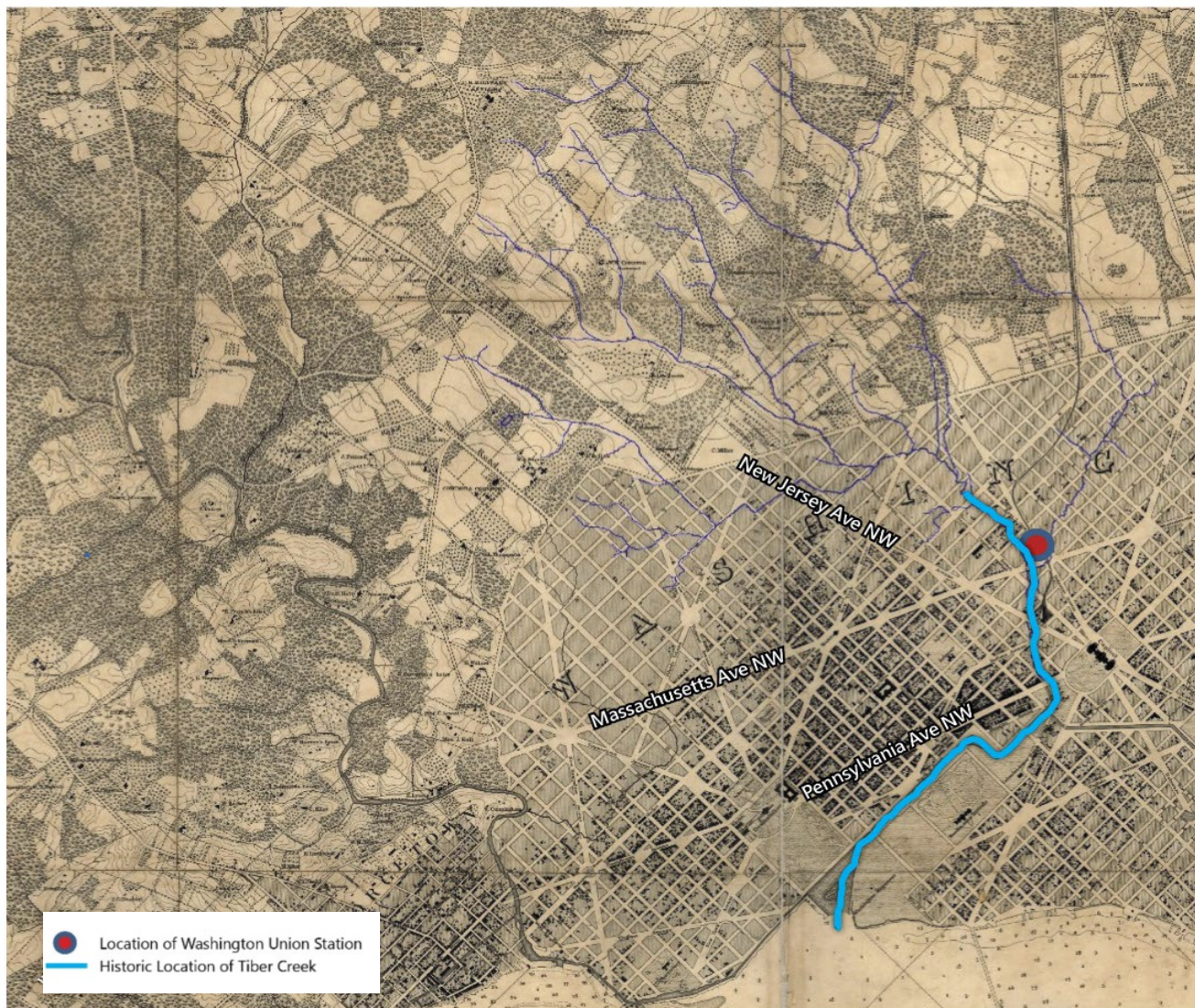
Source: A. Boschke. 1856. Accessed from https://parkviewdc.files.wordpress.com/2011/09/boschke-map-1861.jpg. Accessed on May 3, 2018.

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This creek served as the main stem conveying surface water originating from the watershed covering most of the northeast District. Just downstream from WUS, this channel historically followed a course that is now Louisiana Avenue NW where water eventually discharged into a man-made canal that ran along present-day Madison Drive NW. The canal conveyed the surface water to the Potomac River, where the discharge point was historically located near the present-day Washington Monument. All of Tiber Creek and the canal from the 19th century, near of WUS and downstream, have been filled. Today, water that historically flowed in this channel is now directed into an underground sewer. The former Tiber Creek conduit is not a jurisdictional water of the United States.

2.5.2   Floodplains

A floodplain is defined as any land area susceptible to floodwater inundation from any water source (44 CFR 59). The Federal Emergency Management Agency (FEMA) identifies the 100-year floodplain as the area with a 1.0-percent chance of being inundated by a flood event in any given year. Similarly, FEMA also identifies the 500-year floodplain as the area with a 0.2-percent chance of being inundated by a flood event in any given year. The 100-year and 500-year flood elevations are determined by FEMA and generally used as the baseline for assessing impacts to floodplains.

According to FEMA maps, the nearest 100-year and 500-year flood zones are located approximately 2,200 feet (0.41 mile) southwest of WUS. This area includes eastern portions of the National Mall in front of the U.S. Capitol and along Constitution Avenue where the elevation is less than 12.5 feet North American Vertical Datum of 1988 (NAVD88). The elevation of the Local Study Area ranges between ±50 feet near Columbus Plaza to near 100 feet at the northern end of the Project Area. Based on the FEMA flood insurance rate map dated September 27, 2010 **(Figure 2-4)**, the entire Local Study Area is not located in a 100-year or 500-year floodplain.

2.5.3   Wildlife and Threatened and Endangered Species

The Local Study Area is fully developed with buildings, roads, and a rail yard, and lacks any natural vegetation or habitats. There are approximately 26 ornamental shade trees (Z*elkova serrata*) along the east sidewalk of First Street NE between G Street NE and K Street NE and ten trees of the same species on the west sidewalk of 2nd Street NE, between G Street and the H Street Bridge. These trees may be used by urban-dwelling songbirds such as the house sparrow (*Passer domesticus*). No habitat for listed species occurs within the Local Study Area. On October 31, 2016, the Federal Railroad Administration (FRA) accessed the USFWS *Information for Planning and Conservation* (IPaC) online project review service and determined that no Federally listed plant or animal species are known to occur within the Local Study Area. In addition, there are no bald eagle nests in close proximity of the Project Area.

2.5.4   Coastal Zone Management

The Local and Regional Study Areas are not within the mapped Coastal Zone.

Figure 2-4. FEMA Floodplain Map of Washington Union Station

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3 Water Resources and Water Quality

3.1   Overview

This section provides a description and mapping of three water resource categories that may potentially be affected by Washington Union Station (WUS) Expansion Project (the Project): stormwater (impacts to surface and groundwater quality), water supply, and wastewater. Natural surface water resources within the WUS Project Area (Project Area) are characterized in *Section 2, Natural Ecological Systems*, with regard to wetlands and waters of the U.S. jurisdiction. This section characterizes surface water resources with regard to designated uses and water quality status.

3.2   Regulatory Context and Guidance

The Project will be regulated under both Federal and Washington, DC (District) policies for the protection of surface water, groundwater, and drinking water supply resources. The water quality regulations listed below have been promulgated at the Federal level and are enforced at the District level under local regulations and design guidelines.

The District Department of Energy and Environment (DOEE) is the lead authority on environmental compliance within the District. The DOEE completes reviews and issues permits for land-disturbing projects. DC Water (formerly District of Columbia Water and Sewer Authority [DC WASA]) is an independent authority that distributes drinking water and collects and treats stormwater and wastewater in the District. DC Water Permit Operations Department issues approval for projects that directly or indirectly affect the public water and/or sewer systems.

Discharges from DC Water stormwater and combined sewer systems are permitted under two National Pollutant Discharge Elimination System (NPDES) permits:

- DC Municipal Separate Storm Sewer System (MS4): NPDES Permit Number DC0000221 - Authorization to Discharge under the NPDES Municipal Separate Storm Sewer System Permit. Effective October 7, 2011.

- DC Water Blue Plains Advanced Wastewater Treatment Facility and combined sewer system: NPDES Permit Number DC0021199. Effective September 30, 2010.

Federal policies, regulations and guidance that may pertain to water resources include:

- Clean Water Act (CWA), Water Quality Act of 1987, (33 United States Code[USC] 1251-1376) 401 and 402;

- Federal Water Pollution Control Act of 1972 (33 USC 1251-1376) as amended by the CWA (1977) and the Water Quality Act (1987);

- U.S. Safe Drinking Water Act (SDWA) of 1974 (42 USC 300f);

- U.S. Ground Water Rule (71 Federal Register [FR] 65574);

- U.S. Environmental Protection Agency (EPA) NPDES Construction General Permit;

- Energy Independence and Security Act of 2007;

- Executive Order EO 13834, *Efficient Federal Operations* (2018);

- EO 13508 Chesapeake Bay Protection and Restoration;

District policies, regulations and guidance that may pertain to water resources include:

- District Water Pollution Control Act of 1984, as amended (District Law 5-188);

- District Storm Water Permit Compliance Amendment Act of 2000 (District Law 13-311);

- District Municipal Regulations, Title 21 Water and Sanitation;

- District Department of Transportation (DDOT) *Green Infrastructure Standards;*[1]

- DOEE Stormwater Management Guidebook;[2]

- District Water Green Infrastructure Utility Protection Guidelines;[3] and

- District Water Project Design Manual Volume 3, Infrastructure Design.[4]

3.3   Study Area

The Local Study Area extends 500 feet from the Project Area to encompass adjacent connections to DC Water stormwater, water supply, and wastewater infrastructure (**Figure 3-1**). On a regional-level, water resources were analyzed as it pertains to the Chesapeake Bay Watershed.

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[1]   District Department of Transportation. 2014. *Green Infrastructure Standards*. Accessed from https://ddot.dc.gov/publication/ddot-green-infrastructure-standards-2014. Accessed on April 30, 2018.

[2]   District Office of Energy and Environment. 2013. *Stormwater Management Guidebook.* https://doee.dc.gov/swguidebook. Accessed June 6, 2017.

[3]   DC Water. 2013. *Green Infrastructure Utility Protection Guidelines*. Accessed from https://www.dcwater.com/sites/default/files/Green%20Infrastructure%20Utility%20Protection%20Guidelines.pdf. Accessed on April 30, 2018.

[4]   DC Water and Sewer Authority. 2001. *Project Design Manual Volume 3, Infrastructure Design. Accessed from* https://www.dcwater.com/sites/default/files/Project%20Design%20Manual%20Volume%203%20Infrastructure%20Design.pdf. Accessed on June 6, 2017.

Figure 3-1. Water Resources and Water Quality Study Area

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3.4　Methodology

The information provided in this section was compiled from existing data sources, rather than field studies, because current information sufficed to describe the water resources affected environment. While the Affected Environment assessment focuses on the WUS Project Area and connected infrastructure, it also characterizes potentially affected water resources and infrastructure outside the Study Area, including receiving waterbodies, water sources, and wastewater treatment facilities.

3.5　Affected Environment

This section specifically addresses water resources regulatory context and existing:

- Surface water resources;
- Groundwater resources;
- Drainage systems and receiving waters;
- Wastewater infrastructure;
- Water supply infrastructure; and
- Potable water usage and wastewater generation.

3.5.1　Surface Water

No surface water bodies lie within or adjacent to the Project Area. The Project Area is located within the subwatershed for the Lower Anacostia River (segment DCANA00E_01), a tidal river which runs from the Pennsylvania Avenue Bridge to the Potomac River, and ultimately flows into Chesapeake Bay. As described in greater detail below, drainage from the Project Area reaches the Anacostia River either through combined sewer overflows (CSOs) during large storms, or through the Municipal Separate Storm Sewer System (MS4).

In the 2016 District Integrated Report,[5] DOEE lists the Lower Anacostia River as a Category 4A, impaired for arsenic, chlordane, copper, dichlorodiphenyldichloroethane (DDD), 1,1-Dichloro-2,2-bis(p-chlorophenyl) ethylene (DDE), 1,1,1- trichloro-2,2-bis(p-chlorophenyl)ethane (DDT), debris/floatables/trash, Dieldrin, *Escherichia coli* (*E. coli*), heptachlor epoxide, polychlorinated biphenyls (PCBs), polycyclic aromatic hydrocarbon (PAH), total suspended solids (TSS), and zinc. Water quality within this segment of the Anacostia River does not support the river's designated uses of contact recreation, aesthetic enjoyment, or protection of human health related to

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[5]　DC Department of Energy and Environment. *Water Quality Assessment 2016 Integrated Report to EPA*, Sections 305(b) and 303(d) Clean Water Act. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/2016%20Final%20IR.pdf. Accessed on April 30, 2018.

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consumption of fish and shellfish. Water quality does support the segment's designated uses for navigation and protection and propagation of fish, shellfish, and wildlife.

The EPA has established Total Maximum Daily Loads (TMDLs) for the Anacostia River for the pollutants listed above, along with oil and grease, nitrogen, and phosphorus. The EPA has also established a TMDL for the entire Chesapeake Bay watershed, spanning New York, Pennsylvania, Delaware, Maryland, Virginia, and the District. The Chesapeake Bay TMDL sets a maximum loading limit for nitrogen, phosphorus, and sediment that each jurisdiction may release to its waters that reach Chesapeake Bay.[6]

Executive Order 13508, issued in 2009 by President Obama, established the Federal government's commitment to restoring Chesapeake Bay.[7] As directed by the EO, the Federal Leadership Committee, chaired by the EPA, published a strategy for coordinated implementation of existing Federal programs and projects to guide efforts to protect and restore Chesapeake Bay. The strategy aims to reduce nitrogen, phosphorus, sediment, and other pollutants; recover habitat; sustain fish and wildlife; conserve land; and increase public access.

The District has been a partner of EPA's Chesapeake Bay Program since the Chesapeake Bay Agreement in 1983 (revised 2000). The District is also a signatory to the 2014 Chesapeake Bay Watershed Agreement.[8] The Chesapeake Bay Agreement establishes goals and actions for protection and restoration of living resources, vital habitats, water quality, as well as sound land use, stewardship, and community engagement. By 2025, Agreement partners aim to have all practices and controls installed to achieve the Bay's dissolved oxygen, water clarity/submerged aquatic vegetation and chlorophyll *a* standards, as articulated in the Chesapeake Bay TMDL document.

The District also participates in the Anacostia Watershed Leadership Council and the Anacostia Watershed Restoration Partnership. The District, led by DOEE, is engaged in several restoration initiatives that inform the District's water quality regulations and guidelines, including:

- Anacostia River Watershed Restoration Plan (2010), a 10-year plan to guide future restoration and help accomplish restoration goals;[9]

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6   U.S. Environmental Protection Agency. Chesapeake Bay TMDL. Accessed from https://www.epa.gov/chesapeake-bay-tmdl. Accessed on November 16, 2017.

7   Executive Order 13508, Chesapeake Bay Protection and Restoration. 2009. Accessed from https://www.federalregister.gov/documents/2009/05/15/E9-11547/chesapeake-bay-protection-and-restoration. Accessed on November 16, 2017.

8   Chesapeake Bay. 2014. Chesapeake Bay Watershed Agreement. Accessed from https://www.chesapeakebay.net/what/what_guides_us/watershed_agreement. Accessed on November 16, 2017.

9   Anacostia River Watershed Restoration Plan. 2010. Accessed from http://www.anacostia.net/plan.html. Accessed on November 16, 2017.

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- Anacostia 2031: Plan for a Fishable and Swimmable Anacostia River (2008), which describes a plan to restore the Anacostia to a fishable and swimmable river;[10] and

- Anacostia Watershed Implementation Plan (2012), a roadmap for how the District can achieve and maintain the TMDL limits necessary to meet water quality standards.[11]

3.5.2 Groundwater

No public groundwater supplies or wellhead protection areas exist within the vicinity of the Study Area. The Study Area lies within the Northern Atlantic Coastal Plain aquifer system. The United States Geological Survey (USGS) maintains two groundwater monitoring wells in the Project Area vicinity. **Table 3-1** summarizes the well characteristics and groundwater level findings for these two monitoring wells. The monitoring results indicate that the highest groundwater level observed at these wells was more than 20 feet below the land surface.

Table 3-1. USGS Groundwater Monitoring Wells in Project Area Vicinity

Well Number	Monitoring Period	Land Surface Elevation (Feet above NAVD88)	Highest Measured Groundwater Level (Feet below land surface)	Year Measured
WE Ca 33	11/01/2005 – 11/23/2015	67.75	22.00	2008
WE Ca 32	1/22/2004 – 6/14/2017	79.98	20.34	2007

Source: USGS[12]

Past geotechnical investigations within the Project Area provide further insight into approximate depth to groundwater. These findings are forthcoming and will be incorporated when available. As part of a geotechnical investigation in 2013, borings were drilled near rail platform 27/28, in the eastern half of the WUS rail yard. The geotechnical report concluded that groundwater observed upon completion of boring LB-1, at 31.5 feet below existing grade, likely represented the actual groundwater elevation.[13] A geotechnical investigation in 2016[14] found that water depth within nine borings ranged from approximately 7 to 40 feet below ground surface. During that same

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[10] Anacostia 2031, Plan for a Fishable and Swimmable Anacostia River. 2008. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/Anacostia2032.pdf. Accessed on November 16, 2017.

[11] Anacostia Watershed Implementation Plan. 2012. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/Anacostia_WIP_2012_Final.pdf. Accessed on November 16, 2017.

[12] United States Geological Survey. National Water Information System Web Interface: Groundwater Levels for the Nation. Accessed from https://nwis.waterdata.usgs.gov/nwis/gwlevels. Accessed on August 2, 2017.

[13] Langan Engineering & Environmental Services, Inc. 2013. *Geotechnical Engineering Report, Washington Union Station Platform 27/28 Elevator Project.*

[14] Amec Foster Wheeler. 2017. *Washington Union Station Preliminary Report of Geotechnical Study.*

investigation, water level measured at two existing wells (installed previously) ranged from approximately 33 to 35 feet below ground surface.

A geotechnical investigation in 2017 included limited soil and groundwater sampling during installation of piezometers.[15] The reported concluded that preliminary soil and groundwater sampling results showed relatively low contaminant concentrations that would be expected for a historic industrial site that has operated as a coal yard/rail yard since 1907.

3.5.3   Stormwater

The WUS Project Area, covering approximately 53 acres, drains primarily to combined sewer infrastructure within the Anacostia River Watershed. Stormwater runoff from the Project Area is not currently routed through any structural Best Management Practices (BMPs) before it is released to the closed drainage system.

Combined flows from WUS (southwest portion of the Project Area) are conveyed in the Tiber Creek trunk sewer to either Blue Plains Wastewater Treatment Plant or, during large storms, to CSO outfall #12 in the Anacostia River. Combined flows from the rail corridor to the northeast are conveyed by the Northeast Boundary trunk sewer to either Blue Plains Wastewater Treatment Plant or, during large storms, to CSO outfall #19 in the Anacostia River. A small portion of the Project Area (approximately 7,000 square feet at the furthest northeast end) flows to the MS4; specifically, the Hickey Run subwatershed which discharges to the Anacostia River. **Figure 3-2** shows the delineation of combined sewer and MS4 subwatersheds.

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[15]   Amec Foster Wheeler. 2018. *Interim Environmental Sampling Report, Aquifer Pump Test and Seepage Analysis Project, Washington Union Station.*

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Figure 3-2. Delineation of Combined Sewer and MS4 Subwatersheds

Legend

Project Area

Tiber Creek (CSO 12)

Northeast Boundary (CSO 19)

Hickey Run (MS4)

0   1,300   2,600
Feet

Source: VHB, ESRI ArcGIS Online, DC GIS (2014-2018), Bing Imagery (2015)

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3.5.3.1   Hydrologic Characteristics

Based on the 2016 impervious surfaces data layer from the District of Columbia Geographic Information System (DC GIS), land cover in the Project Area comprises roughly 28 acres of impervious surfaces. The remaining 25 acres of the Project Area is covered by ballasted track. Since the track area is elevated and crosses over several streets, this analysis assumes that the ballasted track sits atop an impervious subbase.

According to Natural Resources Conservation Service (NRCS) soil mapping, existing soils in the Project Area are categorized as "urban land" or unknown, indicating that soils in the Project Area have been transported and/or substantially altered by human activity. The geotechnical investigations at WUS in 2013 and 2016 (described above in Section 3.5.2) found fill extending to a depth of approximately 13 to 44 feet below existing ground surface.[16,17]

The Project Area is relatively flat, sloping slightly from north to south. Light Detection and Ranging (LIDAR) mapping available from DC GIS shows a 2.0-percent average slope in the Project Area. The highest elevation is 104 feet toward the northeast end of Project Area. The lowest elevation is 28 feet, on First Street in the southwest section of the Project Area. There are four low points in the Project Area at Florida Avenue, M Street, L Street, and K Street.

3.5.3.2   Stormwater Retention Volume

As defined in the DOEE Stormwater Management Guidebook,[18] the regulated Stormwater Retention Volume (SWRv) is the runoff resulting from 1.2 inches of rainfall on surfaces within the project limit of disturbance (LOD). [19] For the analysis of potential environmental impacts resulting from the Project, SWRv will be used as an indicator of each alternative's relative stormwater impacts. The existing SWRv, calculated for the existing Project Area in accordance with DOEE guidelines, is presented in **Table 3-2**.

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[16]   Langan Engineering & Environmental Services, Inc. 2013. *Geotechnical Engineering Report, Washington Union Station Platform 27/28 Elevator Project*.

[17]   Amec Foster Wheeler. 2001. *Washington Union Station Preliminary Report of Geotechnical Study*.

[18]   District Department of Energy and Environment. 2020. *Stormwater Management Guidebook*. Accessed from https://doee.dc.gov/swguidebook. Accessed on April 3, 2020.

[19]   The District's SWRv of 1.2 inches represents the 90th percentile rainfall event. This is a lower threshold that required by EISA, under which Federal development or redevelopment projects must incorporate to the *maximum extent technically feasible* stormwater management measures that maintain or restore the pre-development hydrology of the site. Performance or design goals based on the pre-development hydrology can be established based on retention of the 95th percentile rainfall event (EPA. December 2009. *Technical Guidance on Implementing the Stormwater Runoff Requirements for Federal Projects under Section 438 of the Energy Independence and Security Act*. Accessed from: https://www.epa.gov/sites/production/files/2015-09/documents/eisa-438.pdf. Accessed on March 3, 2020).

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Table 3-2. Stormwater Retention Volume for the Project Area

Drainage Area	Paved Area with LOD[1] (Acre)	Compacted Area within LOD (Acre)	Natural Area within LOD (Acre)	Total Area within LOD (Acre)	SWRv (Cubic feet)
Tiber Creek (CSO 12)	26.9	16.6	0	43.4	129,243
Northeast Boundary (CSO 19)	1.1	8.7	0	9.8	13,906
Hickey Run (MS4)	0	0.2	0	0.2	178
TOTAL	28.0	25.5	0	53.4	143,327

1. LOD: Limit of Disturbance, defined for this study as the Project Area boundary

3.5.4 Wastewater

DC Water owns and operates the wastewater collection system, including approximately 1,800 miles of sanitary and combined sewers conveying flows to the Blue Plains Advanced Wastewater Treatment Plant (Blue Plains). Blue Plains treats an average of 300 million gallons per day (MGD) of raw sewage and discharges treated wastewater to the Potomac River. During large rain events, DC Water combined sewers flows are released to 53 CSO outfalls. These discharges are permitted under DC Water's NPDES Permit No. DC0021199.

As described in Section 3.5.3, combined stormwater and wastewater flows from the Station (southwest portion of the Project Area) drain to the Tiber Creek trunk sewer. Tiber Creek is a historic stream that was converted into a brick arch combined sewer in the 1870s. Today, the Tiber Creek Sewer services the center of the District and discharges to either Blue Plains or, during large storms, to CSO outfall #12 in the Anacostia River. Combined flows from the rail corridor to the northeast are conveyed by the Northeast Boundary trunk sewer to either Blue Plains or, during large storms, to CSO outfall #19 in the Anacostia River.

DC Water adopted a CSO Long-Term Control Plan (LTCP)[20] in 2002 that recommends measures for controlling CSOs and meeting water quality standards. Renamed the Clean Rivers Program in 2010, DC Water's LTCP includes green infrastructure, pump station rehabilitation, storage tunnel construction, CSO treatment, outfall consolidation and monitoring, and sewer separation.

As part of its Clean Rivers Project and in accordance with its 2015 Amended Consent Decree,[21] DC Water is currently constructing the Anacostia River Tunnel. The Anacostia River Tunnel is the second of a series of four tunnels that will mitigate CSOs that are currently discharged to the

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[20] DC Waters Long Term Control Plan. 2002. Accessed from https://www.dcwater.com/clean-rivers-project. Accessed on November 16, 2017.

[21] District of Columbia of Water and Sewer Authorigy, District of Columbia Clean Water Settlement. Accessed from https://www.epa.gov/enforcement/district-columbia-water-and-sewer-authority-district-columbia-clean-water-settlement. Accessed on April 30, 2018.

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Anacostia River. The 23-foot diameter tunnel will extend along the Anacostia River from Robert F. Kennedy Memorial Stadium in the northeast part of the District to Poplar Point in the southeast part of the District, where it will connect to the Blue Plains Tunnel. After the tunnel's completion in 2018, CSOs to the Anacostia River are expected to be reduced by 81-percent.

DC Water is also currently constructing the Northeast Boundary Tunnel (NEBT). The 23-foot diameter tunnel will start just south of Robert F. Kennedy Memorial Stadium and extend north to Rhode Island Avenue and continue west along Rhode Island Avenue to R Street NW. The NEBT will connect with DC Water's First Street Tunnel and Anacostia River Tunnel to provide a complete gravity system from the northwest part of the District to Blue Plains. After completion of the NEBT in 2023, CSOs to the Anacostia River are expected to be reduced by 98-percent. The NEBT is also expected to reduce the chance of flooding in the area served by the Northeast Boundary trunk sewer, from the current 50-percent chance of flooding in any given year, down to a 7.0-percent chance.

3.5.5   Water Supply

The Washington Aqueduct, a Federally owned and operated public water supply agency, withdraws water from the Potomac River at Great Falls and Little Falls and treats it at two drinking water treatment plants, Dalecarlia and McMillan, located in the District. DC Water purchases treated drinking water from the Washington Aqueduct and distributes it to DC Water customers. DC Water maintains a network of over 1,300 miles of pipes supplying drinking water to homes and buildings across DC.[22] WUS receives domestic and fire water supply from two DC Water water mains below K Street and 2nd Street.

3.5.6   Wastewater and Water Demand

Potable water usage in the Project Area during 2017 averaged 91,800 gallons per day (gpd), based on DC Water bills provided by the Union Station Redevelopment Corporation (USRC). Water demand is assumed to equal wastewater demand with an added factor of 10-percent to account for consumption, system losses, and other use. Based on a water demand of 91,800 gpd, the estimated wastewater demand is 83,500 gpd. **Table 3-3** presents the estimated current wastewater generation for the Project Area and the calculated flow rate.

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[22]   DC Water website https://www.dcwater.com/drinking-water. Accessed August 2016.

Table 3-3. Existing Estimated Wastewater Generation (Average Daily Flow) at WUS

Location	Use	Unit Flow Rate (gpd)[1]	Total Unit	Estimated Average Daily Flow (gpd)
Union Station	Rail Terminal[2]	83,500	48,300 passengers	1.7 gpd/passenger

1. Unit flow rate calculated as wastewater demand divided by the number of passengers; estimated 2017 wastewater flow calculated as 2017 water demand divided by 1.1.
2. Rail terminal usage includes Amtrak, Maryland Area Regional Commuter (MARC), and Virginia Railway Express (VRE) ridership.

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4 Solid Waste Disposal and Hazardous Materials

4.1   Overview

This section describes the Affected Environment for solid waste disposal including hazardous materials with the potential to impact the human environment.

As it relates to the Washington Union Station (WUS) Expansion Project (the Project), the Federal Railroad Administration (FRA) *Procedures for Considering Environmental Impacts,*[23] under the topic of solid waste disposal states, "The alternatives should be assessed with respect to State and local standards for sanitary landfill and solid waste disposal". Under the topic of public safety, the FRA procedures state, "The Environmental Impact Statement (EIS) should assess the transportation or use of any hazardous materials which may be involved in the alternatives, and the level of protection afforded residents of the affected environment from construction period and long-term operations associated with the alternatives."

The term *hazardous materials* will collectively be used to describe hazardous substances, as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA);[24] hazardous wastes, as defined by the RCRA; asbestos; and petroleum products. The Occupational Safety and Health Administration (OSHA) also defines hazardous materials as any substance or chemical which is a "health hazard" or "physical hazard" as defined by 29 Code of Federal Regulations (CFR) 1910.1200:

> Health hazard means a chemical which is classified as posing one of the following hazardous effects: acute toxicity (any route of exposure); skin corrosion or irritation; serious eye damage or eye irritation; respiratory or skin sensitization; germ cell mutagenicity; carcinogenicity; reproductive toxicity; specific target organ toxicity (single or repeated exposure); or aspiration hazard.

Physical hazard means a chemical which is classified as posing one of the following hazardous effects: explosive; flammable (gases, aerosols, liquids, or solids); oxidizer (liquid, solid or gas);

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[23]   U.S. Department of Transportation, Federal Railroad Administration. 1999. *Procedures for Considering Environmental Impacts (64 Federal Register 28545)*. Accessed from https://www.gpo.gov/fdsys/pkg/FR-1999-05-26/pdf/99-13262.pdf. Accessed on June 5, 2017.

[24]   Comprehensive Environmental Response, Compensations, and Liability Act (CERCLA). *Section 101 Definitions.* Accessed from https://mitpress.mit.edu/sites/default/files/titles/content/ashford_environmental_law/Chapt_9-CERCLA.pdf. Accessed on April 30, 2018.

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self-reactive; pyrophoric (liquid or solid); self-heating; organic peroxide; corrosive to metal; gas under pressure; or in contact with water emits flammable gas.

Solid waste is the broader regulatory term that encompasses RCRA hazardous waste. The term solid waste does not imply the waste is non-hazardous. According to the RCRA, "solid waste" means any "garbage or refuse, sludge for a wastewater treatment plant, water supply treatment plant, or air pollution control facility and other discarded material, resulting from industrial, commercial, mining, and agricultural operations, and from community activities."[25] Solid waste also includes construction debris and excavated soils.

At a Federal level, nonhazardous industrial solid waste and municipal solid waste are managed under the Solid Waste Program (Resource Conservation Recovery Act [RCRA] Subtitle D). The Solid Waste Program sets criteria for municipal solid waste landfills and other solid waste facilities and prohibits the open dumping of solid waste.[26] The District's Green Construction Code also sets forth specific requirements related to solid waste diversion during construction projects.[27]

RCRA Hazardous waste specifically pertains to solid waste that is either RCRA-listed hazardous waste or that meets the RCRA-defined characteristics of hazardous waste, which are ignitability, corrosivity, and reactivity. *Non-hazardous waste* is solid waste not defined as a hazardous waste by RCRA.

The Project has the potential to encounter hazardous materials such as contaminated soils or groundwater during construction activities including but not limited to trenching, excavation, and dewatering. There is also the potential that pre-existing waste materials such as railroad ties, creosote-treated timbers, or demolition material (possibly containing asbestos) will require removal and proper disposal. Solid waste will also be generated from construction processes.

The presence or release of hazardous materials on construction sites can expose workers, surrounding residents, and pedestrian foot traffic. Hazardous materials encountered because of the Project, when not properly managed, may contaminate previously uncontaminated media. In addition, failure to properly identify and assess hazardous materials prior to and during construction can lead to project delays, injuries, fatalities, costly clean-ups, and/or financial penalties.

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[25] United States Environmental Protection Agency. *Criteria for the Definition of Solid Waste and Solid and Hazardous Waste Exclusions*. Accessed from https://www.epa.gov/hw/criteria-definition-solid-waste-and-solid-and-hazardous-waste-exclusions. Accessed on June 5, 2017.

[26] United States Environmental Protection Agency. Undated. *Regulatory Information by Topic: Waste*. Accessed from http://www2.epa.gov/regulatory-information-topic/waste#solid. Accessed on June 5, 2017.

[27] 2013 District of Columbia Green Construction Code. Accessed from https://codes.iccsafe.org/public/document/details/toc/920. Accessed on June 5, 2017.

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4.2   Regulatory Context and Guidance

Federal policies, regulations, and guidance that may pertain to solid waste and hazardous materials include:

- Resource Conservation Recovery Act (RCRA) Solid Waste Regulations, Title 40 CFR 239 through 282;

- The U.S. Environmental Protection Agency (EPA) National Emission Standards for Hazardous Air Pollutants (NESHAP) Regulations, Title 40 CFR 61;

- Toxic Substances Control Act (TSCA) Polychlorinated Biphenyl regulations, Title 40 CFR 761;

- TSCA, 15 USC 2601-2692 including the Asbestos Hazard Emergency Response Action (AHERA);

- Occupational Safety and Health Administration (OSHA) Lead in Construction Standard, Title 29 CFR 1926.62;

- OSHA Standards for Hazardous Materials, Title 29 CFR 1910 and 1926;

- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980 as amended, 42 United States Code (USC) 9601 *et seq.*; and RCRA and Superfund Amendments and Reauthorization Action, 42 USC 6901 *et seq*.

The U.S. Environmental Protection Agency (EPA) is the Federal agency responsible for overseeing hazardous waste generation, storage, treatment, and disposal. The Hazardous Materials Transportation Act is applicable to the transportation of hazardous materials in commerce, including inter- and intrastate carriers. Hazardous materials in rail cars can only be shipped by persons registered by the Department of Transportation (DOT) and the hazardous material must be properly classed, described, packaged, marked, labeled, and in condition for shipment.

District policies, regulations, and guidance that may pertain to solid waste and hazardous materials include:

- District of Columbia (District) Department of Environment and Energy (DOEE) Control of Asbestos, Title 20 DCMR 800;

- Asbestos Notification Form, DOEE, Air Quality Division;

- District of Columbia Hazardous Waste Regulations, 20 District of Columbia Municipal Regulations (DCMR) Chapters 40 through 54;

- Green Construction Code, Sections 406 and 503 of Title 12K of the District of Columbia Municipal Regulations (12K DCMR 406, 503);

- DOEE Control of Asbestos, Title 20 DCMR 800; and

- District of Columbia Illegal Dumping Enforcement Amendment Act of 1994, District Law 10-117, District Official Code 8-901 *et seq.*

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In addition, under RCRA and District statutes, the District has the authority to ensure safe and effective hazardous waste management and to establish a program of regulation over the generation, storage, transportation, treatment, and disposal of hazardous waste under District Law 2-64, District Code 8-1301 through 8-1322. The District Voluntary Cleanup Program (VCP) provides a framework for conducting the cleanup of any brownfield or site contaminated by hazardous substances that are not listed in the EPA National Priority List during property development in the event that the property owner, developer, or other entity did not cause or contribute to the contamination.

4.3 Study Area

This section defines the Study Area for the solid waste disposal and hazardous materials analyses. The Local Study Area for hazardous waste is the same as the WUS Project Area. The Local Study Area for hazardous waste Affected Environment is the same as the WUS Project Area (**Figure 4-1**).

It is considered unlikely that solid waste present at a regional level would require handling and/or storage within the Project Area, therefore, a Regional Study Area was not considered. However, solid waste generated from the Project will require disposal at regional disposal facilities that would be selected based on the type of solid waste requiring disposal, the landfill capacity, and waste characterization requirements. Solid waste (including hazardous materials) generated within the WUS Project Area requiring disposal will be potentially disposed of at the following types of receiving facilities:

- Solid Waste Landfills
- Construction and Demolition Landfills
- Asbestos Receiving Landfills
- Hazardous Waste Landfills
- Hazardous Waste Incinerators
- TSCA Incinerators
- Wastewater Treatment Plants

4.4 Methodology

A profile of the existing solid waste disposal practices and baseline for existing solid waste generation and disposal was developed for the Local Study Area. The profile includes types of solid waste, sources of solid waste, and volume of solid waste generated, to the extent this information is made available.

Figure 4-1. Local Study Area for Solid Waste Disposal and Hazardous Materials

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Existing conditions for hazardous materials (such as those from documented spills/releases) located within the Project Area were also identified by:

- Reviewing existing data and prior environmental reports available for the Project Area;

- Obtaining copies of hazardous materials-related permits issued to the facility from the regulatory departments and facility managers;

- Conducting database search and site reconnaissance, and ranking environmental concerns identified by potential level of risk to environmental media within the Project Area (high, moderate, or low); and

- Identifying existing spill protection/containment plans to address response actions in the event of a release of hazardous materials as well as health and safety programs, which typically outline the property safety protocols around hazardous materials such as proper handling and personal protective equipment.

4.5   Affected Environment

This section describes the baseline conditions for solid waste, including hazardous waste, for the Project Area and the adjacent Local Study Area. The existing solid and hazardous waste currently generated from WUS and associated Amtrak facilities was evaluated by:

- Obtaining and analyzing existing sources and quantities of solid waste being generated at WUS from Amtrak and the USRC.

- Assessing potential hazardous materials impacts associated with onsite railroad-related and commercial operations, which may include the use of hazardous materials (storage/generation), hazardous building materials, and documented spills/releases by requesting information regarding these activities from Amtrak and USRC.

- Evaluating the presence of hazardous materials, based on ASTM International (ASTM) search distances and list of standard environmental records recorded in the ASTM standard 1527-13. A full ASTM Phase I Environmental Site Assessment (ESA) was not conducted since there are no properties proposed for acquisition.

- Determining the status of storage and generation of hazardous materials at commercial and industrial facilities located in close proximity to the Project Area through a review of database listings, since these practices may result in undocumented or documented releases of hazardous materials to the environment.

Much of this information was obtained through a database search report obtained from a third-party data collection service and then reviewed to determine the baseline conditions for hazardous waste within the Local Study Area. The records search included databases that are generally consistent with ASTM 1527-13 *Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process*. In order to supplement this

database search, a Freedom of Information Act (FOIA) request was placed with the District Fire and Emergency Management Services (EMS) Department for records of emergency spills/releases. No records regarding emergency spills and/or releases were obtained for the Project Area from the Fire and EMS Department. The DC Atlas Plus website[28] was also consulted to verify certain databases.

Information was obtained from the property owner(s)/operator(s) and USRC regarding existing WUS solid waste disposal practices, including volume, sources, disposal facilities and locations, recycling programs, and existing permits.

The Property Information Verification System (PIVS) was consulted for an overview of property and permit information for the parcels located within the Local Study Area. Historical information for the Project Area was obtained from the *Washington Union Station Historic Preservation Plan.*[29]

4.5.1 Project Area Data

According to information obtained from Amtrak, WUS generated 800 tons of municipal solid waste and 7.2 tons of recyclables in 2016.[30] Amtrak also provided a recycling data summary report which listed universal and industrial wastes generated during 2016. A total of 86.58 tons of non-industrial recycled materials was recorded for the Project Area in 2016. Other pertinent recycled wastes include but are not limited to:

- Approximately 1.61 tons of lead-acid batteries;

- Approximately 0.45 tons of crushed fluorescent lamps;

- Approximately 1.72 tons of oily solids/debris;

- Approximately 0.15 tons of paint (latex and oil-based); and

- Approximately 0.27 tons of non-hazardous solid waste.

Amtrak also provided the pesticide spraying log for April 4 and 5, 2017, listing the types and quantities of chemicals applied to the Project Area. According to the spraying logs, a total of 900 gallons of herbicides including Opensight®, Esplanade 200 sc, Oust Extra, and additional herbicides were spread over approximately 18 acres of the Project Area including material storage areas, fence lines, tracks, and roadways.

USRC and Amtrak provided relevant information regarding solid waste, including hazardous materials associated with current operations at WUS. No previous Phase I or Phase II ESAs have been completed for any properties within the Project Area.

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28   DC Atlas Plus (mapping tool). Accessed from http://atlasplus.dcgis.dc.gov/. Accessed on April 30, 2018.

29   Building Conservation Associates, Inc. 2015. Washington Union Station Historic Preservation Plan.

30   Email from Amtrak to VHB dated September 27, 2017.

A recycling/waste report completed by Sustainable Solutions Group (SSG) was obtained for WUS which provided solid waste disposal quantities. A total of 1,148 tons of solid waste and 416 tons of recycled waste had been removed from WUS between January and August 2017.[31] Based on the tonnage of recycled waste and total solid waste, approximately 27-percent of solid waste generated from WUS was recycled. USRC identified an Aboveground Storage Tank (AST) presumed to contain fuel oil associated with an emergency generator.

A Tier II Emergency and Hazardous Chemical Inventory was provided by Amtrak which details historical hazardous waste storage at WUS.[32] The following hazardous materials were listed within the inventory between January and December 2015:

- 1,760 pounds/211.2 gallons of diesel fuel in two ASTs;

- 33,250 pounds/3,990 gallons ethylalcohol in one AST;

- 6,680 pounds/801.6 gallons of gasoline in one AST;

- 1,000 pounds of halite in bags;

- 6,200 pounds of lead-acid batteries; and

- 189 pounds/22.6 gallons of transformer oil in one AST.

A 2015 Spills Prevention, Control and Countermeasures (SPCC) Plan was provided by Amtrak outlining spill response actions and preventable measures.[33] SPCC Plan checklists were provided between January 2016 and July 2017. The most recent SPCC Plan checklist completed in July 2017 indicated that no evidence of release occurred from the following petroleum storage tanks:

- 1,000-gallon gasoline AST;

- 150-gallon back-up generator;

- 200-gallons used oil AST;

- 1,050-gallon back-up generator (Verizon); and

- 145-gallon mineral oil dielectric fluid (MODF) transformer.

An Asbestos Abatement Plan was completed in May 2005 for conduit pipes located along tracks.[34] A total of approximately 3,200 linear feet of asbestos-cement conduit was removed at WUS. A project completion report for the release abatement including air sampling results were not provided. An additional asbestos survey was completed in February 2008 at two sub-platform areas at WUS where several hundred linear feet of piping was located. The

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[31] Sustainable Solutions Group (SSG). *Union Station 2017* (Spreadsheet).

[32] Amtrak.2017. *Tier II Emergency and Hazardous Chemical Inventory. Reporting Period From January 1, 2015 to December 31, 2015.*

[33] Amtrak. March 2015. *Spill Prevention, Control and Countermeasures (SPCC) Plan.*

[34] Amtrak. May 2005. *Final Asbestos Abatement Plan. Conduit Pipes along Track #20. National Railroad Passenger Corporation's Union Station.*

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results of the survey determined there was no Asbestos Containing Material (ACM) located within the area.

On September 9, 2015, WUS was assigned EPA identification number DCD 938970716 for the property's listing as a RCRA-Conditional Exempt Small Quantity Generator (RCRA-CESQG) (more recently known as a Very Small Quantity Generator or VSQG) and the associated generation of ignitable waste, corrosive waste, and lead.

1.1.1.1   Database Report

A database report obtained from a third party on June 28, 2017 was reviewed for evidence of oil releases and/or the generation of hazardous materials within the Project Area. A summary of the available and reasonably ascertainable information from standard environmental record sources is provided in **Table 4-1** and **Table 4-2**. According to the database report, WUS and four additional properties partially within the Project Area have been identified as having prior releases of oil and hazardous materials or are identified as generators of hazardous waste.

Table 4-1. Federal Environmental Records

Record Source	Search Distance	Number of Sites Within	Includes the WUS Project Area
National Priorities List (NPL) Sites	1.0 mile	0	No
Safety and Environmental Management System (SEMS) Sites	0.5 miles	8	No
Comprehensive Emergency Response, Compensation, and Liability Information System (CERCLIS) Sites	0.5 miles	7	No
CERCLIS No Further Remedial Action Planned (NFRAP) Sites	Property and Adjoining	5	No
RCRA Corrective Action (CORRACTS) Sites	1.0 mile	0	No
RCRA Non-CORRACTS Treated, Stored, and Disposed of hazardous wastes (TSD) Sites	0.5 miles	1	No
RCRA Generators	0.25 miles	59	Yes
RCRA Non-generators	0.25 miles	71	Yes
Engineering/ Institutional Control Sites	Property and Adjoining	0	No

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Record Source	Search Distance	Number of Sites Within	Includes the WUS Project Area
Federal Emergency Response Notification System (ERNS)	Property	4	Yes
Federal Facility Index System (FINDS)	Property	10	Yes

Source: Environmental Risk Information Services. June 28, 2017. *Database Report.*

Table 4-2. District Environmental Records

Record Source	Search Distance	Number of Sites Within Search Distance	Includes the WUS Project Area
Solid Waste Disposal Sites	0.5 miles	0	No
Leaking Storage Tank Sites	0.5 miles	183	Yes
Registered Storage Tank Sites	Property and Adjoining	149	Yes
Voluntary Cleanup Sites	0.5 miles	29	No
Brownfield Sites	0.5 miles	42	No

Source: Environmental Risk Information Services. June 28, 2017. *Database Report.*

Available records pertaining to the on-site listings were reviewed electronically via state and Federal databases. Information obtained during these reviews is summarized below. Locations for these on-site listings are presented in **Figure 4-2**.

Washington Union Station, 50 Massachusetts Avenue NE

WUS is listed in the underground storage tank (UST), Emergency Response Notification System (ERNS), and RCRA-CESQG (such as VSQG) databases.

Four former USTs were listed at WUS within the southern end of the Project Area. The USTs consisted of:

- One 2,700-gallon gasoline UST;
- One 1,000-gallon gasoline UST;
- One 5,000-gallon gasoline UST; and
- One 1,000-gallon diesel UST.

All of these USTs are listed as permanently out of use and no additional information was obtained regarding the condition of the USTs or whether they were removed or closed in place.

Multiple ERNS listings were identified at WUS relating to non-release incidents involving train derailment and train malfunctions:

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Figure 4-2. On-site Listing Locations

Map ID	Site Name	Site Address
1	Washington Union Station	50 Massachusetts Avenue NE
2	Amtrak Parking	900 2nd Street NE
3	Station Place	100 F Street NE
4	Station Place	600 2nd Street NE
5	Florida Avenue Dump	300 New York Avenue NE

Legend

- Solid Waste Disposal and Hazardous Materials Local Study Area
- Project Area
- Point of Interest
- Open/Recreation Space
- Railroad

Source: VHB, ESRI ArcGIS Online,DC GIS (2014-2017)

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- ▪ Three ERNS listings appear to be release-related including an ERNS listing in 1996 for a release of 250 gallons of diesel to pavement during the refueling of a locomotive.

- ▪ In 1998, 2 gallons of fuel oil dripped out of a locomotive due to equipment failure, which was cleaned up with absorbent materials.

- ▪ In 2011, an unknown chemical release from a train occurred.

- ▪ In May 2010, WUS was evacuated due to a strong odor and issues with back-up batteries within the building. No other information regarding the conditions associated with the evacuation or odor was obtained.

Amtrak at WUS is also identified as a RCRA (VSQG) for the generation of ignitable waste, benzene, methyl ethyl ketone, tetrachloroethylene, and mercury. A commercial establishment identified as a Walgreens located within WUS is listed as a RCRA-CESQG (VSQG) for the generation of various medical wastes associated with the pharmaceutical sales within the establishment.

According to Sanborn Fire Insurance Maps, a boiler room was formerly located within the Project Area from 1947 until at least 1960. Historic boiler rooms are often associated with large oil and hazardous materials (OHM) storage and present a potential risk of release. The boilers were removed from the Project Area between 1964 and 1980. No additional information regarding this former boiler room was obtained.

Amtrak Parking, 900 2nd Street NE

The property located at 900 2nd Street NE, in the eastern portion of the Project Area, is listed in the ERNS database for small releases of hazardous materials associated with incidents related to vehicular collisions and electrical transformer releases. The property is also identified on the Facility Index System (FINDS) database for the "Washington Union Station Soil Boring Project" with EPA ID 110069455850. No additional information regarding the Soil Boring Project was obtained.

Station Place, 100 F Street NE

Station Place at 100 F Street, is partially located on the southwestern portion of the Project Area and is listed in the Leaking UST (LUST) and UST databases. In March 2002, a release of an unknown amount of gasoline and heating oil occurred from a leaking UST at the property. The release impacted soil and groundwater in the area and was assigned Case No. 2002036. No additional information was obtained regarding this release except that the case was closed. A total of 13 former USTs were located on the property, ranging from 550 to 15,000 gallons in capacity and containing hazardous materials such as gasoline, diesel, waste oil, and heating oil.

Station Place, 600 2nd Street NE

Station Place at 600 2nd Street is partially located in the southwestern portion of the Project Area and is listed in the LUST database. In May 2002, a release of an unknown amount of

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heating oil and gasoline occurred at this address. The release impacted soil and groundwater and was assigned Case No. 2002052. No additional information was obtained regarding this release except that the case has a No Further Action status.

Florida Avenue Dump, 300 New York Avenue NE

The property at 300 New York Avenue NE, which is partially located on the northern portion of the Project Area, is listed with the CERCLIS database for the property's use as a dump. In March 2013, there was allegedly unauthorized waste disposal which took place at the property. The property is also listed in the SEMS Archive database under EPA ID DCN000306926.

4.5.2   Project Area Findings

Based on the findings of the database search, environmental concerns that were identified within the Project Area or adjoining the Project Area were classified by potential level of risk to the environment (high, moderate, or low):

- **High Risk:** Assigned when the evidence indicated that hazardous materials were stored/generated or released, on or within the Project Area.

- **Moderate Risk:** Assigned when there was limited information regarding the environmental concern, and it was unknown whether the concern may have impacted the Project Area.

- **Low Risk:** Assigned when there was information indicating that the environmental concern was unlikely to impact the Project Area or has been addressed to the satisfaction of the applicable regulatory agency.

When an environmental concern potentially qualified for more than one of the above-noted categories, the higher level of risk was selected. Environmental concerns that did not appear to impact the Project Area or properties adjoining the Project Area were not included in the following list of findings, which is being noted as an assumption as part of this evaluation.

The environmental concerns and associated risk rating are summarized below.

High Risk: Former USTs and Spills, and Hazardous Materials Generated and Stored Identified Within the Project Area

The on-site listing noted below are considered to present a **high** risk to environmental conditions within the Project Area based on the high number of listings, types of hazardous material released, and types of hazardous materials generated and stored.

- **USTs:** A total of four USTs were formerly located at WUS within the Project Area ranging from 1,000 to 5,000 gallons in capacity used for petroleum products. In addition, 13 former USTs were located at 100 F Street NE (on the southwestern portion of the Project Area), ranging from 500 to 15,000 gallons in capacity and used for petroleum products. Although all the USTs are reported as closed, no closure reports or confirmatory analytical results were available.

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- **Spills:** Two LUSTs reported in 2002 were also listed for 100 F Street NE and 600 2nd Street NE, which are listed as having a closed regulatory status. In addition, multiple ERNS listings were identified at WUS and 900 2nd Street NE related to hazardous materials spills for diesel, fuel oil, unknown chemicals, vehicular fluids, transformer fluids, and battery odors. There was little detail provided concerning these spills.

- **Hazardous Materials Generated and Stored:** Amtrak and Walgreens are listed as RCRA-CESQGs (VSQGs), which relates to the on-site storage and generation of hazardous pharmaceutical materials. The former Florida Avenue Dump at 300 New York Avenue NE is identified as being partially located on the northern portion of the Project Area and listed in the CERCLIS database.

Moderate Risk: Active Railroad Right-of-Way within the Project Area

Based on the presence of the railroad right-of-way and lack of sampling data to confirm the presence of impacts from any potentially released hazardous materials to soil or groundwater, this concern is considered to present a **moderate** risk to environmental conditions within the Project Area.

According to historical sources, railroad tracks have been present within the Project Area since at least 1907. Although not specifically listed in the third-party database report, railroad rights-of-ways are often impacted with residual OHM, including metals, pesticides, and petroleum constituents such as polycyclic aromatic hydrocarbons (PAHs). Railroad related sources of OHM may include creosote- or arsenic-laced railroad ties, herbicides, lubricating oils, diesel fuel, and diesel exhaust. In addition, fill of unknown origin used to bring tracks to grade may contain debris, coal, coal ash, coal slag, or other potential contaminants. According to a geotechnical study conducted for the Project Area in March 2017, fill along the Project Area consists of a mixture of clays, silts, and gravels along with minor amounts of construction debris such as brick and concrete fragments.

Low Risk: Hazardous Building Materials

Several types of potentially hazardous building materials (such as ACM, lead-based paint, mercury, etc.) were identified. However, since these materials do not typically present a concern to the environment when intact under normal use conditions, this concern is considered to present a **low** risk to environmental conditions within the Project Area.

Based on the age of the structures located within the Project Area (pre-1980), ACM such as roof flashing, shingles, tiles, and pipe installation, as well as lead-based paint, mercury switches, PCB-containing light ballasts and other hazardous building materials may be present in association with buildings located within the Project Area. These materials would require special handling if the pre-1980 structures in the Project Area are demolished or renovated.

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4.5.3 Adjoining Property Listings

As shown in **Table 4-3** and **Figure 4-3**, several properties located adjoining to the Project Area have the potential to impact the Project. **Table 4-3** provides additional information on these properties.

Table 4-3. Adjoining Properties with the Potential to Impact the WUS Project Area

Property Name	Address	Description
Archstone	100 K Street NE	■ A release of waste oil occurred from one UST in September 2011 and impacted soil and groundwater. The release case is still open. ■ The property is also listed in the Brownfield and VCP databases. Information associated with this listing was not obtained.
Central Armature Works, Inc.	1200 3rd Street NE	■ A release of heating oil and gasoline occurred from an unknown amount of LUSTs and impacted soil and groundwater in March 2015. The status of the release is listed as "open."
CK MRP Washington Gateway- Phase 3 – South Office Building	202 Florida Avenue NE	■ A release of heating oil and diesel occurred in February 2011 and impacted soil and groundwater at the property. The status of the release is listed as "open."
Courtyard Marriott	201 Florida Avenue NE	■ A release of diesel occurred in March 2000 and impacted soil and groundwater at the property. The property achieved regulatory closure in May 2005.
CS Mast V, LLC & CS Office Three LLC.	175 N Street NE	■ A release of heating oil and gasoline impacted soil from 17 LUSTs in March 2011. The release achieved No Further Action status in July 2012.
DC First Street Corporation	810 First Street NE	■ The property is listed in the FINDS and RCRA-CESQG (VSQG) databases due to the generation of Mercury.
Greyhound Bus Lines	1005 First Street NE	■ A release of diesel impacted soil and groundwater in June 2009. The release

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Property Name	Address	Description
		achieved No Further Action status in February 2012.
		▪ A release of diesel from two LUSTs occurred in November 2005 and impacted soil. The release achieved closure in April 2006.
Griffith Consumer Company	1230 New York Avenue NE	▪ A release of gasoline occurred from one UST and impacted soil in December 1990. The property achieved regulatory closure in May 1992.
No Property Name	77 K Street NE	▪ A release of heating oil occurred at the property in November 2007 and impacted soil and groundwater. The property achieved No Further Action status in November 2007.
		▪ The property is also listed in the FINDS and RCRA-CESQG (VSQG) databases for the generation of ignitable waste and mercury.
No Property Name	51 I Street NE	▪ The property is listed in the Historical Underground Storage Tank (HUST) database for a former tank at the property. No additional information was obtained.
Office Building	700 2nd Street NE	▪ A release of heating oil and gasoline impacted soil from a LUST in May 2002.
		▪ In October 2007, the property achieved No Further Action status.
Silver Building Ltd. Partnership	840 First Street NE	▪ A release of diesel occurred from one UST and impacted soil in May 2002. The release achieved closure in July 2002.
U.S. Security and Exchange Commission	600 2nd Street NE	▪ A release of heating oil and gasoline from a LUST occurred in April 2002, resulting in impacts to soil and groundwater. In May 2002, the property achieved No Further Action status.
Union Station Ventures	131 M Street NE	▪ A release of gasoline, diesel, and heating oil occurred from a LUST and impacted soil in November 1988. The status of the release is closed.

Property Name	Address	Description
		▪ A release of gasoline, diesel, and heating oil from a LUST impacted soil and groundwater in December 1997. The status of the release is closed.
		▪ A release of gasoline impacted soil at the property in June 2001. The release achieved closure in February 2002.
		▪ A release of gasoline, diesel, and heating oil impacted soil and the property in May 2001. The release achieved closure in July 2007.
		▪ A release of heating oil from one UST impacted soil at the property in January 1999. The release achieved No Further Action status in January 2007.
		▪ A release of heating oil from one UST impacted soil at the property in January 1999. The release achieved closure in March 2001.
		▪ A release of gasoline, diesel, and heating oil occurred from one UST and impacted soil and groundwater in December 1997.
		▪ A release of gasoline, diesel, and heating oil impacted soil from one UST in November 1988. The release achieved closure in August 1996.
		▪ The property is listed as a RCRA-CESQG (VSQG) for the generation of mercury and additional halogenated solvents.

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Figure 4-3. Adjoining Properties with the Potential to Impact the WUS Project Area

Map ID	Property Name	Address
1	Archstone	100 K Street, NE
2	Central Armature Works, Inc.	1200 3rd Street NE
3	CK MRP Washington Gateway- Phase 3 – South Office Building	202 Florida Ave NE
4	Courtyard Marriott	201 Florida Avenue NE
5	CS Mast V, LLC & CS Office Three LLC.	175 N Street NE
6	DC First Street Corporation	810 First Street NE
7	Greyhound Bus Lines	1005 1st Street NE
8	Griffith Consumer Company	1230 New York Avenue NE
9	No Property Name	77 K Street NE
10	No Property Name	51 I Street NE
11	Office Building	700 2nd Street
12	Silver Building Ltd. Partnership	840 First Street NE
13	U.S. Security and Exchange Commission	600 2nd Street NE
14	Union Station Ventures	131 M Street

Legend

Project Area

\# — Adjoining Property with Documented Solid Waste/Hazardous Material Concern(s)

Railroad

0 ——— 1,200 ——— 2,400 Feet

Source: VHB, ESRI ArcGIS Online, DC GIS (2014-2017)

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4.5.4   Adjoining Property Listings Findings

Based on the findings of the database search, environmental concerns that were identified on adjoining properties for the Project Area were classified as a **moderate** risk. The environmental concerns and associated risk rating are summarized below.

A total of 12 LUSTs properties are located adjoining to the Project Area. Three of these properties have LUST listings that have not achieved regulatory closure. Although the remaining LUST sites have achieved regulatory closure, no closure reports or confirmatory analytical results were readily available. In addition, the conditions associated with the open LUST properties are unknown. Additional listings identified near the Project Area include RCRA-CESQG (VSQG), FINDS, VCP, and Brownfield properties. Although limited information was obtained from these databases, the generation/storage of hazardous materials and/or documented contamination at adjoining properties poses a concern.

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5 Transportation

5.1 Overview

This section describes the Affected Environment as it relates to transportation across a variety of transportation modes. Railroad (including Amtrak, Virginia Railway Express [VRE], and Maryland Area Regional Commuter [MARC] Train), bus (intercity, tour/charter, and transit), private vehicle, ride-for-hire, bicycle, transit (Metrorail, Streetcar, and Metrobus), and pedestrian existing conditions are assessed.

5.2 Regulatory Context and Guidance

Federal guidance that may pertain to transportation include:

- The Federal Railroad Administration's (FRA's) *Procedures for Considering Environmental Impacts,*[35] which states that an Environmental Impact Statement (EIS) should consider impacts on both passenger and freight transportation, by all modes, with local, regional, national and even international perspectives. Vehicular impacts should be assessed both during the construction period and during post-construction operations.

- *The Comprehensive Plan for the National Capital: Federal Elements, Transportation*, adopted in 2016, prepared by the National Capital Planning Commission (NCPC);[36]

District policies, regulations, and guidance that may pertain to transportation may include:

- *The Comprehensive Plan for the National Capital: District Elements, Transportation*, adopted in 2006 and amended in 2011, prepared by the District of Columbia Office of Planning; [37]

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[35]   U.S. Department of Transportation, Federal Railroad Administration. 1999. *Procedures for Considering Environmental Impacts (64 FR 28545)*. Accessed from https://www.fra.dot.gov/eLib/Details/L02710. Accessed on June 6, 2017.

[36]   National Capital Planning Commission. 2016. *Comprehensive Plan for the National Capital: Federal Elements, Transportation*. Accessed from: https://www.ncpc.gov/plans/compplan/. Accessed on March 3, 2020.

[37]   DC Office of Planning. 2006. *The Comprehensive Plan for the National Capital: District Elements.* Accessed from https://planning.dc.gov/page/comprehensive-plan. Accessed on March 3, 2020.

- District Department of Transportation (DDOT) *Design and Engineering Manual*;[38]
- DDOT Pedestrian Safety and Work Zone Standards – Covered and Open Walkways;[39]
- DDOT Public Realm Manual;[40]
- DDOT DC Temporary Traffic Control Manual;[41] and
- DDOT Comprehensive Transportation Review Guidelines.[42]
- DDOT Environmental Policy and Process Manual, 2nd Edition[43]

Regional Policies, regulations, and guidance that pertain to transportation include:

- Transportation Planning Board's (TPB) 2014 Constrained Long-Range Transportation Plan (CLRP). [44]

5.3   Study Area

This section considers transportation conditions in the Washington Union Station (WUS) Expansion Project (the Project) Area, a Local Study Area, and a Regional Study Area. The Project Area includes the WUS buildings and the tracks and platforms being modified as part of the Project. It also includes Union Station Drive, the access lanes to WUS, as well as First and H Streets NE. The Local Study Area for transportation, depicted in **Figure 5-1**, includes the Project Area and 34 study intersections (listed below).

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[38]   District Department of Transportation. January 2019. *Design and Engineering Manual.* Accessed from https://ddot.dc.gov/page/design-and-engineering-manual. Accessed on February 28, 2020.

[39]   District Department of Transportation. 2007. *Pedestrian Safety and Work Zone Standards – Covered and Open Walkways.* Accessed from https://dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/pedestrian_safety_and_work_zone_standards_covered_and_open_walkways_july_2010.pdf. Accessed on June 6, 2017.

[40]   District Department of Transportation. 2011. *Public Realm Manual.* Accessed from https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/ddot_public_realm_design_manual_2011.pdf. Accessed on June 6, 2017.

[41]   District Department of Transportation. 2006. *D.C. Temporary Traffic Control Manual – Guidelines and Standards.* Accessed from https://comp.ddot.dc.gov/Documents/Temporary%20Traffic%20Control%20Manual.pdf. Accessed on June 6, 2017.

[42]   District Department of Transportation. 2012. *DDOT Guidelines for Comprehensive Transportation Review (CTR) Requirements.* Accessed from https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/ddot_comprehensive_transportation_review_requirements_2012.pdf. Accessed on June 6, 2017.

[43]   District Department of Transportation. 2012. DDOT Environmental Policy and Process Manual. Accessed from https://ddot.dc.gov/page/ddot-environmentalpolicy-and-process-manual-0. Accessed on June 21, 2018.

[44]   Metropolitan Washington Council of Governments (MWCOG). *TPB Constrained Long-Range Transportation Plan. 2014 CLRP and FY 2015-2020 TIP.* Accessed from http://www1.mwcog.org/clrp/resources/KeyDocs_2014.asp. Accessed on April 3, 2020.

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Figure 5-1. Transportation Local Study Area

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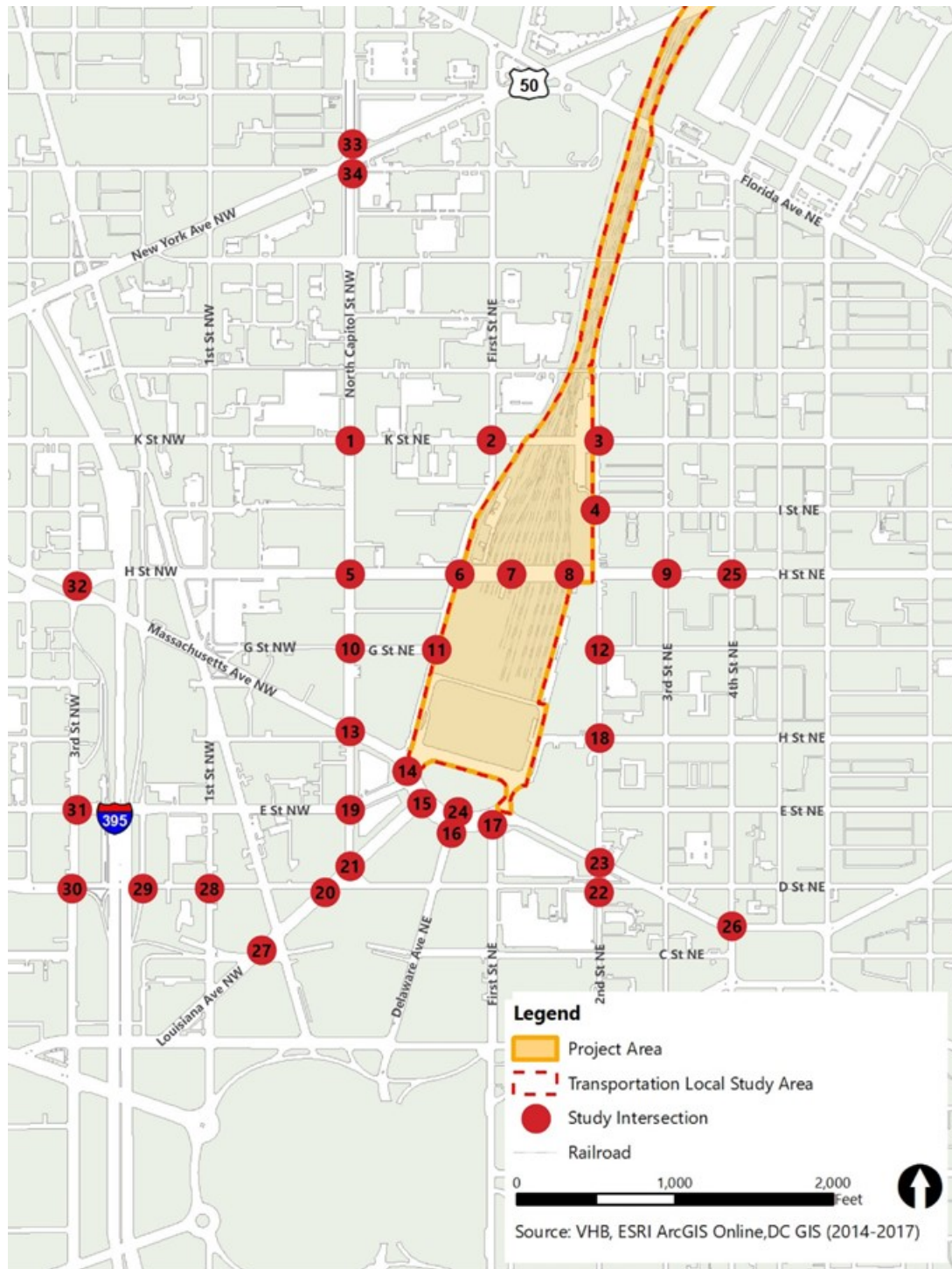
Study Intersections (numbers refer to **Figure 5-1**):

1. North Capitol and K Street
2. First Street and K Street NE
3. 2nd Street and K Street NE
4. 2nd Street and I Street NE
5. North Capitol Street and H Street
6. WUS Garage Entrance and H Street NE
7. WUS Bus Exit and H Street NE
8. Kaiser Permanente Entrance and H Street NE
9. H Street and 3rd Street NE
10. North Capitol Street and G Street
11. First Street and G Street NE
12. 2nd Street and G Street NE
13. North Capitol Street, Massachusetts Avenue, and F Street
14. E Street, Massachusetts Avenue, and First Street NE
15. Louisiana Avenue and Massachusetts Avenue NE
16. Delaware Avenue and Massachusetts Avenue NE
17. First Street and Massachusetts Avenue NE (at WUS entrance)
18. 2nd Street and F Street NE
19. North Capitol Street and E Street
20. Louisiana Avenue and D Street NW
21. Louisiana Avenue and North Capitol Street
22. 2nd Street and D Street NE
23. 2nd Street and Massachusetts Avenue NE
24. Massachusetts Avenue and Delaware Avenue NE
25. 4th Street and H Street NE
26. Massachusetts Avenue, C Street NE, and 4th Street NE
27. Louisiana Avenue and C Street NW
28. First Street and D Street NW
29. I-395 Tunnel at 2nd Street and D Street NW
30. 3rd Street and I-395 On-Ramp and Indiana Avenue and D Street NW
31. 3rd Street and E Street NW
32. 3rd Street, Massachusetts Avenue, and H Street NW
33. North Capitol Street (Southbound Ramp) and New York Avenue
34. North Capitol Street (Northbound Ramp) and New York Avenue

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The Regional Study Area for transportation is the Metropolitan Washington Council of Governments' (MWCOG) area of jurisdictions.[45] The MWCOG includes the local Metropolitan Planning Organizations (MPO) in Maryland (MD), the District, and Virginia (VA). This Regional Study Area is being selected because the Project is regionally significant and has an impact on transportation movements in different modes across the MWCOG area. Furthermore, the MWCOG area is the geography used for the Constrained Long-Range Plan and regional modeling efforts.

At a regional study level, this Affected Environment analysis considers an overview of the existing infrastructure in the Regional Study Area, in the different multimodal areas of analysis.

5.4   Methodology

The Affected Environment analysis summarizes the existing conditions and issues related to overcapacity, level of service (LOS), or other relevant factors depending on the service. The analysis is based on:

- Existing conditions documented from the data sources listed in Section 5.4 for the range of transportation modes identified to provide a broad description of the transportation conditions as they exist;

- The most recent data available for each data source and projected forward to 2017, if necessary, except where past data are consistent with expected present-day levels;

- Traffic counts which have been used to estimate existing LOS conditions at nearby intersections; and

- Data collected from observations at intersections surrounding WUS.

Existing conditions are used to calibrate the baseline and validate the model used to assess environmental consequences. 2017 is the base year for the existing conditions analysis. The analysis makes use of the most recent data available for each data source projected forward to 2017, if necessary, except where past data are consistent with expected 2017 levels.[46]

It should be noted that the Affected Environment analysis identified peak hours for WUS based on total activity for all modes; the station-wide AM Peak Hour was 8:00 AM – 9:00 AM and the station-wide PM Peak Hour was 4:30 PM – 5:30 PM. In certain instances, the analysis also identified peak hours or peak periods for a specific mode. These peak hours and peak periods are defined within each subsection as applicable.

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[45]   Map of MWCOG member jurisdictions. Accessed from https://www.mwcog.org/maps/cog-member-map/. Accessed on April 26, 2018

[46]   Traffic counts that predated 2017 were grown to 2017 levels using a 0.5 percent annual growth factor, consistent with the growth factor used to project forward to 2040 in the 2040 transportation impact analysis.

The Affected Environment analysis drew from a variety of data sources, which are listed below.

- Trains and Platforms
    - Amtrak, MARC, and VRE ridership data and train schedules provided by the rail operators; and
    - Platform occupancy data at peak periods from Amtrak.

- Bus Terminal
    - Daily bus counts and reservation data from Union Station Parking Garage, LLC (USPG);
    - Monthly passenger counts from USPG;
    - Data from private operators Greyhound/BoltBus, Megabus, and Peter Pan concerning bus fleet, monthly and yearly ridership, and daily schedules; and
    - On-site data collection of bus movements and passenger behavior.

- Parking
    - Parking counts provided by USPG;
    - Amtrak ridership survey data as it pertains to parking garage usage; and
    - On-site data collection, including parked car counts.

- Transit
    - WMATA existing ridership and schedule data for Metrobus and Metrorail;
    - DC Circulator ridership and schedule data;
    - Commuter bus ridership and schedule data; and
    - WMATA Union Station Access and Capacity Improvement Study Project Report.[47]

- Bicycle
    - DDOT bicycle counts;
    - DDOT planning efforts, including moveDC, Bike Master Plan, and Capital Bikeshare Plan;
    - Capital Bikeshare usage data for local stations;
    - Dockless bikeshare usage data for the area; and

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[47] Washington Metropolitan Area Transit Authority. 2011. Union Station Access and Capacity Improvement Study Project Report. Accessed from https://www.wmata.com/initiatives/plans/upload/Final-Union-Station-Project-Report-Feb182011.pdf. Accessed on June 6, 2017.

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- On-site data collection, including bicycle counts.

▪ Pedestrian

- On-site data collection of pedestrian volumes, both inside WUS and on local streets, during peak hours on a representative day.

▪ Traffic and Traffic Safety

- Traffic counts and resulting traffic analysis taken at key intersections;

- Roadway existing conditions;

- Signal timing information;

- Amtrak ridership surveys mode split information;

- Metropolitan Police Department and DDOT crash data; and

- DC Vision Zero traffic safety plan.

▪ For-Hire Vehicles

- On-site data collection of usage and dwell time information for all for-hire vehicles (taxis and transportation networking companies [TNCs]) performing pick-up and drop-off during peak hours on a representative day.

5.5   Affected Environment

5.5.1   Commuter and Intercity Rail Service

WUS is the busiest railroad station in the region and, with 37 million annual riders, is busier than any of the region's three commercial airports. Three railroads serve WUS: Amtrak, MARC, and VRE.

5.5.1.1   Amtrak

Amtrak provides intercity rail service to WUS. Eighty-five percent of Amtrak ridership originating or terminating at WUS is on two services – the Acela Express and the Northeast Regional – with the remaining 15-percent coming from long-distance services. Amtrak's Acela service provides high-speed, business class service between the District and Boston, MA. Amtrak's Northeast Regional service provides frequent stop service between the District and Boston, with extensions southward in VA to Lynchburg, Norfolk, and Newport News. Several long-distance trains also serve WUS. The Capitol Limited to Chicago, via Pittsburgh and Cleveland, and the Vermonter to St. Albans, VT, both originate from WUS. The Cardinal to Chicago, via Cincinnati and Indianapolis; Silver Service to FL; the Palmetto to Savannah, GA; the Crescent to New Orleans, LA; and the Carolinian to Charlotte all originate in NY and stop at WUS.

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In 2015, annual Amtrak ridership at WUS was 5.08 million, making WUS the second busiest Amtrak station in the system behind NY's Penn Station. The 5.08 million passengers represent the highest ridership of the 10 years included in this analysis, although ridership growth at WUS was relatively flat between 2011 and 2015 **(Figure 5-2)**. Systemwide, Amtrak ridership in 2017 was anticipated to be comparable to 2015 ridership figures, with Northeast Regional ridership up by approximately 4.0-percent. Based on Amtrak Northeast Corridor (NEC) ridership data, the projected 2017 Amtrak ridership at WUS was 5.14 million. Weekdays on average see higher ridership than weekends, with more than 16,000 average daily weekday boardings in 2015 **(Figure 5-3)**. Sundays are typically the busier of the weekend days, with nearly 50-percent more average daily boardings than Saturdays.

WUS is the southernmost electrified station on the East Coast. As a result, all trains heading southward of WUS operate using diesel engines. Trains coming from the north, but continuing to the south, make use of the "run-through" tracks on the east of WUS and switch from electric to diesel engines at WUS. The Capitol Limited operates a diesel train from the stub-end tracks[48] on the west side of the terminal.

Figure 5-2. Amtrak Annual Ridership at WUS by Fiscal Year
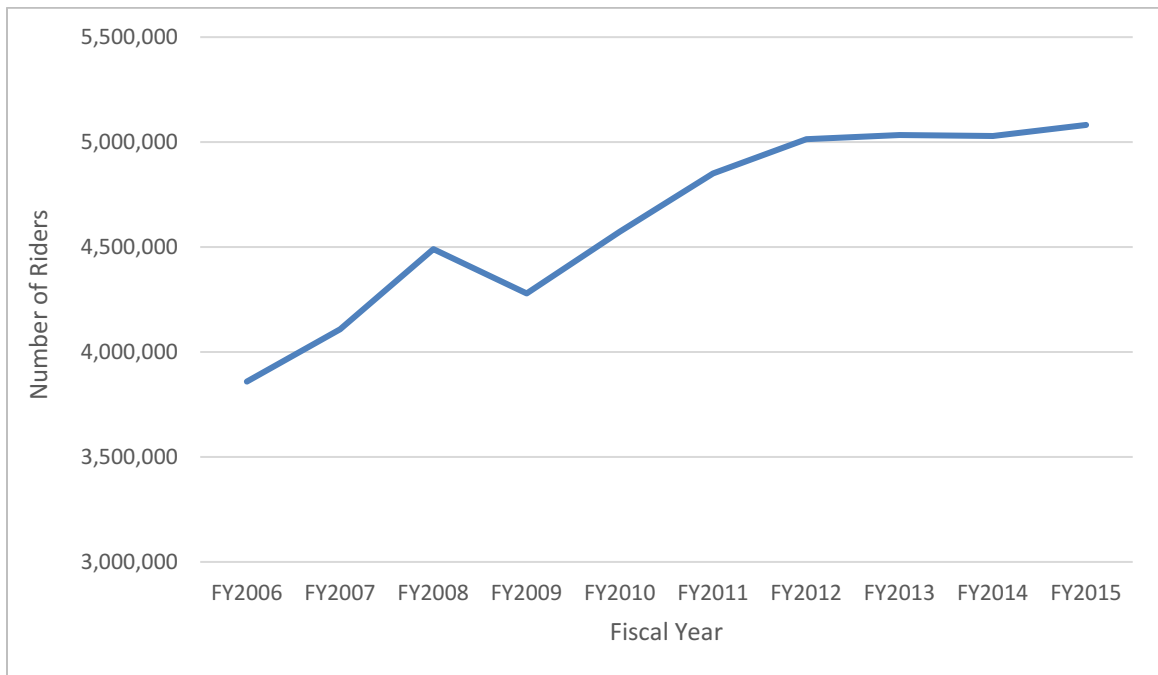
Source: Amtrak, 2015. *Union Station Rider and Revenue Report*. Accessed on October 20, 2015.

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[48]   In a stub-end track, the track ends at the station.

Figure 5-3. FY2015 Amtrak Average Daily Boardings and Alightings at WUS by Service Day
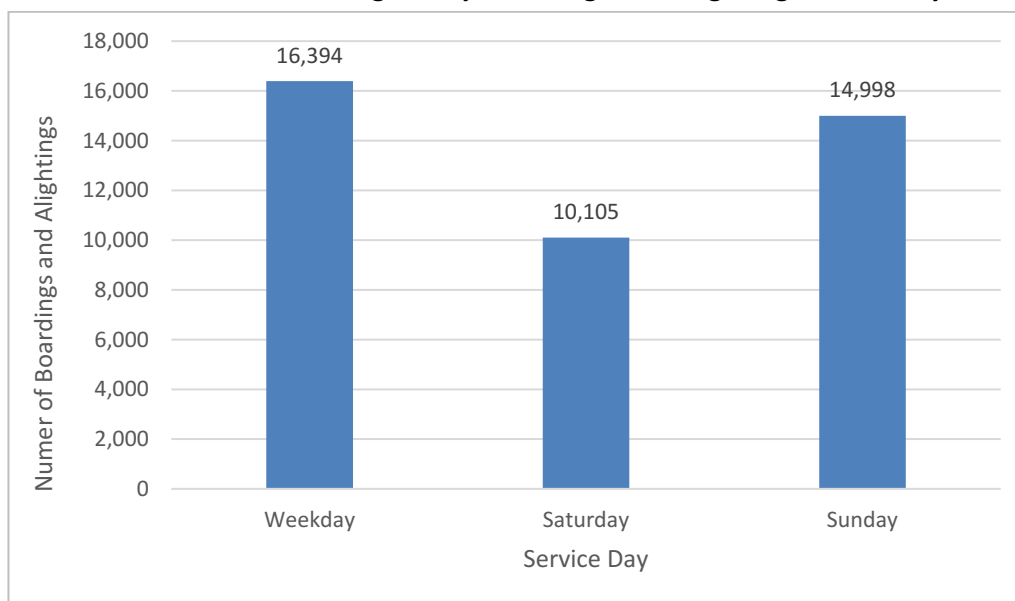
Source: Amtrak, 2015. Amtrak Union Station Ridership by Train Time. Accessed on October 20, 2015.

On average, Amtrak operates 93 daily weekday trips at WUS. Amtrak trains operate throughout the day with peak period trips accounting for approximately 41-percent of all trips and midday trips accounting for approximately 32-percent of all trips **(Table 5-1)**. A majority of the scheduled trips serving WUS originate and terminate at WUS; specifically, 70-percent of all weekday trips, 58-percent of Saturday trips, and 64-percent of Sunday trips.

Table 5-1. Number of Amtrak Trips Serving WUS by Trip Type, Time Period, and Service Day

	Early AM (3 AM – 6 AM)	AM Peak (6 AM –9 AM)	Midday (9 AM –3 PM)	PM Peak (3 PM –7 PM)	Evening (7 PM –11 PM)	Late Night (11 PM –3 AM)	Saturday	Sunday
Start and End	4	9	21	19	14	5	40	50
Through	-	4	9	7	1	-	17	18
Total	4	13	30	26	15	5	57	68

Source: Amtrak, 2015.[49]

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[49] Amtrak System Timetable Spring to Fall 2015. Accessed from http://www.timetables.org/newpdf/NatT01_20150406_2015_Spring_Fall.pdf. Accessed on October 21, 2015.

The overall peak hour of Amtrak ridership on weekdays was between 5:00 PM and 6:00 PM, with nearly 2,000 boardings and alightings.[50] On Saturdays, the overall peak hour was betwee 9:00 AM and 10:00 AM (1,200 boardings and alightings), and on Sundays the overall peak hour was between 4:00 PM and 5:00 PM (1,700 boardings and alightings). Based on ridership data, weekdays typically had three distinct periods with relatively high levels of ridership activity: 8:00 AM to 11:00 AM, 1:00 PM to 2:00 PM, and 3:00 PM to 7:00 PM. **Figure 5-4** illustrates average daily boardings and alightings by hour and service day.

On an average weekday, Acela and Northeast Regional trains serving WUS had a total capacity of 56,498 passengers, with a capacity of 3,146 passengers during the AM Peak Hour (8:00 AM – 9:00 AM) and 3,276 passengers during the PM Peak Hour (4:30 PM – 5:30 PM). The average weekday peak hour load factor at WUS for Acela trains was 61.1 for the AM Peak and 65.4 for the PM Peak. For Northeast Regional trains, the average weekday peak hour load factor at WUS was 38.9 in the AM Peak and 55.3 in the PM Peak.

Figure 5-4. FY2015 Amtrak Average Daily Ridership at WUS by Hour and Service Day
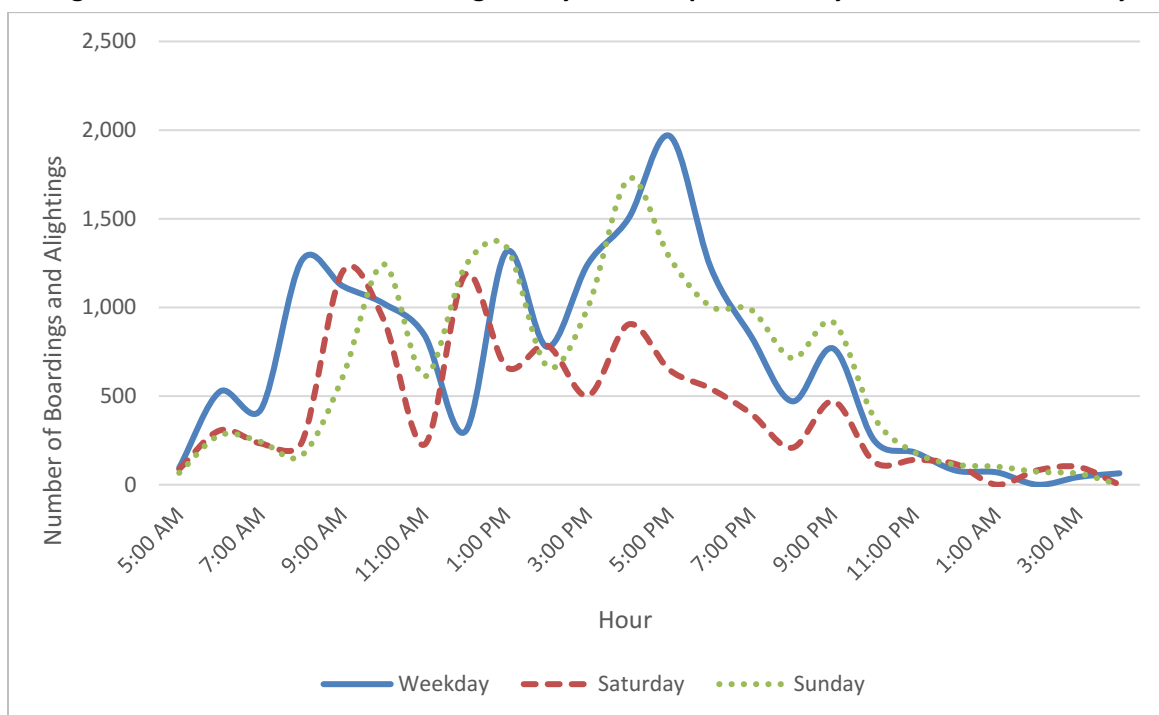
Source: Amtrak, 2015. Amtrak Union Station Ridership by Train Time. Accessed on October 20, 2015.

Amtrak's highest ridership trips are all on the Northeast Regional Line. The highest ridership weekday departures included the 5:20 PM departure (291 passengers) and the 5:05 PM departure (403 passengers). The highest ridership weekday arriving trip was the 5:20 PM (291 passengers), followed by the 1:05 PM (284 passengers). The overall highest ridership

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[50] A boarding refers to a passenger getting onto a transit vehicle, in this case a train. An alighting refers to a passenger disembarking from a transit vehicle.

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departing trip was the 5:05 PM weekday trip, while the highest arriving weekend trip was the 5:35 PM Sunday trip. The highest ridership weekday arrival and departure trips have Friday service only. **Table 5-2** summarizes the highest ridership arriving and departing trips by service day.

Table 5-2. FY2015 Amtrak Highest Ridership Arrival and Departure Trips at WUS by Service Day

	Passengers	Trip Start Time	Service
Weekday Departing	433	5:05 PM	Northeast Regional Friday Only (Washington, DC to Springfield, MA)
Weekday Arriving	291	5:20 PM	Northeast Regional Friday Only (Boston, MA to Newport News, VA)
Saturday Departing	323	9:44 AM	Northeast Regional Saturday Only (Richmond, VA to Boston, MA)
Saturday Arriving	291	2:25 PM	Northeast Regional Saturday and Sunday (Boston, MA to Richmond, VA)
Sunday Departing	414	4:25 PM	Northeast Regional Sunday Only (Washington, DC to New York, NY)
Sunday Arriving	387	5:35 PM	Northeast Regional Saturday and Sunday (Boston, MA to Washington, DC)

Source: Amtrak, 2015. Amtrak Union Station Ridership by Train Time. Accessed on October 20, 2015.

5.5.1.2   MARC

MARC provides commuter rail service between WUS and points in MD and WV. Three MARC lines serve WUS: the Brunswick Line, Camden Line, and the Penn Line **(Figure 5-5)**. The Brunswick Line extends from WUS to Martinsburg, WV, with a spur to Frederick, MD, along CSX's Metropolitan Division. The Camden Line connects WUS and Baltimore-Camden Station along the Camden Division owned by CSX. The Penn Line operates along Amtrak's NEC tracks between WUS and Perryville, MD, via Baltimore-Penn Station. The Penn Line service is electrified, while Brunswick and Camden Line services use diesel engines. MARC service currently uses the western stub-end tracks at WUS. Across the three services, daily WUS ridership over twelve months in 2014-2015 was 16,020 **(Table 5-3)**, for a total of 3.97 million annual riders. Based on ridership trends, 2017 numbers are estimated to be the same. Data are currently unavailable from MARC regarding overcrowding of trains. However, in the *MARC Growth and Investment Plan Update 2013 to 2050*, the Maryland Transit Administration (MTA) cites crowded rush hour trains as a challenge for future growth.

Figure 5-5. MARC System Map

Source: MTA, 2017.[51]

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51   MARC System Map Accessed from https://mta.maryland.gov/sites/default/files/MARC_System_Map_10302017.pdf.
     Accessed on April 30, 2018.

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Table 5-3. MARC Commuter Rail Average Daily Ridership at WUS by Route and Service Day

	Average WUS Weekday Ridership	Average WUS Saturday Ridership	Average WUS Sunday Ridership
MARC Penn Line	10,795	1,143	741
MARC Camden Line	2,067	-	-
MARC Brunswick Line	3,158	-	-
MARC Total	16,020	1,143	741

Source: MTA, 2015.[52]

MARC trains operate out of Gates A, B, C, and L. MARC tickets are available as full-fare, one-way, 7-day, and monthly. Tickets can be purchased at a ticket agent counter, online, through a commuter store, the Amtrak Quik-Trak ticket machine in WUS, or on-board MARC trains. Purchasing tickets on-board are subject to a five-dollar surcharge. MARC also has a cross honor agreement with Amtrak which allows MARC monthly, weekly, and Transit Link Card ticket holders the ability to use specified Amtrak trains for commuter travel within the MARC zone.

The Penn Line operates weekday peak, midday, and evening service and weekend service at WUS. During peak hours, both express and local trains provide service, providing service to Perryville, Baltimore, and BWI Thurgood Marshall Airport, among other locations. In the southbound direction (Perryville, MD or Baltimore Penn to DC), nine trips, including one operated by Amtrak, serve WUS during weekday AM Peak Periods (between 6:15 AM and 8:36 AM). In the northbound direction (DC to Perryville, MD), 12 trips, including one operated by Amtrak, serve WUS during weekday PM Peak Periods (between 3:02 PM and 6:40 PM).

The Camden Line operates primarily peak weekday service at WUS. In the westbound direction (Baltimore, MD to DC), five trips serve WUS during weekday AM Peak Periods (between 6:05 AM and 8:21 AM). In the eastbound direction (DC to Baltimore, MD), six trips serve WUS during weekday PM Peak Periods (between 3:30 PM and 6:55 PM).

The Brunswick Line operates weekday peak-only directional service with one evening trip departing WUS. In the eastbound direction (Martinsburg, WV to DC), eight trips serve WUS during weekday AM Peak Periods (between 6:32 AM and 8:52 AM). In the westbound direction (DC to Martinsburg, WV), eight trips serve WUS during weekday PM Peak Periods (between 3:30 PM and 6:40 PM). **Table 5-4** shows level of service for MARC commuter rail in the Local Study Area by route, direction, service day, and time.

5.5.1.3   VRE

Both VRE lines have their terminus at WUS (**Figure 5-6**). The Manassas Line provides service from Broad Run in Prince William County, VA. The Fredericksburg Line provides service from

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[52]   MARC Ridership Data by Line. Accessed from https://data.maryland.gov/Transportation/MTA-Average-Weekday-Ridership-by-Month/ub96-xxqw. Accessed on October 20, 2015.

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Spotsylvania in Spotsylvania County, VA. VRE service uses diesel locomotives and uses the run-through tracks on the east end of the terminal. In fiscal year 2015 (FY2015), VRE had a total of 18,589 riders across all lines and stations. Based on growth figures, it is estimated that 2017 WUS ridership is 4,352 daily riders and 1.09 million annual riders.

VRE trains provide service on weekdays only, their current agreements with host railroads prohibit weekend operations. VRE trains operate out of Gates G and L. Passengers can purchase tickets on-board or at VRE kiosks, and VRE honors MARC tickets for onboard reverse flow VRE trains. MARC no longer honors VRE tickets on off-peak trains. VRE operates one reverse flow AM trip and PM trip respectively on the Manassas Line.

Figure 5-6. VRE System Map

Source: VRE. 2015. System Map. Accessed from https://www.vre.org/service/map/. Accessed on October 20, 2015

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Table 5-4. Number of MARC Commuter Rail Trains Serving WUS by Route, Direction, Time Period, and Service Day

	Weekday					Weekend	
	Early AM (4 AM –6 AM)	AM Peak (6 AM –9 AM)	Midday (9 AM –3 PM)	PM Peak (3 PM –7 PM)	Evening (7 PM –11 PM)	Saturday	Sunday
Penn Line Northbound	1	6	7	11	3	9	6
Penn Line Southbound	2	8	7	7	3	9	6
Camden Line Westbound	0	6	0	3	1	-	-
Camden Line Eastbound	0	4	0	6	1	-	-
Brunswick Line Westbound	0	0	0	8	1	-	-
Brunswick Line Eastbound	0	9	0	0	0	-	-
MARC Total	3	33	14	35	9	18	12

Source: MTA, 2015.[53]

The Fredericksburg Line provides primarily weekday peak service. In the northbound direction (Fredericksburg, VA to DC), seven trips, including one operated by Amtrak, serve WUS during weekday AM Peak Periods (between 6:30 AM and 9:00 AM). In the southbound direction (DC to Fredericksburg, VA), nine trips, including two operated by Amtrak, serve WUS during weekday PM Peak Periods (between 3:00 PM and 7:00 PM).

The Manassas Line provides primarily peak weekday service. In the northbound direction (Manassas, VA to DC), five trips serve WUS during weekday AM Peak Periods (between 6:24 AM and 8:39 AM). In the southbound direction (DC to Manassas, VA), seven trips, including one operated by Amtrak, serve WUS during weekday PM Peak Periods (between 3:45 PM and 6:50 PM). **Table 5-5** shows VRE Commuter Rail LOS by route, direction, and time period.

During the midday, VRE trains are currently stored in the existing wedge and Ivy City yards owned by Amtrak. As a result, VRE trains have to cross multiple tracks in the morning and afternoons to stage trains, affecting the operations of the WUS railyard.

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[53] MARC Schedules (Brunswick, Camden, and Penn Lines). Accessed from https://mta.maryland.gov/marc-train. Accessed on October 20, 2015.

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Table 5-5. Number of VRE Commuter Rail Trains Serving WUS by Route, Direction, and Time Period

	AM Peak (6 AM – 9 AM)	Midday (9 AM – 3 PM)	PM Peak (3 PM – 7 PM)	Evening (7 PM – 11 PM)
Fredericksburg NB	7	1	0	0
Fredericksburg SB	0	1	7	0
Fredericksburg Amtrak Service[54] NB	1	3	0	1
Fredericksburg Amtrak Service SB	1	1	2	1
Manassas NB	5	1	2	0
Manassas SB	1	1	6	0
Manassas Amtrak Service NB	0	1	0	0
Manassas Amtrak Service SB	0	0	1	0
VRE Total	15	9	18	2

Source: VRE, 2015.[55]

The Manassas Line has higher ridership than the Fredericksburg Line at WUS. On weekdays, approximately 4,333 persons ride VRE trains at WUS, with slightly more passengers riding in the outbound direction than in the inbound direction. **Table 5-6** below shows average weekday VRE ridership at WUS by route and direction.

Table 5-6. VRE Commuter Rail Average Weekday Ridership at WUS by Route and Direction

	Inbound at WUS	Outbound at WUS
VRE Fredericksburg	879	1,124
VRE Manassas	1,128	1,202
Total	2,007	2,326

Source: VRE, 2014.[56]

According to the *2015 VRE Performance Measures Report*, two trips on the Manassas Line and three trips on the Fredericksburg Line experience overcrowding during the mid-week peak. One additional trip on the Manassas Line is nearing capacity. The five overcrowded trips are all during the PM Peak Period in the southbound direction, or outbound from WUS. The most severely overcrowded trip is the 3:10 PM Fredericksburg Line trip, which experiences passenger loads at 123-percent of seated capacity.

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[54] Monthly VRE tickets are accepted on these Amtrak Regional trains.

[55] Fredericksburg and Manassas Lines Schedules. Accessed from https://www.vre.org/service/schedule/. Accessed on October 22, 2015.

[56] VRE. 2014. FY14 VRE Ridership by Station. Accessed on October 21, 2015.

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5.5.2   WMATA Metrorail

WUS is served by the WMATA Union Station Metrorail station, located directly west of the historic station. Entrances to WUS from the WMATA Metrorail station are in the western colonnade, in the Claytor Concourse, and in the food court. The WUS Metrorail station, located on the Red Line, is the busiest station in the system, with 28,762 entries and 29,251 exits in October 2015. On Saturdays, entries total 9,577 and exits total 8,744. On Sundays, entries average 8,211 and exits average 6,876.[57] Based on WMATA's ridership trends, it is estimated that ridership remains at similar levels today. While there were further dips in ridership after October 2015 due to SafeTrack, WMATA's intensive restorative maintenance program, ridership has bounced back slightly since the conclusion of that program in summer 2017.

The WUS WMATA Metrorail station has a north and south mezzanine. Ridership follows the boarding and alighting patterns presented in **Table 5-7** on the two mezzanines. Crowding is an existing peak hour condition at the station. In 2009, the last year for which data was available, WMATA indicated that it could take passengers up to five minutes and 35 seconds to travel from the WMATA platform level to the train platform level, due to queueing at the existing escalators.[58]

Table 5-7. WUS WMATA Total Entries per Mezzanine

	North Mezzanine	South Mezzanine
Weekday	13,800	14,962
Saturday	4,216	5,361
Sunday	4,345	3,866

Source: WMATA, 2011.[59]

Information is also available on the train loads by direction in the peak hour (**Table 5-8**). In the AM Peak (8:00 AM – 9:00 AM), the ridership is higher in the westbound direction, with 8,499 riders in the segment between the NoMA Metrorail station and the WUS Metrorail station, and 10,378 peak riders between WUS and Judiciary Square. In the PM Peak (5:00 PM – 6:00 PM), the ridership is higher in the eastbound direction, with a notable drop-off east of WUS. From Judiciary Square to WUS, the PM Peak ridership is 9,948 and from WUS to NoMA Metrorail station the peak ridership is 7,776.

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[57]   WMATA. 2015. October 2015 Metrorail Faregate Data.

[58]   WMATA. 2011. *Union Station Access and Capacity Improvement Study.* Accessed at https://www.wmata.com/initiatives/plans/upload/Final-Union-Station-Project-Report-Feb182011.pdf. Accessed on July 2, 2018.

[59]   WMATA, 2011. *Union Station Access and Capacity Study.* Accessed from https://www.wmata.com/initiatives/plans/upload/Final-Union-Station-Project-Report-Feb182011.pdf. Accessed on October 25, 2015.

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Table 5-8. WUS Peak Hour Ridership by Red Line Segment

Eastbound			Westbound		
Segment	AM Peak (8 AM – 9 AM)	PM Peak (5 PM – 6 PM)	Segment	AM Peak (8 AM – 9 AM)	PM Peak (5 PM – 6 PM)
Judiciary Square to Union Station	5,071	9,948	NoMA-Gallaudet to Union Station	8,499	2,592
Union Station to NoMA-Gallaudet	1,955	7,776	Union Station to Judiciary Square	10,378	5,275

Source: WMATA, 2015.[60]

5.5.3 Streetcar

The DC Streetcar, operated by DDOT, began providing service on February 27, 2016. The streetcar operates on a 2.4-mile track on H Street NE/Benning Road and connects WUS to H Street NE and Benning Road. The stop for the DC Streetcar is located on H Street NE behind WUS and is accessible from WUS via the bus facility. To reach the platform, pedestrians must cross to the center median (signalized crossing) and walk approximately 200 feet. The Streetcar operates seven days a week and now averages a 12-minute headway. As of July 2017, weekday ridership on the entire Streetcar line is 3,805 and weekend ridership is 2,875. Monthly ridership topped 100,000 in both June and July 2017. Ridership figures for just the WUS stop are not available at this juncture.[61] Funding has been secured to extend the DC Streetcar line to the Benning Road Metrorail station.

5.5.4 Intercity, Tour/Charter, Sightseeing, and City Buses

Since the 1980s, WUS has contained a bus facility in its parking garage. The bus facility has 61 slips (short term parking spots) and is the largest bus facility in the region. It also presently offers long-term storage of buses, as well as large vehicles like box trucks, TV trucks, and RVs.

Initially, only tour and charter buses served WUS. In 2012, intercity buses were brought into the terminal as part of a process led by USRC, DDOT, and Delegate Eleanor Holmes Norton. These intercity carriers included Greyhound, Bolt, Megabus, Washington Deluxe, and Best Bus. Based on the August 2013 to December 2015 data provided by USRC, the Bus Terminal saw between 130,000 and 284,000 monthly riders over those two years.[62] In that period, ridership peaked in August 2014, when it reached 284,544 across all operators. Megabus consistently has the highest ridership, followed by Greyhound, Bolt Bus, Washington Deluxe, and Best Bus. Greyhound reports that they served 754,632 passengers in calendar year 2014

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[60] WMATA. 2015. May 2015 Passenger Load Data. Accessed on October 20, 2015.

[61] DC Streetcar Ridership Reports. Accessed from https://www.dcstreetcar.com/about/information/ridership-reports/ . Accessed on April 30, 2018.

[62] USRC. 2015. Intercity Bus Terminal Passenger Counts. Accessed on April 30, 2018.

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and that Bolt served 392,994. Megabus reported 1.478 million passengers in that same period. Ridership has since decreased from 2012 peaks as of 2015 data. \

Tour and charter buses continue to use the bus facility at WUS, largely providing tourists the opportunity to eat and shop at WUS. The existing bus facility is located in the WUS garage, and is accessed via H Street NE. The facility has 61 slips available for short-term bus parking. Rental data from the month of May in three successive years (2013-2015) indicate that between 2,100 and 2,381 buses rented a spot per month. The daily bus counts taken by USPG between May 26 and June 17, 2016 found that loads peaked around midday (11:00 AM – 12:00 PM), with approximately 10 buses in an hour, and early evening (5:00 PM), with approximately 11 buses in an hour. The weekday and weekend data are fairly similar. On weekdays, the initial peak comes in the 11:00 AM hour and averages 11 buses/hour, while the evening peak happens at 5:00 PM with 12 buses in an hour. On weekends, the Midday Peak occurs in the 12:00 PM hour with nine buses in an hour and the PM Peak occurs in the 5:00 PM hour with nine buses in an hour. In any one hour, the number of reservations peaked at 27. Facility use is very low in the overnight hours. The period of 8:00 PM to 7:00 AM averaged fewer than one bus per hour for the study period, though buses, usually around one or two at a time, do enter and exit the facility in the overnight hours.

Daily sightseeing coach buses are also present in the bus facility. These buses provide scheduled service to popular tourist attractions such as Gettysburg, Mount Vernon, and the monuments on the National Mall at night. These bus services currently occupy two slips in the facility.

The DC Circulator, a city bus service operated by DDOT, uses the bus facility for its Georgetown to WUS (GT-US) route. This route regularly uses three to four bus slips to maintain a 10-minute headway on the service. Based on DDOT data, approximately 120,000 riders use the GT-US route monthly, or approximately 4800 every weekday, as of December 2016.[63] Approximately 24,000 riders use the entirety of the Union Station-Navy Yard Circulator service that serves WUS from Massachusetts Avenue NE, while 17,000 monthly users ride the entirety of the National Mall Circulator service that serves WUS from E Street NE.

Hop-on/hop-off sightseeing buses use the front of WUS in the middle lanes of Union Station Drive NE. These bus companies include Duck Tours, Old Town Trolley, Big Bus, and City Sights DC. Big Bus, City Sights DC, and Old Town Trolley/Duck Tours all pick-up and drop-off passengers in Columbus Circle. Big Bus has a small kiosk located adjacent to the WUS front entrance, at the end of the taxi lane, for ticket sales. City Sights DC and Old Town Trolley/Duck Tours have ticket counters in WUS's main lobby. The three companies' buses layover in the Columbus Circle Bus Lane. Additionally, buses for Big Bus layover adjacent to

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[63]   DDOT, 2017. *DC Circulator Key Performance Indicators*. Accessed from
https://public.tableau.com/profile/david.koch4362#!/vizhome/CirculatorKeyPerformanceIndicators/KeyPerformanceIndicators. Accessed on June 28, 2018.

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their sales kiosk, at the end of the taxi lane, while Old Town Trolley/Duck Tours layover in the WUS bus deck at two unassigned bays near the Kiss and Ride.

5.5.5   Vehicular Parking and Rental Cars

WUS has an existing parking facility that provides parking for private vehicles, including monthly parking, and for rental cars. Data were provided by the USPG, which operates the bus terminal and parking garage on behalf of USRC. Data collected from USPG were validated by field visits and surveys. USPG provides approximately 2,200 marked parking spaces on four levels. Factoring in the space used for rental cars (see Rental Cars below), total capacity is approximately 2,450 cars. A review of USPG daily and seasonal data noted that the garage operates above or near 90-percent occupancy on most weekdays throughout the year.

Survey of Current Parking Garage Usage and Occupant Behavior

Comprehensive parking inventory and occupancy data were provided by USRC and USPG. The data included daily garage occupancy, revenue, and hourly usage for comparison of a multi-month period.

The 90th percentile occupancy of the garage within the data set provided was 1,981 vehicles, which represents approximately 90-percent of the garage capacity. The USRC and USPG data indicated that on many afternoons throughout the year Level 1 and Level 4 reach capacity. Seasonal occupancy rates are shown in **Table 5-9** and **Figure 5-7**. These data show the days of the week within each season when the garage is most full. According to the data, Wednesday is the busiest day for the garage across all seasons. Seasonally, occupancy peaks in the spring across all weekdays. On Wednesdays in the spring, 90th percentile occupancy reaches as high as 95-percent.

Table 5-9. Daily and Seasonal 90th Percentile Occupancy

Day	Winter (Dec-Feb)		Spring (Mar-May)		Summer (Jun-Aug)		Fall (Sep-Nov)	
	Occupied Spaces	Percent Full	Occupied Spaces	Percent Full	Occupied Spaces	Percent Full	Occupied Spaces	Percent Full
Monday	1,620	74%	1,787	81%	1,714	78%	1,702	78%
Tuesday	1,907	87%	2,004	91%	1,976	90%	1,913	87%
Wednesday	1,948	89%	2,078	95%	2,040	93%	2,017	92%
Thursday	1,962	89%	2,029	92%	1,976	90%	1,941	88%
Friday	1,789	82%	1,954	89%	1,789	82%	1,720	78%

Source: USPG, 2016.[64]

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[64]   USPG. March 2016. Counts conducted March 24, 2016. Provided to FRA.

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Figure 5-7. Daily and Seasonal 90th Percentile Occupancy
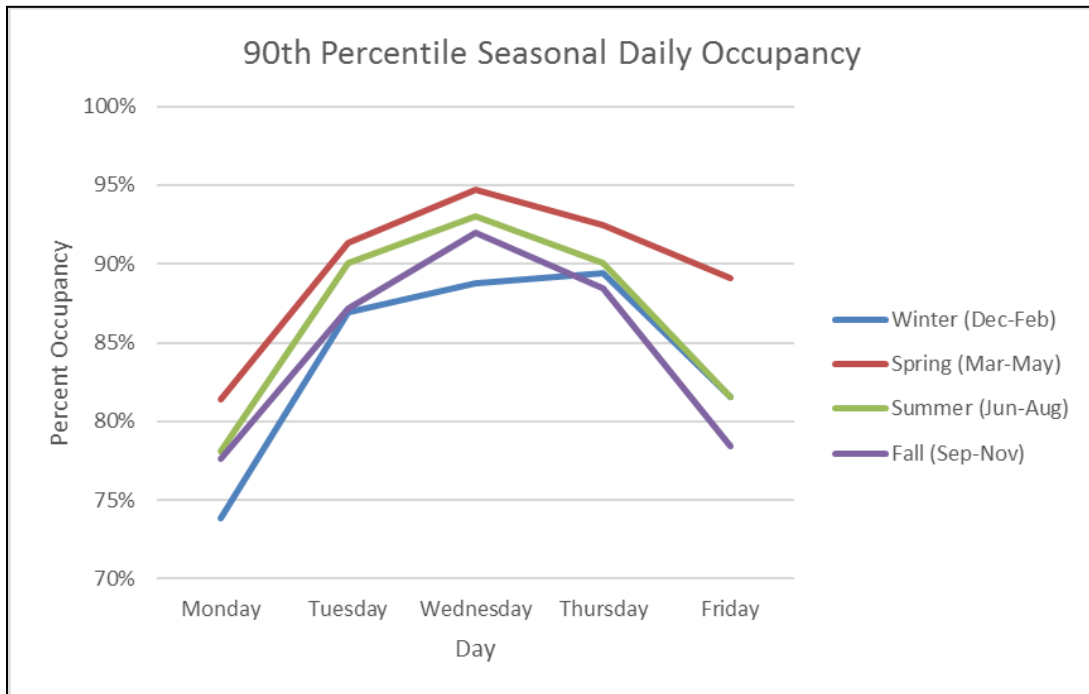
Source: USPG, 2016.[65]

Retail/Tourism/Short-term Visitor Parking

The Union Station Redevelopment Act of 1981 called for expansion of the parking garage to its originally intended size. The Act stipulated that the garage's pricing structure could be above cost but should encourage use by patrons visiting both WUS and the surrounding area.

The retail at WUS relies in part on the parking capacity offered at the parking garage. The retail lease stipulates the provision of 600 spaces. To understand the demand for retail and other short-term uses, it was assumed that visitors to WUS remaining there for less than five hours were making use of the retail functions of WUS or making use of the garage to visit the surrounding area as noted in the Act. Based on USPG parking data, an average of around 860 parkers used the facility between one and five hours. These parkers stay a total of 1,800 hours. A peaking analysis concluded that 429 spaces would be required to meet daily observed retail demand.

Rental Cars

The WUS Parking Garage also supports rental car facilities for Enterprise Car Rental, Avis/Budget Car Rental, and Hertz Car Rental. Zipcar and Enterprise CarShare also have

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[65] USPG, 2016. March 2016. Counts conducted March 24, 2016. Provided to FRA.

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spaces. A site visit to the car rental facility was conducted on November 2, 2016, with follow-up site visits in January 2017. There are approximately 85 marked parking spaces in the facility. Information from USPG provided in April 2017 indicated that the average occupancy of the rental car facility was around 275, up from 260 in 2016.[66] There are also three large areas for cleaning rental vehicles and simple maintenance. The rental car operators have indicated that the current conditions are cramped and lead to vehicle accidents.[67] Site visits confirmed that when the facility is near capacity, there is substantial "stacking" of vehicles[68] and very limited room for vehicles to maneuver. Stacking of rental vehicles allows for maximized parking per square footage as opposed to discrete parking spaces. The current facility has approximately 51,800 square feet of space. **Table 5-10** below lists the current rental car companies and their range of spot counts. The table includes two car-share providers, Zipcar and Maven, which operate within traditional parking spaces in the garage.

Table 5-10. Rental Car Counts at WUS Garage

Provider	Range of Car Counts	Approximate Square Footage Used in Garage
Hertz	80-90	17,000
Avis	75-80	17,000
National	95-120	18,000
ZipCar	25-30	n/a
Maven	20-30	n/a

Source: USPG, 2016.[69]

5.5.6   For-Hire Vehicles

The term "for-hire vehicles" refers to both traditional taxis, limousines, and "transportation networking companies," like Uber and Lyft, that provide point-to-point service. All these services make use of WUS, with official pick-up and drop-off activities happening exclusively in the front of WUS along Union Station Drive. Anecdotally, pick-ups and drop-offs also happen on 1st, 2nd, and H Streets NE.

There is a designated taxi lane for taxis picking up passengers in Columbus Circle. Only taxis with District license plates are allowed to use this lane and pick up passengers. Taxis can enter the queue via H Street NE. Taxis from all states can drop off passengers in the designated pick-up/drop-off lane in Columbus Circle. However, non-District plated taxis cannot pick up passengers in the pick-up/drop-off lanes.

USPG, the same entity that manages the WUS bus facility and parking garage, manages the day-to-day taxi operations. Taxi dispatchers are positioned at the WUS front entrance to

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[66]   USPG email correspondence to Drew Morrison. April 12, 2017.

[67]   USPG email correspondence to Paul Moyer. April 11, 2016.

[68]   "Stacking" refers to when multiple vehicles are parked in a single parking space or when cars are parked with such density that they block adjacent parked cars.

[69]   USPG. March 2016. Counts conducted on March 24, 2016. Provided to FRA.

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assist passengers loading into taxis and at the H Street entrance to manage traffic and prevent non-District taxis from entering the line.

Taxi lane operations vary depending on passenger needs. When there is no passenger queue, taxis line up single file and passengers are simply directed to the first taxi in line. When there is a passenger queue, the taxis are instructed by the dispatchers to queue in both lanes. The dispatcher directs patrons to whichever taxi is next in line – either the taxi in the inner lane or the outer lane. The dispatcher will also load patrons into taxis that are behind the designated loading area. There were a few times during observations where there were passengers in the queue but no available taxis. The dispatchers would use their radio to locate District taxis in the outer pick-up and drop-off lanes and instruct passengers in the taxi passenger queue to use these cabs.

On average, taxis picked up 1.2 passengers per vehicle in the AM Peak Hour (8:00 AM – 9:00 AM) and 1.3 passengers in the PM Peak Hour (4:30 PM – 5:30 PM). The longest taxi queue line observed terminated at 50 H Street NE. The District discourages taxi queueing on H Street and enforcement is conducted regularly. The average queue length was 51 vehicles, approximately 1,269 feet, in the AM Peak, and 103 vehicles, approximately 2,579 feet, in the PM Peak. **Table 5-11** below summarizes the observed taxi lane and queue operations during data collection on December 3, 2015.

Table 5-11. Columbus Circle Observed Taxi Lane Activity by Peak Period

	AM Peak	PM Peak
Maximum Number of Taxis per hour	197	135
Average Through Time	7.3 minutes	9.8 minutes
Average Dwell Time	31.1 seconds	20.6 seconds
Average Number of Passengers Entering/Exiting per Taxi	1.2	1.3
Average Queue (Number of Vehicles)	51	103
Average Queue (Length)	1,269 feet	2,579 feet

Source: VHB, Count conducted on December 3, 2015.

The observed passenger queue, patrons waiting in line for an available taxi, was longest directly after Amtrak trains arrived at WUS. The maximum observed passenger queue was approximately 70 persons in the AM Peak Period and approximately 80 persons in PM Peak Period. The head dispatchers explained that the queue gets busy depending on train arrivals. Therefore, dispatchers on duty pay attention to the train arrival display inside WUS so they can anticipate when the queue line will be busy.

Also of interest are other for-hire or ridesharing services, like Uber and Lyft. Detailed information is not available about these services as the operators themselves only offer limited data publicly. Based on DDOT data, approximately 4,100 TNC pick-ups and 5,300 drop-offs happen daily at WUS.

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5.5.7   Private Pick-up and Drop-off

As with for-hire vehicles, private passenger vehicles engage in pick-up and drop-off in Union Station Drive NE. The middle lanes, which are separated from the taxi lane and outer lanes with concrete islands and security posts, are designated bus only lanes. The two outer most lanes are reserved for vehicles picking-up and dropping-off passengers.

In the outer lanes, the left lane is for through traffic and the right lane is for cars picking up and dropping off passengers. In the PM Peak, there are USPG Traffic Control personnel helping to direct traffic and ensure that cars are not idling in this lane.

The maximum number of total vehicles entering the pick-up/drop-off and bus lanes during observations was 385 between 3:30 PM and 4:30 PM. The maximum number of buses observed was six during the AM Peak and 12 during the PM Peak. Private automobiles had the highest average dwell time, the time it takes passengers to enter or exit a vehicle, with 62.3 seconds. The average number of passengers entering or exiting each vehicle was highest among for-hire vehicles in the PM Peak with 1.4 passengers per vehicle.

The longest calculated queue for the pick-up/drop-off and bus lanes was in the PM Peak Period at approximately 1,755 feet, or 70 vehicles. This queue was metered by the traffic signal at First Street NE, which prevented vehicles from queuing further into the circle.

5.5.8   Loading

As an active transportation and retail facility, WUS receives daily deliveries of goods. Two loading facilities serve WUS: 1) on First Street NE between Massachusetts Avenue NE, and G Street NE, and provides access to a loading dock and the train tracks and 2) on H Street NE to the east of the railroad tracks, is shared with the adjacent Station Place private development. Based on counts taken in April 2017, an average of 48 WUS-serving vehicles use the H Street loading dock every day. An average of 43 vehicles use the First Street loading dock every day. A mix of vehicles use the loading docks based on the program they serve. The First Street loading dock provides access for Amtrak vehicles, including Red Cap service, to the tracks and platforms. It also provides access for users of Package Express, a service where individuals can ship goods using Amtrak, as well as access to a loading dock serving the Food Court. The H Street loading dock primarily serves retail activity within WUS.

To determine the existing conditions, the current average volume of individual trips for each hour of the weekday (weekend data was removed because the volumes were low and skewed the data) was calculated for the west loading dock based on two weeks of hourly data collected in May 2017. The percentage of the total daily trip volume that each hour represented at the First Street loading dock was extrapolated to predict the hourly volume for the H Street loading dock on weekdays, as there is no hourly volume data currently available for the H Street loading dock. To note, the H Street loading dock daily trip volume data included vehicle trips destined for both Union Station and Station Place. The analysis conducted utilized only the Union Station data. The hour with the peak average loading dock trip volume is 10:00AM - 11:00AM, with an average of 12 vehicles currently utilizing the

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combined docks at that hour (**Table 5-12**). The 8:00AM – 9:00AM and 9:00AM – 10:00AM
hours average 8 and 9 vehicle trips, or 8 percent of the overall daily trips respectively.

Table 5-12. 2017 Weekday Hourly Loading Dock Volumes

Time	First Street Hourly Vehicles	H Street Estimated Hourly Vehicles	Combined Volume
12:00AM - 1:00AM	1	1	2
1:00AM - 2:00AM	2	2	4
2:00AM - 3:00AM	1	1	2
3:00AM - 4:00AM	1	1	2
4:00AM - 5:00AM	3	3	6
5:00AM - 6:00AM	4	4	8
6:00AM - 7:00AM	3	3	6
7:00AM - 8:00AM	2	2	4
8:00AM - 9:00AM	4	4	8
9:00AM - 10:00AM	4	5	9
10:00AM - 11:00AM	6	6	12
11:00AM - 12:00PM	3	4	7
12:00PM - 1:00PM	3	3	6
1:00PM - 2:00PM	4	4	8
2:00PM - 3:00PM	3	3	6
3:00PM - 4:00PM	3	3	6
4:00PM - 5:00PM	2	2	4
5:00PM - 6:00PM	1	1	2
6:00PM - 7:00PM	1	1	2
7;00PM - 8:00PM	1	1	2
8:00PM - 9:00PM	1	1	2
9:00PM - 10:00PM	0	0	0
10:00PM - 11:00PM	1	1	2
11:00PM - 12:00AM	1	1	2
Totals	53	56	109

5.5.9 Pedestrians

With its convenient location in the center of the District, WUS has high volumes of pedestrian
activity. Pedestrian data were collected on April 6, 2016, from 6:30 AM to 9:00 AM, from
11:30 AM to 1:30 PM, and from 3:30 PM to 7:00 PM to determine the peak five-minute
pedestrian utilization of several points within and surrounding WUS. Data were collected at
23 locations within WUS itself and at six crosswalk locations outside of WUS during a period
when both local schools and Congress were in session.

These locations were examined to determine the pedestrian flow patterns during each overall observation period and to identify peak five-minute periods. The overall pedestrian activity for the AM observation period, midday observation period, and PM observation period are shown graphically below in **Figures 5-8**, **5-9**, and **5-10**, respectively.

Figure 5-8. AM Total Pedestrian Activity
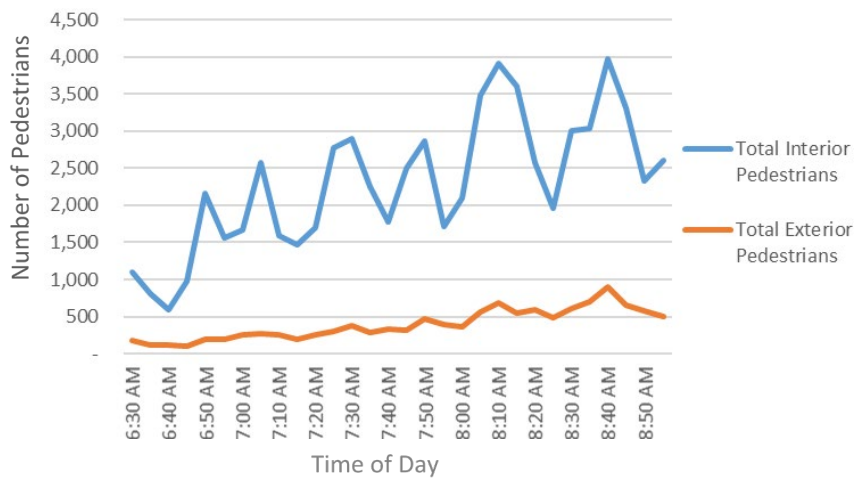
Figure 5-9. Midday Total Pedestrian Activity

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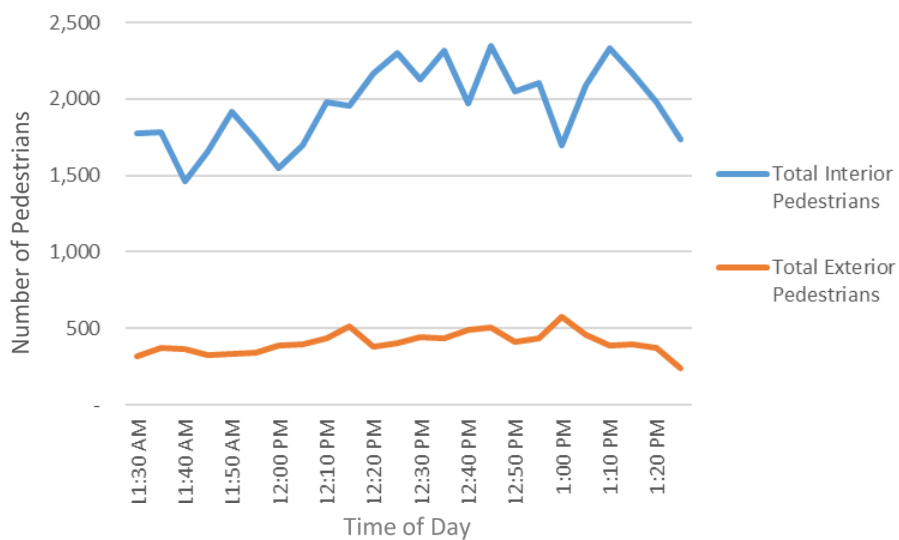
Figure 5-10. PM Total Pedestrian Activity
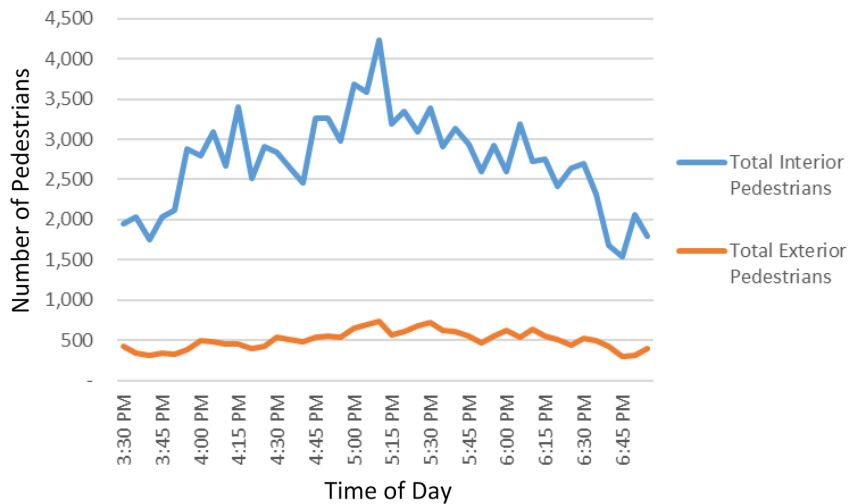
It should be noted that the pedestrian activity depicts the overall number of pedestrians counted for all locations and would include some "double-counting" given that individual pedestrians likely walked past multiple count locations as they traversed WUS. This notwithstanding, the overall pedestrian activity patterns bore out the following:

- The AM pedestrian activity inside WUS is a clear ebb and flow pattern that likely follows train arrival patterns, with pedestrian activity inside WUS varying greatly within 30-minute periods. The pedestrian activity exterior to WUS gradually rises to approximately 8:40 AM, which would correspond to commuter flows.

- The midday pedestrian activity is a much more general upwards trend between 11:30 AM and 12:30 PM which begins to decline after approximately 1:15 PM, corresponding to pedestrians that may come to WUS to eat lunch at one of the many restaurants. It should be noted, however, that some spikes in pedestrian activity do remain, likely attributed to train arrivals. Pedestrian activity outside of WUS were generally stable throughout the midday period.The PM pedestrian activity inside WUS is a more identifiable peak in activity at approximately 5:15 PM with flows gradually increasing prior to this point and then decreasing afterward. Not as pronounced as in the AM and midday observation periods, but otherwise still present were smaller peaks likely associated with the arrival and departure of trains in WUS. As with the midday observation period, the pedestrian activity outside of WUS remained relatively stable throughout the PM observation period.

Based on the information tabulated and described above, the peak five-minute periods inside of WUS were generally determined to be from 8:40 AM to 8:45 AM, from 12:45 PM to 12:50 PM, and from 5:10 PM to 5:15 PM.

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The count data indicated that the greatest concentration of pedestrians in the peak five-minute periods were in the northwestern quadrant of WUS where passengers can connect from trains serving WUS to Metrorail. Some additional peaks were noted on the escalator connecting the WUS concourse with the bus garage level, primarily associated with charter bus and intercity bus passengers entering and exiting WUS (a smaller portion of this is due to parking garage pedestrians).

Outside of WUS, a substantial number of pedestrians were noted crossing the crosswalks on First Street on the west side of WUS near Columbus Circle. Given the layout of the crosswalks across the northbound and southbound lanes of First Street, as well as across the bicycle lanes in relation to the Metrorail and WUS entrances adjacent to this location, many pedestrians do not use the crosswalks and instead jaywalk in this area. Pedestrian counts include those pedestrians within the crosswalk and within approximately 20 feet of the crosswalk to account for crosswalk usage.

5.5.10 Bicycle Activity

Bicycle activity in the Local Study Area is currently accommodated through a variety of on-road facilities and off-road shared-use paths. The Metropolitan Branch Trail (MBT), a shared use path that carries relatively high volumes of commuter and recreational bicycle traffic, runs along the west side of 2nd Street NE between L Street NE and F Street NE and on an elevated structure parallel to the Metrorail tracks north of L Street NE. The MBT provides connections to the regional bicycle network in northeast and northwest District and MD. A cycle track on First Street NE between M Street NE and Massachusetts Avenue NE provides access to the NoMA neighborhood and to the MBT. On-street bike lanes provide connections between WUS, NoMA, Capitol Hill, and points east via G Street NE, I Street NE, and M Street NE; and between WUS and downtown via E Street NW. On-street bike lanes on 4th Street NE and 6th Street NE provide north-south connections in the NoMA and Capitol Hill neighborhoods east of WUS. There is also a westbound bike lane on Columbus Circle at the front of WUS.

Bicycles counts were conducted at two locations in the Local Study Area: First Street NE between G Place NE and Massachusetts Avenue NE along the First Street cycle track; and Massachusetts Avenue NE between Louisiana Avenue NE and E Street NE along the one-way bicycle lane. Counters were installed at the two locations and data for First Street NE were collected for August 8, 2015, and for Massachusetts Avenue NE for July 28, 2015 (**Table 5-13** and **Table 5-14**). Based on the count data, the AM Peak Hour for bicycle activity was 8:15 AM to 9:15 AM for both roadway segments. The PM Peak Hour was 5:00 PM to 6:00 PM for First Street NE and 5:15 PM to 6:15 PM for Massachusetts Avenue NE. Overall, Massachusetts Avenue registered a higher number of riders during both the AM and PM Peak Hours. During the AM Peak Hour, both counters registered a higher number of southbound direction riders than northbound direction riders. During the PM Peak Hour, there were a higher number of northbound riders than southbound riders. Based on the substantial growth in bicycle ridership in downtown, this analysis estimated that the peak hour levels are 10-percent higher in 2017 than in 2015.

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Table 5-13. AM Peak Hour Bicycle Activity, 2015 Counts and 2017 Estimates

On Street	Between	AM Peak Hour	NB	SB	AM Peak Hour Total (2015)	2017 Total Estimate
First Street NE	G Place NE / Massachusetts Ave NE	8:15 AM-9:15 AM	32	95	127	140
Massachusetts Ave NE	Louisiana Ave NE/ E Street NE	8:15 AM-9:15 AM	82	99	181	199

Source: DDOT, 2015.[70]

Table 5-14. PM Peak Hour Bicycle Activity, 2015 Counts and 2017 Estimates

On Street	Between	PM Peak Hour	NB	SB	PM Peak Hour Total (2015)	2017 Total Estimate
First Street NE	G Place NE / Massachusetts Ave NE	5:00 PM-6:00 PM	64	51	115	127
Massachusetts Ave NE	Louisiana Ave NE/ E Street NE	5:15 PM-6:15 PM	143	74	217	239

Source: DDOT, 2015. [71]

Bicycle parking at WUS includes bike racks as well as covered, secure storage at Bikestation Washington DC, located just west of the historic station on First Street NE. Bikestation provides full-time access for members, and is staffed 66 hours a week. The Bikestation has space for over 100 bicycles, private changing rooms, and day-use lockers for rent, bike rentals, repairs, and retail sales. Site visits suggest this is a highly-used facility.

Bike rentals are available through a variety of providers, including Capital Bikeshare and a number of dockless bikeshare companies. The Capital Bikeshare station at WUS, located on F Street NE at the front of WUS, has 54 bicycle docks, making it one of the larger docking stations in the regionwide system. Additional Capital Bikeshare stations in the Local Study Area are located at North Capitol Street and F Street NW (21 docks), 2nd Street and G Street NE (19 docks), and North Capitol Street and G Place NE (17 docks).

DDOT allows private "dockless" bikeshare providers to operate within the District. These services allow users to activate the bicycle using their phone and to park the bicycle in a location that does not block vehicular or sidewalk traffic. While representative data on these services are not available at this time, site visits confirm that dockless bikes are available near WUS.

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[70] DDOT, 2015. Counts conducted on July 28, 2015, and August 8, 2015. Accessed on December 1, 2015.

[71] DDOT, 2015. Counts conducted on July 28, 2015, and August 8, 2015. Accessed on December 1, 2015.

Bike and Roll provides bike rentals and bike tours from the Bikestation. Tours, including evening tours, are offered on a seasonal basis. Bike rentals are available year-round, weather permitting.

5.5.11 Transportation Safety

Pedestrians and bicyclists face safety problems at the front of WUS. When crossing directly in front of WUS, pedestrians must cross six lanes of traffic, with a mix of uses including buses that can limit visibility. There are also high pedestrian volumes in the southwest section of Union Station Drive near the intersection with Massachusetts Avenue NE at an un-signalized crosswalk. The front of WUS and the area of H Street that process access to the WUS garage provide limited safe space for bicyclists. H Street is unaccommodating for bicyclists east of the garage because of safety issues arising from grade, traffic volumes, and lack of accommodations. There are no accommodations for bicyclists on Union Station Drive, though observations indicate that bicyclists make use of the middle portion of Union Station Drive that is currently reserved for buses when bus volumes are low.

Based on the most recent DDOT data, there were 72 crashes across all modes from 2012 to 2016 in front of WUS within the Project Area. There were 5,465 reported vehicular crashes in the Local Study Area in the five-year period from 2012 to 2016. Approximately 10-percent of the crashes in the Local Study Area resulted in injury; 3.0-percent of crashes resulted in serious injury to one or more persons involved. There were no fatal crashes reported during this period.

The intersections with the highest crash incidence were located on roadways that carry relatively high traffic volumes: the intersections of North Capitol Street/H Street, North Capitol Street/New York Avenue, New York Avenue/First Street NE, and New York Avenue/ Florida Avenue NE each had more than 100 crashes between 2012 and 2016 **(Figure 5-11)**.

These locations, as well as several intersections on K Street NE east of the rail overpass, had the highest incidence of crashes resulting in major injury.

Approximately 3.0-percent of all crashes in the Local Study Area involved a bicyclist or pedestrian being struck by a vehicle. The North Capitol Street corridor between H Street and New York Avenue had the highest incidence of pedestrian/bicycle crashes in the Local Study Area, with the intersection of North Capitol Street and New York Avenue having the most pedestrian/bicycle crashes of any single intersection in the Local Study Area. Based on the crash data, other locations with relatively high numbers of cross-modal conflicts include First Street NE, which runs along the west side of the Project Area and features a cycle track, and First Street NW between D Street NW and New York Avenue.

Figure 5-11. 2016 Intersection Crash Incidences near Washington Union Station
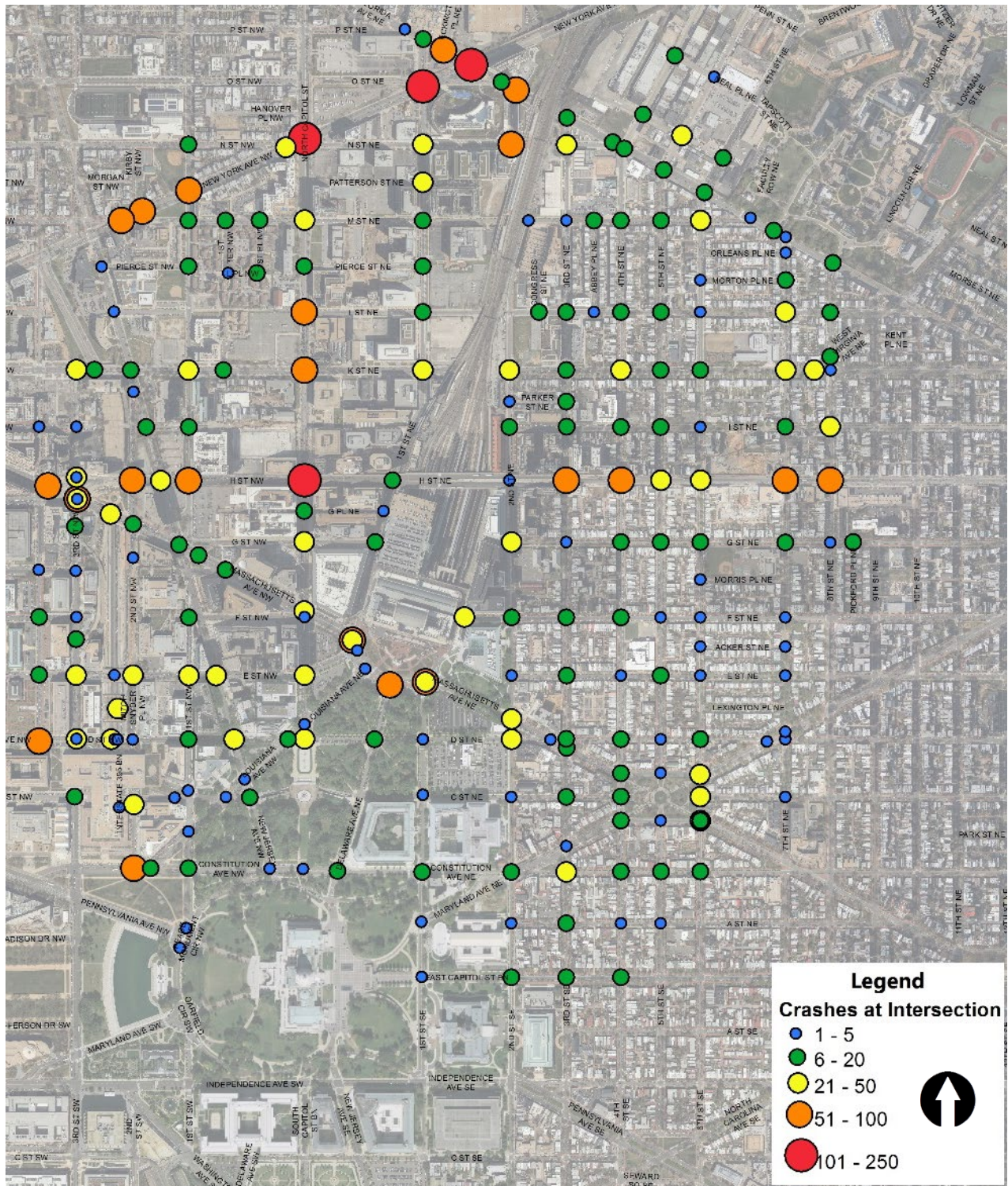
Source: DDOT and ESRI, 2017.

As part of its Vision Zero plan to eliminate transportation-related fatalities and serious injuries by the year 2024, DDOT conducted a series of site visits at high crash intersections. Among the intersections reviewed was First Street NE and Massachusetts Avenue NE, adjacent to WUS. As part of the site visit and safety review, a multidisciplinary team identified safety issues and developed actionable, low-cost recommendations to address those issues. As of December 2016, 11 of the 12 recommendations for improvements to the First Street and Massachusetts Avenue NE intersection had been implemented by DDOT.[72]

5.5.12 City and Commuter Buses

Transit and commuter bus service is provided in the Local Study Area by WMATA, the MTA, DC Circulator, and Loudoun County Transit (LCT). Overall, 13 Metrobus routes and three DC Circulator routes operate within the Local Study Area. The service areas of these routes are diverse and extend in all directions across the District. All the routes provide local service with exception of Metrobus Route X9, which is a limited stop "MetroExtra" route. **Table 5-15** details the 16 local bus routes that serve the Local Study Area, including their major destinations and Metrorail Station connections. The Metrobus system has rebounded from its ridership dip in 2009 due to the economic recession, and ridership steadily increased between 2011 and 2015. Ridership declined by approximately 6 percent subsequently, and ridership in the tables below has been adjusted accordingly.

The Local Study Area serves some of the most highly-utilized and high-frequency routes within the local bus system: 10 of the 16 bus routes operate at headways of less than 15 minutes during peak periods; six of the 13 Metrobus routes rank in the Metrobus system's top 10-percent for ridership; and, the GT-US Circulator route has the highest ridership in the Circulator system. Metrobus Route X2 has the highest ridership within the Local Study Area, the highest ridership in the entire Metrobus system, and is the only route in the Local Study Area that experiences overcrowding. The number of buses that stop and lay over directly outside WUS in Columbus Circle contribute to congestion in the Circle during peak periods.

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[72] Only one recommendation, to widen the pedestrian curb ramp and install a separate bicycle crosswalk, was not implemented due to the need to coordinate with Architect of the Capitol (AOC).

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Table 5-15. Metrobus and DC Circulator Routes Serving the Local Study Area

Route	Description	Route Type	Stop Serving WUS	Major Destinations	Metrorail Station Connections
Metrobus					
80	North Capitol Street Line	Local	NB: North Capitol St/ Massachusetts Ave NE SB: North Capitol St/ Massachusetts Ave NW	Brookland, Downtown, Potomac Park	Fort Totten, Brookland-CUA, Union Station, Gallery Place, Metro Center, McPherson Square, Farragut North, Farragut West
96	East Capitol St – Cardozo Line	Local	EB: Massachusetts Ave NE/ Columbus Cir NE WB: Massachusetts Ave NE/ First St NE	Tenleytown, Woodley Park, Adams Morgan, U Street, Capitol Hill, Benning, Capitol Heights	Tenleytown-AU, Woodley Park, U Street, Union Station, Stadium-Armory, Benning Road, Capitol Heights
97	East Capitol St – Cardozo Line	Local	EB/WB: Massachusetts Ave NE/ Columbus Cir NE	Capitol Hill, Benning, Capitol Heights	Union Station, Stadium-Armory, Benning Road, Capitol Heights
D3	Ivy City- Dupont Circle Line	Local	EB: North Capitol St/E St NE WB: North Capitol St/ Massachusetts Ave NW	Ivy City, Trinidad, Franklin Square, Dupont Circle, Georgetown	Union Station, Metro Center, Judiciary Square, Farragut North, Farragut West, Dupont Circle
D4	Ivy City – Franklin Square Line	Local	EB: K St NW/ North Capitol St WB: K St NE/ North Capitol St	Ivy City, Trinidad, Mount Vernon Square, Franklin Square	-
D6	Sibley Hospital – Stadium – Armory Line	Local	EB: Massachusetts Ave NE/ Columbus Cir NE WB: Massachusetts Ave NE/ Columbus Cir NE	Georgetown, Dupont Circle, Downtown, Capitol Hill	Dupont Circle, Farragut North, Farragut West, Metro Center, Judiciary Square, Union Station, Stadium-Armory

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Route	Description	Route Type	Stop Serving WUS	Major Destinations	Metrorail Station Connections
D8	Hospital Center Line	Local	NB/SB: Massachusetts Ave NE/ Columbus Cir NE	Washington Hospital Center, Brentwood Village, Edgewood, Trinidad	Rhode Island Avenue
P6	Anacostia – Eckington Line	Local	EB: K St NW/ North Capitol St WB: K St NE/ North Capitol St	Anacostia, Washington Navy Yard, National Mall, Downtown, Chinatown, Eckington	Anacostia, Navy Yard – Ballpark, Waterfront, Federal Center SW, Federal Triangle, Metro Center, Gallery Place, Archives, Rhode Island Ave
X1	Benning Road Line	Local	NB: North Capitol St/ Massachusetts Ave NE SB: North Capitol St/ Massachusetts Ave NW	H St NE, Downtown, State Department, Foggy Bottom	Minnesota Avenue, Union Station, Federal Triangle, Foggy Bottom – GWU
X2	Benning Road – H Street Line	Local	EB: H St NW/ North Capitol St WB: H St NW/ North Capitol St	H St NE, Downtown, Chinatown	Minnesota Avenue, Gallery Place, Metro Center, McPherson Square
X8	Maryland Avenue Line	Local	EB: Massachusetts Ave NE/ Columbus Cir NE WB: Massachusetts Ave NE/ Columbus Cir NE	Carver Terrace, Hechinger Mall, Station Park, WUS	Union Station
X9	Benning Road – H Street Limited	Metro Extra	EB: H St NW/ North Capitol St WB: H St NW/ North Capitol St	Capitol Heights, Benning, H St NE, Chinatown, Downtown	Capitol Heights, Minnesota Avenue, Gallery Place, Metro Center
13Y	Arlington – Union Station	Local	EB: H St NW/ North Capitol St WB: H St NW/ North Capitol St	Reagan National Airport, Crystal City, Pentagon City, Pentagon, WUS	National Airport, Crystal City, Pentagon City, Pentagon, Union Station
DC Circulator					

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Route	Description	Route Type	Stop Serving WUS	Major Destinations	Metrorail Station Connections
GT-US	Georgetown - Union Station –	Local	Massachusetts Ave NE/ Columbus Cir NE; North Capitol St/ Massachusetts Ave NW; WUS Bus Garage	Georgetown, Downtown, Convention Center, WUS	Union Station, McPherson Square, Farragut North, Farragut West, Foggy Bottom
CH-US	Congress Heights – Union Station –	Local	Massachusetts Ave NE/ Columbus Cir NE	Navy Yard, Eastern Market, Barracks Row, US Capitol, WUS	Union Station, Eastern Market, Navy Yard, Anacostia, Congress Heights
NM	National Mall	Local	E St NE/Columbus Cir NE	National Mall, Jefferson Memorial, Lincoln Memorial, Washington Monument, WUS	Union Station, Smithsonian

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The local bus routes in the Local Study Area generally serve WUS either from Massachusetts Avenue NE near Columbus Circle or North Capitol Street. However, several routes in the Local Study Area do not directly serve WUS, including Metrobus Routes P6 and D4 (operating on K Street NE), and Metrobus Routes X2 and X9 (operating on H Street NE).

Weekday peak periods are between 6:00 AM and 9:00 AM, and 3:00 PM and 7:00 PM. Most routes operate seven days per week; however, several Metrobus routes only operate during weekday peak periods, including the 97, D3, X1, and X9. Additionally, Metrobus Route 13Y only operates during early AM weekend hours to serve passengers traveling to and from Reagan National Airport and Crystal City/Pentagon City in Arlington County, VA before the Metrorail system opens. The GT-US Circulator, the National Mall (NM) Circulator, and the Congress Heights to WUS (CH-US) Circulator operate seven days per week. **Table 5-16** summarizes the level of service for each Metrobus and DC Circulator route in the Local Study Area.

Table 5-16. Metrobus and DC Circulator Level of Service by Route

Route	Weekday		Saturday	Sunday
	Peak	Off-peak		
80	✔	✔	✔	✔
96	✔	✔	✔	✔
97	✔			
D3	✔			
D4	✔	✔	✔	✔
D6	✔	✔	✔	✔
D8	✔	✔	✔	✔
P6	✔	✔	✔	✔
X1	✔			
X2	✔	✔	✔	✔
X8	✔	✔	✔	✔
X9	✔			
13Y			✔	✔
GT-US	✔	✔	✔	✔
CH-US	✔	✔	✔	✔
NM	✔	✔	✔	✔

Source: WMATA, 2015, 2020.[73]

Several routes have weekday peak headways of 15 minutes or less, including Metrobus Routes 80, 97, D6, P6, X1, X2, and X9. Additionally, the three DC Circulator routes have

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[73] WMATA, 2015. Metrobus Schedules. DDOT, 2015. DC Circulator Schedule. Accessed from https://www.dccirculator.com/ride/rider-tools/schedule/. Accessed on December 1, 2015 and February 28, 2020.

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weekday peak headways of 10 minutes. Metrobus Route X2 has the highest LOS with seven to 8-minute headways between 6:00 AM and 7:00 PM on weekdays, and 13-minute headways on weekends. Metrobus Routes 96 and X2 have the longest span of service with both having nearly 24-hour weekday and Saturday service, and approximately 22-hour Sunday service. The local routes are shown in **Figure 5-12**.

Ridership

Ridership data for Metrobus routes are available at both the trip and stop level from the Automatic Passenger Count (APC) units installed on every vehicle. The latest quarter of data available are from the fourth quarter of FY2015 consisting of March, April, and May data.

Ridership data for the GT-US Circulator are available at the trip and stop level from ride checks performed in 2013 as a part of the *MoveDC* study. Ridership data are not available for the NM Circulator because the route only began operating in April 2015 and additional comprehensive data had not been collected at the time of analysis. The ridership numbers in the table below were reduced based on WMATA information that indicates that bus ridership was down 6-percent since 2015. 2018 ridership data for the CH-US line was by provided by DDOT in 2019.

Average daily ridership for each Metrobus and DC Circulator route is summarized by service day in **Table 5-17**. Overall, Metrobus Routes X2 and 80, and GT-US Circulator have the highest average weekday ridership, ranging from just under 8,000 boardings on the GT-US Circulator to nearly 18,000 boardings on the X2. These routes serve busy corridors in the downtown District. The X2 operates on the busy H Street corridor while the 80 operates on North Capitol Street. The GT-US Circulator operates from WUS through downtown District to Georgetown primarily along the Massachusetts Avenue NW, K Street NW, M Street NW, and Wisconsin Avenue NW corridors. Metrobus Route X2 also has the highest overall weekend ridership, followed by the GT-US Circulator and Metrobus Route 96, which operates along the East Capitol Street corridor across the city to Tenleytown. On several routes with midday service, the midday period has the highest ridership, including on Metrobus Routes 80, 96, D8, P6, and X2, and the GT-US Circulator. These routes likely serve populations with nontraditional working hours and a number of non-work trips. Metrobus Routes D4, D6, and X8 have the highest ridership during peak periods and are likely used primarily for traditional commuting. Monthly, approximately 65,000 riders used the CH-US Circulator service that serves WUS from Massachusetts Avenue NE while 17,000 riders used the NM Circulator service that serves WUS from E Street NE.

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Figure 5-12. Existing Metrobus and DC Circulator in the Local Study Area
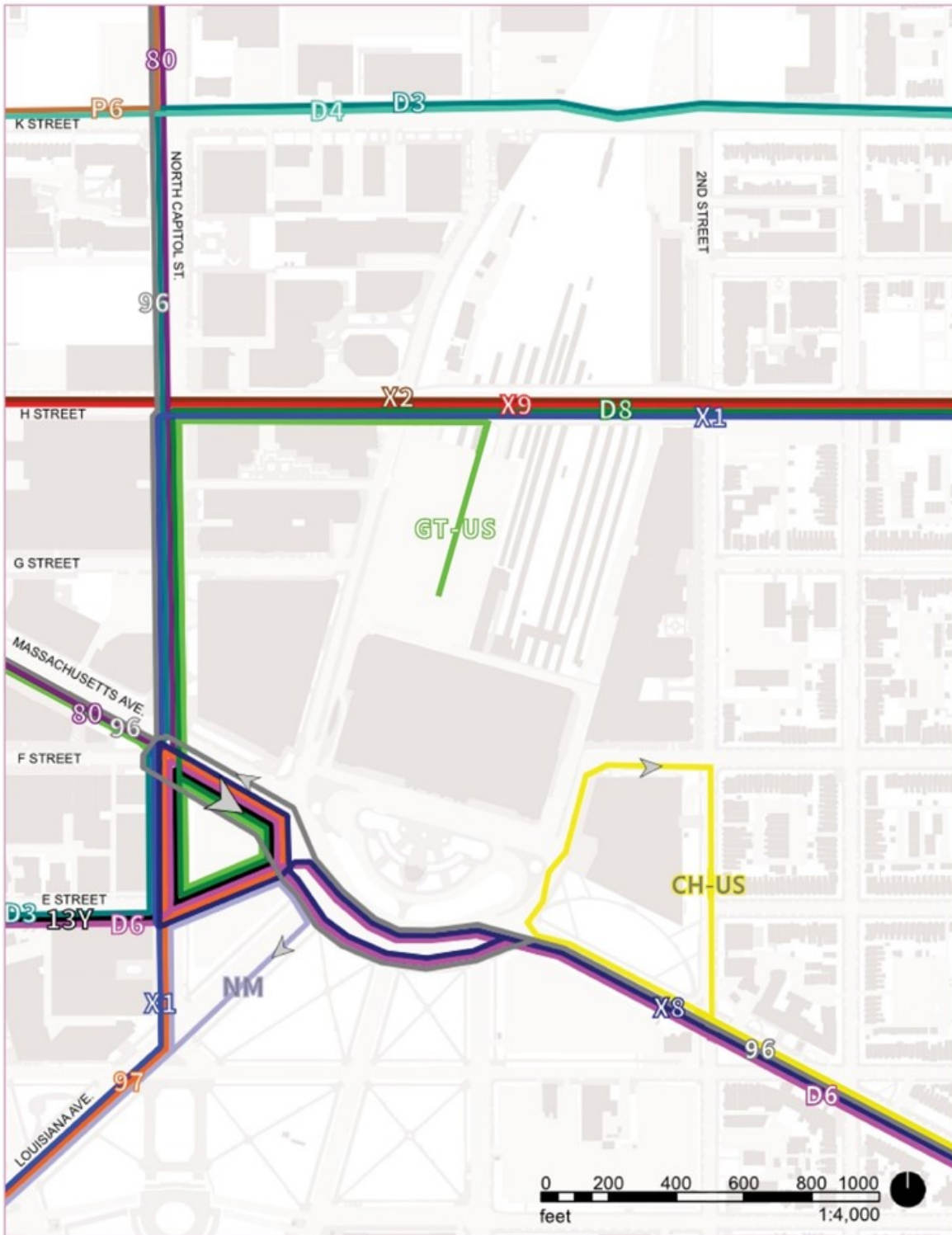
Source: WMATA, 2015. Metrobus Route and Stop Geodatabase. ESRI, 2015. Accessed on December 1, 2015; updated March 2020.

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Table 5-17. Metrobus and DC Circulator Average Ridership by Route and Service Day

Route	Weekday	Saturday	Sunday
X2	16,583	11,570	8,532
80	8,550	3,232	2,438
GT-US	7,201	5,591	3,520
96	5,629	4,037	3,035
D8	5,498	3,028	1,937
P6	5,425	2,644	1,994
D6	5,263	2,372	1,654
X9	2,358	-	-
CH-US	2,501	1,229[1]	
97	1,949	-	-
D4	1,608	967	844
X8	1,539	649	489
X1	889	-	-
D3	582	-	-
13Y	-	89	69

1. Daily average for the weekend.
Source: WMATA, 2015 and 2019.[74]

The busiest stops are in proximity to WUS on Massachusetts Avenue NE, North Capitol Street, and H Street NW. These corridors also serve high ridership routes, including Metrobus Routes X2 and 80, and the GT-US Circulator.

The busiest stop is Massachusetts Avenue NE at Columbus Circle NE in the eastbound direction. This stop is served by seven routes and is the closest stop to the main entrances of WUS, including the Metrorail entrance. The second busiest stop is Massachusetts Avenue NE at Columbus Circle in the westbound direction (on the east side of WUS). This stop is served by three routes, two of which terminate at the stop (Metrobus Route X8 and the CH-US Circulator). The third busiest stop is North Capitol Street at Massachusetts Avenue NW (southbound), which is served by four routes, including the busy Metrobus Route 80 and the GT-US Circulator.

Commuter Bus

According to the MWCOG's *Regional Bus Staging, Layover, and Parking Location Study* from March 2015, four companies operate approximately 739 daily commuter bus trips entering

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[74] WMATA, 2015. Metrobus Ridership by Route and Trip Data. DDOT, 2013. DC Circulator Ridecheck Data. Accessed on December 1, 2015. Additional data provided by DDOT in July 2019.

and leaving the District; however, most of these trips occur outside the WUS Local Study Area.

Commuter bus service to the Local Study Area is provided by two different agencies: MTA and LCT. MTA provides service to the downtown District from several MD counties: Calvert, Anne Arundel, Queen Anne's, and Prince George's. LCT provides service from Purcellville, VA, and the area surrounding Dulles Airport in Loudoun County, VA to the downtown District.

Nine commuter bus routes serve the Local Study Area. In total, MTA operates seven routes serving four stops, and LCT operates two routes serving two stops. These commuter routes serve the North Capitol Street corridor, the K Street corridor, and the Massachusetts Avenue corridor surrounding WUS. The WUS Local Study Area serves 177 daily weekday commuter bus trips. Based on MWCOG data, the WUS Local Study Area serves approximately 24-percent of all daily commuter bus trips entering or leaving the District.

The majority of the Local Study Area's commuter bus trips provide connections to eastern and southern MD. The majority, 92-percent, of the trips in the Local Study Area occur during peak periods. Commuter bus ridership data were not available. Two MTA commuter bus routes directly serve WUS at Massachusetts Avenue and Columbus Circle during the PM Peak Period; however, the majority of the Local Study Area's commuter bus routes do not directly serve WUS. Instead, the commuter bus routes serve Union Center Plaza (North Capitol Street and H Street NE), North Capitol Street, or K Street NE.

MTA currently has five stops in the Local Study Area and LCT has two stops. Both LCT routes stop at the North Capitol Street at H Street stop and the North Capitol Street at Massachusetts Avenue stop. All MTA routes also serve North Capitol Street and H Street stop. Additionally, three MTA routes serve K Street at First Street NE, three serve K Street at 2nd Street NE (two routes in the AM direction only), four serve North Capitol at E Street in the AM direction only, and two routes serve Massachusetts Avenue at Columbus Circle in the PM Peak Period only. **Figure 5-13** illustrates the seven bus stop locations within the Local Study Area and **Table 5-18** summarizes the seven commuter bus routes that serve the Local Study Area. For this study, the commuter bus stop at Louisiana Avenue and D Street NW was not included because it is outside the defined Local Study Area.

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Figure 5-13. Commuter Bus Routes and Stops in Local Study Area
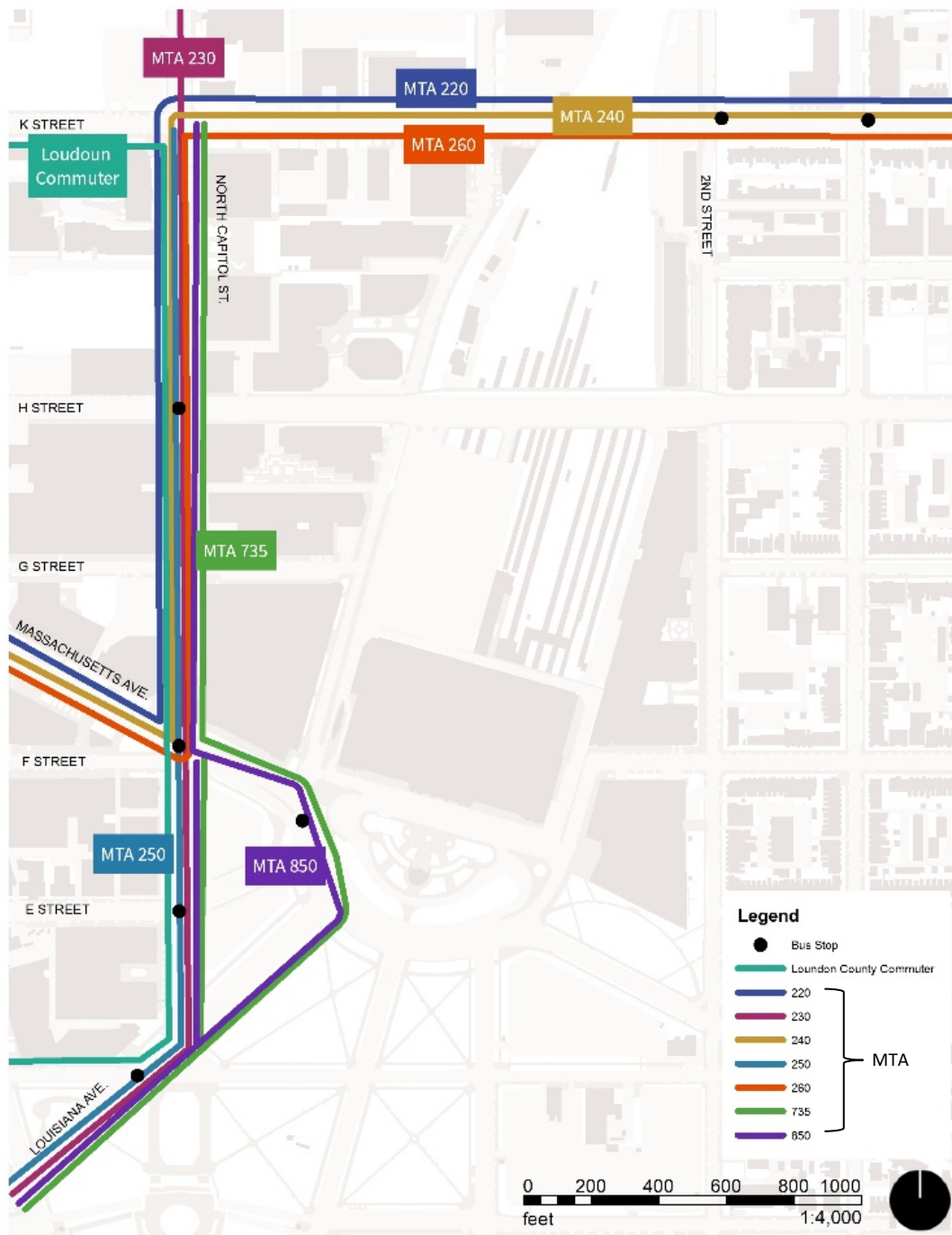
Source: MTA, 2015. Commuter Bus Schedules. Loudoun County, 2015. LCT Commuter Bus Schedules. ESRI, 2015. Accessed from https://mta.maryland.gov/commuter-bus and https://www.loudoun.gov/bus. Accessed on December 1, 2015MTA, 2015.

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Table 5-18. Commuter Bus Routes within Local Study Area

Agency	Route	Stop Location	Destination
MTA	220	K St & 1st St NE; H St & North Capitol St; K St & 2nd St NE (AM)	Annapolis
MTA	230	N. Capitol St & E St (AM only); H St & North Capitol St	Severna Park/ Annapolis
MTA	240	K St & 1st St NE; H St & North Capitol St; K St & 2nd St NE	Kent Island
MTA	250	N. Capitol St & E St (AM only); H St & North Capitol St	Kent Island
MTA	260	NE K St & 1st St NE; K St & 2nd St NE (AM only); H St & North Capitol St	Severna Park/ Davidsonville
MTA	735	H St & North Capitol St; North Capitol St & E St NE (AM only); Columbus Circle & Massachusetts Ave, NE (PM only)	Charlotte Hall/ Waldorf
MTA	850	H St & North Capitol St; North Capitol St & E St NE (AM only); Columbus Circle & Massachusetts Ave, NE (PM only)	Prince Frederick
LCT	Purcellville	H St & North Capitol St, Massachusetts Ave & North Capitol St	Purcellville
LCT	Dulles North	H St & North Capitol St, Massachusetts Ave & North Capitol St	Dulles North

Source: MTA, 2015. Loudoun County, 2015.[75]

5.5.13 Vehicular Traffic

The existing roadway conditions surrounding WUS were reviewed based on the locations at which WUS-associated traffic impacts occur. All intersections immediately adjacent to WUS were examined, as were select intersections within one-half mile of WUS that are estimated to carry significant traffic volumes associated with WUS.

WUS is immediately surrounded by principal and minor arterials, collectors, and local streets. Of these, H Street, North Capitol Street, and Massachusetts Avenue (west of North Capitol Street) are considered principal arterials; E Street, K Street, and Massachusetts Avenue (east

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[75] MTA, 2015, Commuter Bus Schedules. Loudoun County, 2015. LCT Commuter Bus Schedules. Accessed from https://mta.maryland.gov/commuter-bus and https://www.loudoun.gov/bus. Accessed on December 1, 2015.

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of North Capitol Street) are considered minor arterials; D Street, F Street, First Street, 2nd Street, and Delaware Avenue are considered collectors; and the remaining streets within the Local Study Area are considered local streets. These arterials, collectors, and local streets provide connectivity to the surrounding area and to nearby Interstate 395 and New York Avenue (U.S. Route 50), which both provide direct access to regional interstates.

Vehicular turning maneuver as well as pedestrian crossing data were collected on Wednesday, November 18, 2015 and Tuesday, December 1, 2015 from 6:30 AM to 9:30 AM and from 4:00 PM to 7:00 PM to determine the peak hour utilization of several intersections surrounding WUS. Based on coordination with DDOT, additional counts were taken in fall 2017 in the same hours and counts from other projects taken in 2013 were also used and grown to estimate present day levels. Data were collected when both local schools and Congress were in session. Data were collected for 34 intersections surrounding WUS (see **Section 5.3**, *Study Area*, and **Figure 5-1** above).

The peak hours for the roadway network were from 8:00 AM to 9:00 AM and from 4:45 PM to 5:45 PM.

An intersection capacity analysis was performed for the existing conditions at intersections within the WUS Local Study Area, during the morning and afternoon peak hours. Synchro, Version 8.0 was used to analyze the study intersections based on the *Highway Capacity Manual* (HCM) 2010 methodology. For instances of nonstandard intersection geometry or phasing, HCM 2000 methodology was used. The results of the capacity analysis are expressed in LOS and delay (seconds per vehicle) for each approach. A LOS grade is a letter grade based on the average delay (in seconds) experienced by motorists traveling through an intersection. LOS results range from "A" being the best to "F" being the worst. LOS E is typically used as the acceptable LOS threshold in the District; although LOS F is sometimes accepted in urbanized areas.

The LOS capacity analyses were based on: 1) the peak hour traffic volumes outlined previously; 2) the lane use and traffic controls outlined previously; and 3) the HCM 2010 methodologies (using Synchro 8.0 software). The average delay of each approach and LOS is shown for the signalized intersections in addition to the overall average delay and intersection LOS grade.

Table 5-19 and **Figure 5-14** show the results of the capacity analyses, including LOS and average delay per vehicle (in seconds) for existing conditions.

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Table 5-19. Capacity Analysis Results

Intersection		Approach	Existing Conditions (2017)			
			AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS
1	North Capitol Street & K Street	Overall	**[88.2]**	**[F]**	**35.9**	**D**
		Eastbound	34.7	C	49.9	D
		Westbound	[261.1]	[F]	50.1	D
		Northbound	21.9	C	11.9	B
		Southbound	[119.0]	[F]	56.2	E
2	First Street & K Street NE	Overall	**[95.1]**	**[F]**	**59.7**	**E**
		Eastbound	29.4	C	38.6	D
		Westbound	[121.0]	[F]	[113.9]	[F]
		Northbound	27.9	C	46.3	D
		Southbound	[119.0]	[F]	56.2	E
3	2nd Street & K Street NE	Overall	**26.6**	**C**	**12.0**	**B**
		Eastbound	25.1	C	6.5	A
		Westbound	22.2	C	14.1	B
		Northbound	46.5	D	26.9	C
		Southbound	21.3	C	22.4	C
4	2nd Street & Driveway/I Street (Unsignalized) NE	Overall	**12.8**	**B**	**10.7**	**B**
		Eastbound	8.4	A	8.8	A
		Westbound	9.5	A	8.8	A
		Northbound	14.2	B	11.1	B
		Southbound	11.4	B	10.5	B
5	North Capitol Street & H Street	Overall	**17.6**	**C**	**27.3**	**C**
		Eastbound	19.8	B	30.6	C
		Westbound	10.3	B	20.5	C
		Northbound	27.9	C	26.5	C
		Southbound	18.6	B	29.7	C
6	WUS Garage & H Street NE	Overall	**1.8**	**A**	**7.8**	**A**
		Eastbound	3.4	A	6.3	A
		Westbound	0.3	A	0.5	A
		Northbound	54.5	D	51.4	D
7	WUS Bus Exit & H Street NE	Overall	**2.3**	**A**	**5.5**	**A**
		Eastbound	3.1	A	4.3	A
		Westbound	1.7	A	6.4	A
		Northbound	39.9	D	36.1	D
8	Kaiser Permanente Entrance & H Street NE	Northbound	10.9	B	9.8	A
9	3rd Street & H Street NE	Overall	**58.1**	**E**	**24.8**	**C**
		Eastbound	18.2	B	21.7	C

| Intersection | Approach | Existing Conditions (2017) | | | |
| | | AM Peak Hour | | PM Peak Hour | |
		Delay	LOS	Delay	LOS
	Westbound	70.4	E	18.1	B
	Northbound	61.1	E	37.5	D
	Southbound	54.0	D	45.3	D
10 **North Capitol Street & G Street**	**Overall**	**7.7**	**A**	**10.8**	**B**
	Westbound	28.6	C	35.5	D
	Northbound	8.5	A	6.9	A
	Southbound	3.6	A	4.7	A
11 **First Street & G Street (Unsignalized) NE**	**Overall**	**9.4**	**A**	**9.5**	**A**
	Eastbound	9.6	A	8.7	A
	Southbound	9.1	A	9.8	A
12 **2nd Street & G Street NE**	**Overall**	**12.4**	**B**	**10.6**	**B**
	Westbound	11.3	B	9.1	A
	Northbound	13.0	B	11.5	B
	Southbound	12.5	B	9.8	A
13 **North Capitol Street & Massachusetts Avenue & F Street**	**Overall**	**35.4**	**D**	**36.1**	**D**
	Eastbound	27.0	C	31.6	C
	Northbound	27.6	C	46.8	D
	Southbound	37.9	D	28.2	C
	Southeast-bound	28.0	C	30.9	C
	Northwest-bound	41.7	D	38.7	D
14 **E Street & Massachusetts Avenue & First Street NE**	**Overall**	**72.9**	**E**	**72.6**	**E**
	Northeast-bound Left	46.2	D	34.9	C
	Northeast-bound Right	[163.4]	[F]	[344.5]	[F]
	Southwest-bound	[184.7]	[F]	46.1	D
	Southbound	25.1	C	33.2	C
	Southeast-bound	31.9	C	35.0	D
	Northwest-bound	24.9	C	17.6	B
15 **Louisiana Avenue & Massachusetts Avenue NE**	**Overall**	**18.9**	**B**	**28.0**	**C**
	Northeast-bound	10.4	B	36.4	D
	Northwest-bound	18.9	B	29.2	C

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Intersection		Approach	Existing Conditions (2017)			
			AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS
		Southeast-bound	23.0	C	24.8	C
16	Delaware Avenue & Massachusetts Avenue NE	**Overall**	**3.3**	**A**	**4.6**	**A**
		Northbound	35.4	D	36.4	D
		Southeast-bound	2.9	A	3.8	A
17	First Street & Massachusetts Avenue NE	**Overall**	**40.5**	**D**	**18.5**	**B**
		Eastbound	24.1	C	9.2	A
		Westbound	54.6	D	30.2	C
		Northbound	37.4	D	35.3	D
18	2nd Street & F Street (Unsignalized) NE	**Overall**	**14.4**	**B**	**13.4**	**B**
		Eastbound	10.8	B	12.6	B
		Westbound	12.0	B	9.8	A
		Northbound	13.2	B	14.6	B
		Southbound	17.4	C	13.2	B
19	North Capitol Street & E Street	**Overall**	**18.9**	**B**	**41.7**	**D**
		Eastbound	21.2	C	20.8	C
		Westbound	41.1	D	[157.8]	[F]
		Northbound	0.4	A	28.2	C
		Southbound	20.6	C	7.8	A
20	Louisiana Avenue & D Street NW	**Overall**	**[268.3]**	**[F]**	**[177.3]**	**[F]**
		Eastbound	[670.7]	[F]	[629.6]	[F]
		Westbound	[867.4]	[F]	[382.2]	[F]
		Northeast-bound	8.9	A	14.6	B
		Southwest-bound	13.9	B	6.3	A
21	Louisiana Avenue & North Capitol Street	**Overall**	**[84.3]**	**[F]**	**42.0**	**D**
		Northbound	33.3	C	35.3	D
		Southbound	[140.5]	[F]	73.0	E
		Northeast-bound	53.9	D	16.3	B
		Southwest-bound	42.5	D	31.3	C
22	2nd Street & D Street NE	**Overall**	**39.5**	**D**	**[183.1]**	**[F]**
		Eastbound	44.4	D	27.3	C
		Westbound	9.9	A	8.4	A
		Northbound	48.2	D	[305.8]	[F]
		Southbound	44.5	D	[252.8]	[F]

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Intersection		Approach	Existing Conditions (2017)			
			AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS
23	2nd Street & Massachusetts Avenue NE	Overall	**28.3**	**C**	**30.0**	**C**
		Eastbound	19.1	B	28.8	C
		Westbound	23.3	C	21.3	C
		Northbound	45.9	D	42.0	D
		Southbound	31.8	C	27.0	C
24	Massachusetts Avenue WB at Delaware Ave NE	Westbound	0.1	A	1.0	A
25	4th Street & H Street NE	Overall	**17.0**	**B**	**11.9**	**B**
		Eastbound	2.4	A	3.2	A
		Westbound	11.6	B	8.0	A
		Southbound	59.4	E	56.5	E
26	Massachusetts Avenue / C Street NE & 4th Street NE	Overall	**29.6**	**C**	**43.0**	**D**
		Eastbound	27.3	C	47.5	D
		Westbound	23.7	C	16.7	B
		Southbound	71.0	E	[102.2]	[F]
27	Louisiana Avenue & C Street NW	Overall	**12.3**	**B**	**9.9**	**A**
		Eastbound	22.6	C	9.2	A
		Westbound	47.0	D	24.4	C
		Northeast-bound	13.6	B	10.2	B
		Southwest-bound	5.6	A	9.8	A
28	First Street & D Street NW	Overall	**18.8**	**B**	**33.5**	**C**
		Eastbound	22.3	C	39.5	D
		Westbound	6.9	A	25.2	C
		Northbound	23.6	C	50.3	D
		Southbound	26.6	C	30.7	C
29	Tunnel Ramp/2nd Street & D Street NW	Overall	**49.2**	**D**	**37.5**	**D**
		Westbound	18.8	B	18.8	B
		Northbound	57.8	E	46.5	D
30	3rd Street & I-395 On-Ramp & Indiana Avenue/D Street NW	Overall	**26.6**	**C**	**28.7**	**C**
		Eastbound	35.4	D	48.1	D
		Westbound	27.9	C	37.2	D
		Northbound	41.4	D	49.5	D
		Southbound	5.7	A	5.0	A
31	3rd Street & E Street NW	Overall	**26.3**	**C**	**23.2**	**C**
		Eastbound	28.4	C	28.6	C
		Westbound	51.6	D	43.7	D
		Northbound	12.7	B	13.1	B

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Intersection		Approach	Existing Conditions (2017)			
			AM Peak Hour		PM Peak Hour	
			Delay	LOS	Delay	LOS
		Southbound	11.3	B	14.1	B
32	**3rd Street & Massachusetts Avenue & H Street NW**	**Overall**	**56.8**	**E**	**48.8**	**D**
		Southbound	40.7	D	44.4	D
		Eastbound Right (Mass Avenue)	46.0	D	42.8	D
		Eastbound Right (3rd Street)	42.9	D	[117.3]	[F]
		Southeast-bound	[118.4]	[F]	58.7	E
		Northwest-bound	12.7	B	10.8	B
33	**North Capitol Street (SB Ramp) & New York Avenue**	**Overall**	**27.3**	**C**	**25.7**	**C**
		Eastbound	23.4	C	31.7	C
		Westbound	3.4	A	5.1	A
		Southbound	[173.9]	[F]	76.7	E
34	**North Capitol Street (NB Ramp) & New York Avenue**	**Overall**	**18.7**	**B**	**15.9**	**B**
		Eastbound	3.3	A	3.8	A
		Westbound	8.3	A	9.6	A
		Northbound	[118.5]	[F]	[87.6]	[F]

Bold indicates overall intersection LOS
[Red] indicates an unacceptable operational level (LOS F)
Source: Gorove/Slade Associates, Inc. 2019.

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Figure 5-14. Existing Levels of Service at Study Intersections

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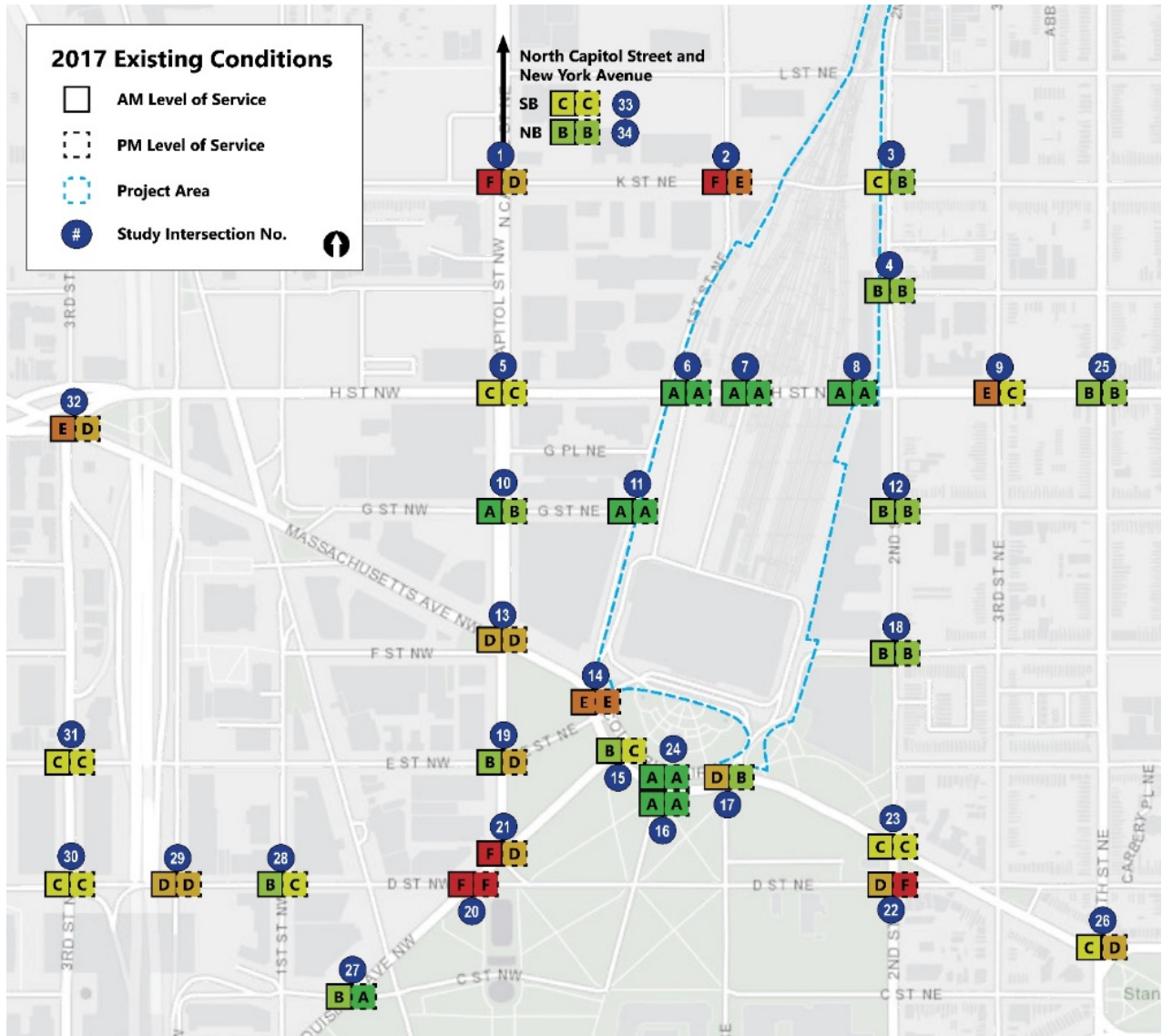
As shown in the capacity analysis results, most of the intersections operate at an acceptable level of service under existing conditions (LOS E or better) except for the following intersections, which operate at LOS F:

- North Capitol Street and K Street in the morning peak hour, due to heavy westbound and southbound volumes.

- First Street and K Street NE in the morning peak hours, also because of high westbound and southbound volumes.[76]

- Louisiana Avenue and D Street NW in both peak hours because of heavy westbound and eastbound volumes.

- Louisiana Avenue and North Capitol Street during the morning peak hour, due to the high volume of southbound vehicles attempting to turn right onto Louisiana Avenue from North Capitol Street.

- Second Street and D Street NE in the evening peak hour, because of northbound and southbound volumes.

In addition to the capacity analysis presented above, a queuing analysis was performed at the study intersections using Synchro software. The 50th percentile and 95th percentile maximum queue lengths are shown for each lane group at the study intersections. The 50th percentile maximum queue is the maximum length of queue of cars at a light on a typical cycle. The 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes and shows the queuing results for the Local Study Area intersections. As shown in the queuing results, most intersections operate at an acceptable level, where neither the 50th percentile nor 95th percentile maximum queue lengths exceed the storage lengths of each lane group in either the morning or afternoon peak hour.

Table 5-20 shows the intersection approaches that had either 50th percentile or 95th percentile maximum queues that exceeded their storage length. Twenty-three study intersections and 52 approaches had such exceedance.

Certain trends emerge from this queue analysis. The results show areas of most severe queues on K Street westbound at North Capitol Street, at 3rd and H Street NE, along Massachusetts Avenue from North Capitol Street to 2nd Street NE, along North Capitol Street from Massachusetts Avenue to Louisiana Avenue, and along 2nd Street NE from Massachusetts Avenue NE to D Street NE.

Overall, while many intersections operate within acceptable levels, congestion currently exists along Massachusetts Avenue through Columbus Circle and at some locations along North Capitol Street, Louisiana Avenue, 2nd Street, and H Street.

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[76] Since 2017, DDOT completed a road diet on K Street NE east of 2nd Street NE that may have lowered LOS performance further.

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Table 5-20. Queueing Analysis

Int. No.	Intersection – Lane Group	Storage Length (feet)	AM Peak		PM Peak	
			50th Percentile	95th Percentile	50th Percentile	95th Percentile
1	North Capitol Street / K Street – Westbound/Through	790	~852	#1091	-	-
2	First Street / K Street NE – Eastbound Left	90	-	#94	-	-
	First Street / K Street NE – Northbound Left	125	-	-	-	#136
3	2nd Street / K Street NE – Northbound LTR	175	-	#318	-	185
5	North Capitol Street / H Street – Southbound Through	315	-	-	-	#318
9	3rd Street / H Street NE – Westbound Through	325	~596	#738	-	-
	3rd Street / H Street NE – Westbound TR	325	-	#738		-
	3rd Street / H Street NE – Northbound Left	5	79	#190	17	45
	3rd Street / H Street NE – Southbound Left	5	35	75	71	137
13	North Capitol Street / Massachusetts Avenue – Southbound LT	400	-	#416	-	-
	North Capitol Street / Massachusetts Avenue – Southbound Through	400		#416	-	-
	North Capitol Street / Massachusetts Avenue – Northwestbound Right	95	128	M#170	131	M207
14	Massachusetts Avenue / E Street / First Street NE – Northwestbound Left	100	126	#248	-	-
15	Louisiana Avenue / Massachusetts Avenue NE – Westbound Left	90	99	#168	132	#223
	Louisiana Avenue / Massachusetts Avenue NE – Westbound Through	100	188	303	110	123
	Louisiana Avenue / Massachusetts Avenue NE – Southeastbound Through	75	76	M89	115	M120
17	First Street / Massachusetts Avenue NE – Westbound Through	610	-	#611	-	-
	First Street / Massachusetts Avenue NE – Westbound TR	610	-	#611	-	-
	First Street / Massachusetts Avenue NE – Northeastbound Left	135	-	#287	-	-

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Int. No.	Intersection – Lane Group	Storage Length (feet)	AM Peak		PM Peak	
			50th Percentile	95th Percentile	50th Percentile	95th Percentile
20	Louisiana Avenue / D Street NW – Eastbound LT	240	~592	M#710	~439	#630
	Louisiana Avenue / D Street NW – Westbound LT	530	-	#537	-	#587
21	Louisiana Avenue / North Capitol Street-Southbound Right	250	~525	#758	~521	#738
	Louisiana Avenue / North Capitol Street-Northeastbound Left	90	~474	m#612	168	m252
	Louisiana Avenue / North Capitol Street-Northeastbound LT	90	281	m360	91	m150
22	2nd Street / D Street NE-Northbound LTR	355			~475	#679
	2nd Street / D Street NE-Southbound LTR	70	192	#342	~602	#826
23	2nd Street / Massachusetts Avenue NE-Westbound LT	200	221	297	263	399
	2nd Street / Massachusetts Avenue NE-Westbound TR	200	221	297	263	399
	2nd Street / Massachusetts Avenue NE-Northbound LTR	70	226	#389	319	#480
	2nd Street / Massachusetts Avenue NE- Southbound LT	225	-	248	-	-
	2nd Street / Massachusetts Avenue NE-Northbound LTR-Southbound Right	150	-	224	-	164
25	4th Street / H Street NE-Westbound LT	225	261	337	-	-
	4th Street / H Street NE-Westbound Through	225	261	337	-	-
26	Massachusetts Avenue / C Street / 4th Street NE-Westbound Left	210	310	393		
	Massachusetts Avenue / C Street / 4th Street NE-Southbound Through	175	183	#325	~232	#414
27	Louisiana Avenue / C Street NW-Eastbound Left	115	-	194	-	-
	Louisiana Avenue / C Street NW-Southwestbound Through	105	-	-	181	251
28	First Street / D Street NW-Eastbound LTR	325	456	m518	349	454
29	2nd Street / D Street NW-Westbound Through	320	-	-	-	351

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Int. No.	Intersection – Lane Group	Storage Length (feet)	AM Peak		PM Peak	
			50th Percentile	95th Percentile	50th Percentile	95th Percentile
	2nd Street / D Street NW-Westbound TR	320	-	-	-	351
	2nd Street / D Street NW-Northbound Left-Northbound Left	200	412	#660	-	296
	2nd Street / D Street NW-Northbound Left-Northbound Through	300	~712	#953	~605	#839
	2nd Street / D Street NW-Northbound Right	300	347	#582	-	379
30	3rd Street / I-395 On-ramp / D Street NW-Southbound TR	60	-	-	-	72
31	3rd Street / E Street NW-Westbound Right	25	69	#228	0	#123
32	3rd Street / Massachusetts Ave / H St NW-Eastbound Right to 3rd Street	135	-	-	~138	#318
	3rd Street / Massachusetts Ave / H St NW-Southbound Through	80	223	284	224	284
	3rd Street / Massachusetts Ave / H St NW- Southeastbound Through	160	~438	#569	418	#568
	3rd Street / Massachusetts Ave / H St NW- Southeastbound TR	160	~438	#569	418	#568
	3rd Street / Massachusetts Ave / H St NW Northwestbound Through	310	-	m217	-	-
33	North Capitol Street (SB Ramp) / New York Avenue-Southbound Right	375	-	#440	-	-
34	North Capitol Street (NB Ramp) / New York Avenue-Northbound LT	225	~311	#503	311	#508

m = Volume for 95th percentile queue is metered by upstream signal.
~ = Volume exceeds capacity, queue is theoretically infinite.
# = 95th percentile volume exceeds capacity, queue may be longer.

5.6 Transportation in the Regional Study Area

At a regional study level, this section provides an overview of the existing infrastructure in the Regional Study Area, in the different multimodal areas of analysis. This regional assessment extends to MWCOG jurisdictions.

5.6.1 Regional Passenger Railroad Infrastructure

WUS sits in the middle of the region's intercity and commuter passenger railroad infrastructure. As mentioned above, WUS is served by Amtrak, MARC, and VRE passenger

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operations. Additional Amtrak stations within the Regional Study Area are Rockville and New Carrollton in MD, and Alexandria, Manassas, and Quantico in VA. These stations are served by Amtrak Northeast Regional service (with the exclusion of Rockville, MD) and various Amtrak long-distance trains. Multiple stations for the MARC and VRE commuter services are located within the Regional Study Area. All five local commuter rail lines (MARC Penn, MARC Camden, MARC Brunswick, VRE Manassas, and VRE Fredericksburg) serve the Regional Study Area.

Railyards serving these train services are located in the District's Ivy City neighborhood, serving Amtrak, MARC, and VRE trains. A VRE railyard is located within the Regional Study Area in Prince William County, VA.

5.6.2   Regional Transit Network

The region has a robust transit network. The WMATA Metrorail system has six lines and 91 stations, all within the Regional Study Area. As of 2016, annual ridership was 748,000.[77] The DC Streetcar line extends from Union Station to Oklahoma Avenue along H Street and Benning Road NE.

A range of entities provide bus service in the region. The largest, and the only one serving most of the region, is the WMATA Metrobus system. Local jurisdictions provide additional transit bus service. These include: Ride On in Montgomery County, MD; The Bus in Prince George's County, MD; ART in Arlington County, VA; DASH in Alexandria, VA; Fairfax Connector in Fairfax County, VA; The Q in Fairfax City, VA; OmniLink in Prince William County, VA; and LCT in Loudoun County, VA. Commuter bus service is provided by the MTA, OmniRide from Prince William County, and LCT from Loudoun County, VA.

The interaction of this regional network with WUS is described above in Section 5.5.12.

5.6.3   Regional Road Network

The regional road network is notable for high levels of traffic congestion. Major roadways within the Regional Study Area include major parkways and highways. Notable parkways, most under the control of the National Park Service, include the George Washington Memorial Parkway, the Clara Barton Parkway, the Rock Creek and Potomac Parkway, the Baltimore-Washington Parkway, and Suitland Parkway. Major interstates and limited access highways include I-495 (the Capital Beltway), I-95, I-66, I-270, MD 200 (The Inter-County Connector), and U.S. 50.

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[77]   WMATA. "Metrorail Average Weekday Passenger Boardings." 2016. Accessed from https://www.wmata.com/initiatives/plans/upload/2016_historical_rail_ridership.pdf. Accessed on [DATE]Accessed on April 30, 2018.

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5.6.4   Regional Bicycle Infrastructure Network

The region has a bicycle infrastructure network throughout its various jurisdictions. As of 2015, the District had 60 miles of bicycle lanes, Arlington County, VA had 24 miles, and Montgomery County, MD had 17 miles.[78] Of particular relevance to the Project is the Metropolitan Branch Trail. The Metropolitan Branch Trail is a partially completed hiker-biker trail that extends from First and L Streets NE in the District to Silver Spring, MD.

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[78]   National Capital Region Transportation Planning Board. 2015. *Bicycle and Pedestrian Plan for the National Capital Region.* Accessed from file:///C:/Users/dmorrison/Downloads/2015_Bicycle_Pedestrian_Plan.pdf. Accessed on July 2, 2018.

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6 Air Quality

6.1   Overview

This section defines the air quality resource category set forth by the U.S. Environmental Protection Agency (EPA) and the Clean Air Act (CAA) and its amendments and introduces the methodology for determining existing conditions for the Project.

Air Quality refers to the condition of the ambient air within our surrounding and is determined through the measurement of air pollution. Air Pollution is a general term that refers to one or more substances determined to degrade the quality of the atmosphere. Urban air pollution is typically emitted by mobile sources or stationary sources. Mobile sources are those that can be moved from one location to another, such as cars, trains or trucks. Stationary sources are those that do not move, such as boilers or generators.

The air quality assessment will quantify and summarize emissions from the Washington Union Station (WUS) Project Area; compare them to existing ambient emissions; and evaluate the results based on the existing National Ambient Air Quality Standards (NAAQS) criteria pollutants. The assessment will also evaluate the hazardous air pollutants (HAP) from the Project, including the Mobile Source Air Toxics (MSAT).

6.2   Regulatory Context and Guidance

The CAA is the primary statute that drives regulating air quality and sets the nation's air quality standards for pollutants. The CAA authorizes the EPA to "protect public health by regulating emissions of harmful pollutants." The National Environmental Policy Act (NEPA) and the Conformity Rule also require the analysis of potential impacts in terms of the project's context, intensity, and duration. The Federal Railroad Administration (FRA) *Procedures for Considering Environmental Impacts*[79] state that an environmental document should consider possible impacts on air quality. These regulations and the regulatory agencies associated with them are outlined in the following sections.

Federal policies, regulations, and guidance that may pertain to air quality include:

- CAA of 1970 (42 United States Code [USC] 7401);
- Conformity Rule (40 Code of Federal Regulations [CFR] 51 & 93);

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[79]   U.S. Department of Transportation, Federal Railroad Administration (FRA). May 26, 1999. *Procedures for Considering Environmental Impacts (64 FR 28545)*. https://www.gpo.gov/fdsys/pkg/FR-1999-05-26/pdf/99-13262.pdf. Accessed June 5, 2017.

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- NAAQS (40 CFR 50);

- FRA Procedures for Considering Environmental Impacts (64 FR 28545);

- Control of Hazardous Air Pollutants from Mobile Sources 2007 (72 Federal Register [FR] 8427);[80]

- Federal Highway Administration (FHWA) Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents;[81] and

- Council on Environmental Quality (CEQ), Regulations for Implementing the Procedural Provision of the Nation Environmental Policy Act (40 CFR 1500-1508).

- FHWA Technical Advisory T6640.8A[82]

6.2.1   Criteria Pollutants

Under authority of the CAA, EPA has established NAAQS for criteria pollutants to protect the public health and welfare. Ambient air is generally defined as the portion of the atmosphere, external to buildings, to which the general public has access. The following six main air pollutants have been identified by the EPA as being of nationwide concern, based on their potential effect on public health and the environment:

- Carbon monoxide (CO);

- Sulfur dioxide (SO_2);

- Nitrogen dioxide (NO_2);

- Ozone (O_3);

- Particulate matter sized 10 micrometers or less (PM_{10}), and 2.5 micrometers or less ($PM_{2.5}$); and

- Lead (Pb).

These pollutants may be referred to collectively as Criteria Pollutants. Criteria pollutants are described in **Table 6-1**.

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[80] U.S. Environmental Protection Agency. 2007. *Final Rule for Control of Hazardous Air Pollutants from Mobile Sources*. Accessed from https://www.epa.gov/mobile-source-pollution/final-rule-control-hazardous-air-pollutants-mobile-sources. Accessed on June 6, 2017.

[81] Federal Highway Administration (FHWA). October 18, 2016. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. Memorandum. Accessed from https://www.fhwa.dot.gov/environMent/air_quality/air_toxics/policy_and_guidance/msat/. Accessed on June 12, 2017.

[82] FHWA. 2018. Accessed from https://www.environment.fhwa.dot.gov/legislation/nepa/guidance_preparing_env_documents.aspx. FHWA Technical Advisory T6640.8A. Accessed on June 21, 2018.

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Table 6-1. Description of Criteria Pollutants

Pollutant	Description
Carbon Monoxide (CO)	CO is a colorless and odorless gas that is a product of incomplete combustion. CO is absorbed by the lungs and reacts with hemoglobin to reduce the oxygen carrying capacity of the blood. At low concentrations, CO has been shown to aggravate the symptoms of cardiovascular disease. It can cause headaches, nausea, and at sustained high concentration levels, can lead to coma and death.
Nitrogen Dioxide (NO_2)	When combustion temperatures are extremely high, such as in engines, atmospheric nitrogen gas may combine with oxygen gas to form various oxides of nitrogen. Of these, nitric oxide (NO) and NO_2 are the most significant air pollutants. This group of pollutants is generally referred to as nitrogen oxides (NO_X). Nitric oxide is relatively harmless to humans but quickly converts to NO_2. NO_2 has been found to be a lung irritant and can lead to respiratory illnesses. Nitrogen oxides, along with Volatile Organic Carbons (VOCs), are also precursors to ozone formation.
Ozone (O_3)	O_3 is a highly reactive compound of oxygen. At very high concentrations, O_3 is a blueish, highly unstable gas, pungent in odor. It is colorless and odorless at the ambient concentrations experienced in the District of Columbia. O_3 is not emitted directly into the atmosphere but instead is produced by an atmospheric reaction of NO_X and VOCs in the presence of sunlight. Generally, this reaction is most favorable during the warmer summer months when sunlight is stronger. Exposure to O_3 may impair lung function and cause respiratory difficulties to sensitive populations (for example a person with asthma, emphysema or reduced lung capacity).
Particulate Matter (PM_{10} and $PM_{2.5}$)	Particulate matter is comprised of small solid particles and liquid droplets. PM_{10} refers to particulate matter with a nominal aerodynamic diameter of 10 micrometers or less, and $PM_{2.5}$ refers to particulate matter with an aerodynamic diameter of 2.5 micrometers or less. Particulates can enter the body through the respiratory system. Particulates over 10 micrometers in size are generally captured in the nose and throat and are readily expelled from the body. Particles smaller than 10 micrometers, and especially particles smaller than 2.5 micrometers, can reach the air ducts (bronchi) and the air sacs (alveoli) in the lungs. Particulates are associated with increased incidence of respiratory diseases, cardiopulmonary disease, and cancer.
Sulfur Dioxide (SO_2)	SO_2 emissions are the main components of the oxides of sulfur, a group of highly reactive gases from fossil fuel combustion at power plants, other industrial facilities, industrial processes, and burning of high-sulfur fuels by locomotives, large ships, and non-road equipment. High concentrations of SO_2 lead to formation of other sulfur oxides. Reducing SO_2 emissions also reduces other forms of sulfur oxides. When oxides of sulfur react with other compounds in the atmosphere, small particles capable of affecting the lungs can be formed. This can lead to respiratory disease and aggravate existing heart disease.
Lead (Pb)	Pb is a heavy metal that, in substantial doses, can affect the nervous system, kidneys, immune system, reproductive system, and cardiovascular system. It is emitted through some heavy industrial manufacturing processes, especially those associated with metal processing. Adding Pb to fuel increases engine performance and reduces valve wear but this use has been phased out for on-road vehicles in the United States. Since then, Pb concentrations in ambient air are often low. States with no significant lead emitting sources typically do not measure Pb at their ambient air monitoring stations.

Source: EPA 2003[83], [84]

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[83] U.S. Environmental Protection Agency Criteria Air Pollutants. Accessed from https://www.epa.gov/criteria-air-pollutants. Accessed on December 14, 2017

[84] U.S. Environmental Protection Agency. *National Air Quality and Emissions Trends Report: 2003 Special Studies Edition*. EPA-454/R-03-005. September 2003.

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The criteria pollutants which are of significance to the project include CO, NO_2, O_3 (in the form of oxides of nitrogen (NOx) and volatile organic compounds (VOC)), PM_{10}, and $PM_{2.5}$. Sulfur dioxide and Pb are generally not emitted in substantial quantities by on-road vehicles because regulations have limited the amount of sulfur and lead allowed in the composition of fuels for these vehicles. Sulfur dioxide pollution is still of concern for some non-road engines that burn high-sulfur fuel. The NAAQS are summarized in **Table 6-2**.

Table 6-2. National Ambient Air Quality Standards

Pollutant	Averaging Period	Primary Standard	Secondary Standard	Form
Carbon Monoxide (CO)	8-hour	9 ppm	-	Not to be exceeded more than once per year
	1-hour	35 ppm	-	
Nitrogen Dioxide (NO₂)	1-hour	100 ppb	-	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	1-year[a]	53 ppb	53 ppb	Annual Mean
Ozone	8-hour[b]	0.070 ppm	0.070 ppm	Annual 4th highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter 2.5 (PM₂.₅)	1-year	12 μg/m³	15 μg/m³	Annual mean, averaged over 3 years
	24-hour	35 μg/m³	35 μg/m³	98th percentile, averaged over 3 years
Particulate Matter 10 (PM₁₀)	24-hour	150 μg/m³	150 μg/m³	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO₂)	1-hour[c]	75 ppb	-	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	3-hour	-	0.5 ppm	Not to be exceeded more than once per year
Lead (Pb)	Rolling 3-month average[d]	0.15 μg/m³	0.15 μg/m³	Not to be exceeded

Source: EPA 2016a.

(ppm) – parts per million; (ppb) – parts per billion; (μg/m3) – micrograms per cubic meter

a. The level of the annual NO_2 standard is 0.053 ppm. It is shown here in terms of ppb for the purposes of clearer comparison to the 1-hour standard level.

b. Final rule signed October 1, 2015, and effective December 28, 2015. The previous (2008) O_3 standards additionally remain in effect in some areas. Revocation of the previous (2008) O_3 standards and transitioning to the current (2015) standards will be addressed in the implementation rule for the current standards.

c. The previous SO_2 standards (0.14 ppm 24-hour and 0.03 ppm annual) will additionally remain in effect in certain areas: (1) any area for which it is not yet 1 year since the effective date of designation under the current (2010) standards, and (2) any area for which implementation plans providing for attainment of the current (2010) standard have not been submitted and approved and which is designated nonattainment under the previous SO_2 standards or is not meeting the requirements of a SIP call under the previous SO_2 standards (40 CFR 50.4(3)). A SIP call is an EPA action requiring a state to resubmit all or part of its State Implementation Plan to demonstrate attainment of the require NAAQS.

d. In areas designated nonattainment for the Pb standards prior to the promulgation of the current (2008) standards, and for which implementation plans to attain or maintain the current (2008) standards have not been submitted and approved, the previous standards (1.5 μg/m³ as a calendar quarter average) also remain in effect.

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The EPA assesses an area's attainment of the NAAQS by classifying the area under four designations for each criteria pollutant: Attainment, Nonattainment, Maintenance, and Unclassifiable. An **Attainment** designation occurs when an area's ambient air concentrations are below the respective NAAQS. **Nonattainment** areas have ambient air concentrations of criteria pollutants that are greater than the NAAQS for one or more criteria pollutants. A **Maintenance** designation indicates that an area has recently achieved Attainment after being previously designated as a Nonattainment area. An **Unclassifiable** designation specifically refers to an area where insufficient data exists to decide as to Attainment or Nonattainment. Unclassifiable areas are generally treated as Attainment areas.

Should an area be designated as Nonattainment, a State Implementation Plan (SIP) is required to demonstrate a pathway back to NAAQS compliance. A SIP identifies how the state will attain and/or maintain the primary and secondary NAAQS, including Federally-enforceable requirements. There is a SIP for the District as the area is in nonattainment for 8-hour ozone and is in a Maintenance area for carbon monoxide and $PM_{2.5}$.

Projects that are proposed in a Nonattainment or Maintenance area must show conformity with the SIP. Conformity is showing agreement to a SIP's purpose of reducing the severity of or eliminating the NAAQS violation(s) in the area. Conformity requires that a project will not:

- Cause or contribute to any new violation of the NAAQS;

- Increase the frequency or severity of any existing violation of the NAAQS; or

- Delay the attainment of the NAAQS.

EPA promulgated final General Conformity regulations in 40 CFR Part 93 Subpart B for all Federal activities except those covered under the Transportation Conformity regulations. FRA activities are not covered under Transportation Conformity as FRA is exempt from the applicability criteria listed in 43 CFR 93.102. Transportation Conformity only addresses air pollution from on-road mobile sources and projects that are exempt include specific projects under the categories of safety, mass transit, and air quality [85]; therefore, General Conformity regulations apply to the WUS Expansion Project (the Project). The EPA has established *de minimis* thresholds (minimum thresholds) for which a conformity determination must be performed for various criteria pollutants. These thresholds are presented in **Table 6-3**.

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[85] U.S. Department of Transportation, Federal Highway Administration, Transportation Conformity. Accessed from https://www.fhwa.dot.gov/environment/air_quality/conformity/. Accessed on July 25, 2017.

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Table 6-3. General Conformity *de minimis* Emissions Levels

Pollutant	Tons per Year	Area Type
Ozone (VOC or NOx)	50	Serious Nonattainment
	25	Severe Nonattainment
	10	Extreme Nonattainment
	100	Other Areas Outside an Ozone Transport Region
Ozone (NOx)	100	Marginal and Moderate Nonattainment Inside an Ozone Transport Region
	100	Maintenance
Ozone (VOC)	50	Marginal and Moderate Nonattainment Inside an Ozone Transport Region
	50	Maintenance Within an Ozone Transport Region
	100	Maintenance Outside an Ozone Transport Region
Carbon Monoxide (CO), Sulfur Dioxide (SO$_2$) and Nitrogen Dioxide (NO$_2$)	100	All Nonattainment and Maintenance
Particulate Matter 10 (PM$_{10}$)	70	Serious Nonattainment
	100	Moderate Nonattainment and Maintenance
Particulate Matter 2.5 (PM$_{2.5}$)[1]	70	Serious Nonattainment
	100	Moderate Nonattainment and Maintenance
Lead (Pb)	25	All Nonattainment and Maintenance

Source: EPA 2016b

1. Direct emissions, SO$_2$, NOx, (unless determined not to be a significant precursor), VOC or ammonia (if determined to be a significant precursor)

An analysis of the estimated potential emissions (described in Section 6.5) of the Build Alternatives will be compared to the d*e minimis* Emissions Levels of Table 6-2. If annual direct emissions are less than the *de minimis* thresholds, then the Project does not require a General Conformity determination. The applicability of General Conformity only considers the pollutants in nonattainment and maintenance for the District.

6.2.2   Mobile Source Air Toxics

Most air toxics originate from human-made sources, including onroad mobile sources, nonroad mobile sources such as internal combustion engines used in vehicles, locomotives, and construction equipment. Controlling air toxic emissions became a national priority with the passage of the Clean Air Act Amendments (CAAA) of 1990, whereby Congress mandated that the EPA regulate 188 air toxics, also known as hazardous air pollutants.

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The EPA assessed this expansive list in its rule on the *Control of Hazardous Air Pollutants from Mobile Sources,*[86] and identified a group of 93 compounds emitted from mobile sources that are part of EPA's Integrated Risk Information System (IRIS).[87] In addition, EPA identified nine compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers or contributors and non-cancer hazard contributors from the *2011 National Air Toxics Assessment* (NATA).[88] These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While the FHWA considers these the priority mobile source air toxics (MSAT), the list is subject to change and may be adjusted in consideration of future EPA rules.

Air toxics analysis is a continuing area of research. While much work has been done to assess the overall health risk of air toxics, many questions remain unanswered. In particular, the tools and techniques for assessing project-specific health outcomes as a result of lifetime MSAT exposure remain limited. Neither the EPA or FRA have released guidelines for quantitatively assessing the air toxics emissions of rail sources. These limitations impede the ability to evaluate how the potential health risks posed by MSAT exposure should be factored into project-level decision-making within the context of NEPA. For the Project, MSAT analysis will be based on interim guidance released by FHWA.

6.2.3   State and Regional Regulation

States (and the District) may have laws and regulations to control or abate air pollution, and some states establish their own air quality or emissions standards. States may also establish entities to administer, regulate, and enforce the Federal and state air quality laws, which may include delegating authority to local governments to enforce air pollution controls.

The Department of Energy and Environment (DOEE) enforces the District's air quality regulations that are codified in the District Municipal Regulations (DCMR) at Title 20, Chapters 1 through 15. The purpose of the regulations is to prevent or minimize emissions into the atmosphere in order to protect and enhance the quality of the District's air resources. These regulations control emissions from both stationary sources and mobile sources to the extent allowed by Federal regulations and the CAA.

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[86]   U.S. Environmental Protection Agency. February 26, 2007. Control of Hazardous Air Pollutants from Mobile Sources (72 FR 8430). Accessed from https://www.gpo.gov/fdsys/pkg/FR-2007-02-26/pdf/E7-2667.pdf. Accessed June 7, 2017.

[87]   U.S. Environmental Protection Agency. Integrated Risk Information System. Accessed from https://www.epa.gov/iris. Accessed June 6, 2017.

[88]   U.S. Environmental Protection Agency. National Air Toxics Assessment. Accessed from https://www.epa.gov/national-air-toxics-assessment. Accessed June 6, 2017.

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District permitting of the major and minor emission sources is described in 20 DCMR Chapters 2[89] and 3.[90] Permits are not required for fuel burning equipment that have heat input capacity of 5 million British thermal units (MMBtus) per hour or less and operate on gaseous fuels or distillate oils.[91] Should a permit be required, the operation must demonstrate that the appropriate control measures are implemented to sufficiently protect public welfare, prevent the delay or nonattainment of the NAAQS and comply with the DCMR. Should a stationary source emit 25 tons or more per year of a regulated air pollutant, records of the nature and amount of emissions must be kept in accordance with 20 DCMR 500.[92]

The control of fugitive dust and particulate matter is regulated in 20 DCMR §605.[93] Fugitive dust is non-point particulate matter emission into the atmosphere that results from a mechanical disturbance, such as dust blown into the air from a dirt pile by the wind or re-entrained- from the ground by a vehicle tire. Fugitive dust is typically of concern during construction activities. Per 20 DCMR 605, fugitive dust must be controlled for unpaved roads, unpaved parking lots, transport of dusty material, demolition, and other scenarios likely to generate this type of emissions.

The District has established air quality regulations for other relevant air quality concerns such as the on-road engine and non-road diesel engine idling in 20 DCMR §900[94] and adoption of the General Conformity requirements in 20 DCMR §1501.[95] Another potentially relevant air quality concern, the storage of petroleum products, is regulated in 20 DCMR Chapter 7.[96]

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[89] 20 DCMR Chapter 2. Accessed from https://www.epa.gov/sips-dc/district-columbia-sip-20-dcmr-chapter-2-general-and-non-attainment-area-permits. Accessed on November 17, 2017.

[90] 20 DCMR Chapter 3. Accessed from https://www.epa.gov/sips-dc/district-columbia-sip-20-dcmr-chapter-3-general-and-non-attainment-area-permits. Accessed on November 17, 2017.

[91] 20 DCMR Chapter 2 §200.12. Accessed from https://www.epa.gov/sips-dc/district-columbia-sip-20-dcmr-chapter-2-general-and-non-attainment-area-permits. Accessed on November 17, 2017.

[92] 20 DCMR Chapter 5. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/aqd.revch5_.pdf. Accessed on November 17, 2017.

[93] 20 DCMR Chapter 6. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/aqd.revch6_.pdf. Accessed on November 17, 2017.

[94] 20 DCMR Chapter 9. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/chapter9revised.pdf. Accessed on November 17, 2017.

[95] 20 DCMR Chapter 15. Accessed from http://dcrules.elaws.us/dcmr/20-1501. Accessed on November 17, 2017.

[96] 20 DCMR Chapter 7. Accessed from https://dcregs.dc.gov/Common/DCMR/RuleList.aspx?ChapterNum=20-7&ChapterId=467. Accessed on November 17, 2017.

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6.3   Study Area

Air quality is studied at both local and regional levels. Local analyses are called microscale or "hot-spot" analyses and focus on pollutant concentrations in publicly accessible spaces. Regional analyses are called mesoscale analyses and focus on pollutant inventories and the mass of pollutants being emitted by a project.

The Local Study Area focuses on locations around the Project's emission sources where the public has access to ambient air. The local air quality analysis will evaluate mobile and stationary sources associated with the Project and traffic accessing WUS. As such, the Local Study Area is determined by combining the extent of the Project Area and the intersections considered in the traffic analysis (**Figure 6-1**).

The Local Study Area for the mobile source assessment focuses on the area where trains enter and leave WUS. The mobile source assessment Local Study Area is consistent with the area determined for the assessment of traffic impacts and covers the worst-case air quality impacts for review against the required air quality standards. In addition, the proposed stationary emission sources (heating, ventilation, and air conditioning [HVAC] equipment, construction equipment, etc.) which could impact human health or the environment were reviewed within the Project Area to determine any air quality impacts. Nearby intersections that are affected by vehicular traffic entering and leaving the station were also examined.

The Regional Study Area is used for all regional mesoscale air quality analyses conducted for the Project. The Regional Study Area is typically defined as the county or counties a project is located in. For the Project, the Regional Study Area (**Figure 6-2**) encompasses the area of the jurisdictions that are members of the Metropolitan Washington Council of Governments (MWCOG) Maryland, the District, and Virginia. This Regional Study Area is being selected because WUS is a project of regional significance that has an impact on transportation movements in different modes across the MWCOG area. The air quality Regional Study Area includes the roadways and intersections studied for this Project in the transportation analysis**.** This encompasses the geography of MWCOG that the Constrained Long-Range Plan and regional modeling efforts are conducted.[97]

6.4   Methodology

The regional climate and metrological conditions in the Regional Study Area were determined based on publicly available data from the National Oceanic and Atmospheric Administration (NOAA) and the National Weather Service (NWS). This information includes data on historical temperatures, precipitation, wind speeds, and distributions.

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[97]   MWCOG FY 2017-2022 Transportation Improvement Program November 2016 & 2016 Amendment to Constrained Long-Range Transportation Plan (CLRP) November 2016, Accessed from http://www1.mwcog.org/clrp/resources/KeyDocs_2016.asp, Accessed on December 14, 2017.

Figure 6-1. Air Quality Local Study Area
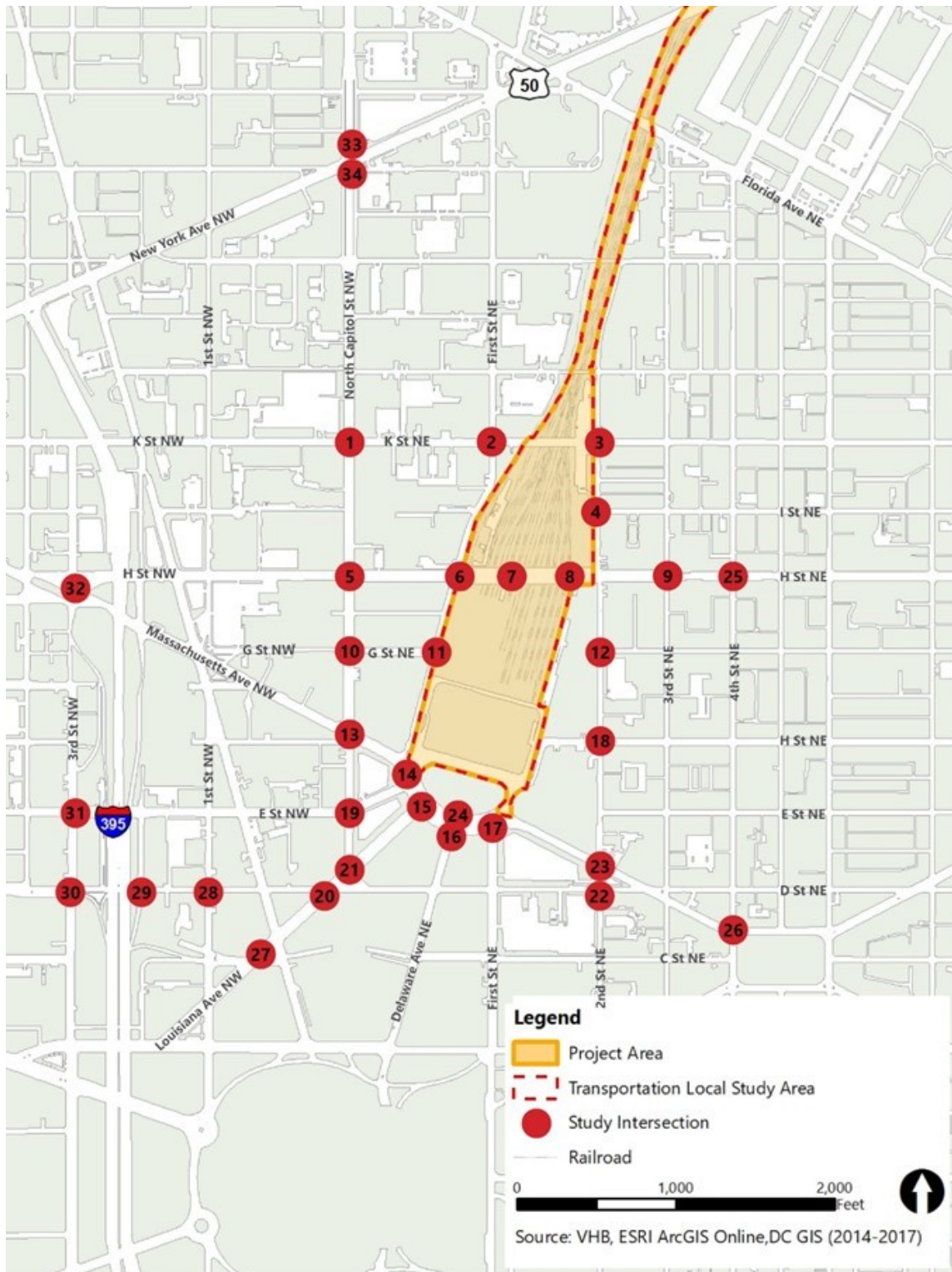
Note: see Section 5.3., Study Area, for key to study intersection numbers.

Figure 6-2. Air Quality Regional Study Area

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The existing ambient air quality conditions were obtained from DOEE and EPA air quality monitoring data. This information was retrieved from the Ambient Air Monitoring Network Plans and the EPA AirData Database. The design value concentrations were used to determine whether an area was attaining (meeting) NAAQS for Ozone and used to determine the Project's criteria pollutants as regulated by the NAAQS.

The attainment status of the Regional Study Area was confirmed based on the EPA Federal Register Notices (available from EPA's Greenbook). The attainment was confirmed for the District. WUS is in the District, which has been designated by EPA as in non-attainment for 8-hour ozone and is in a Maintenance area for CO and $PM_{2.5}$. Existing conditions related to mobile sources were determined as follows and are described in more detail in the methodology chapters:

- Local Assessment included an assessment of the existing conditions of the Local Study Area through a CO hot spot analysis and $PM_{2.5}$ hot spot analysis. The need for a hotspot assessment was determined through coordination with FRA.

- Regional Assessment/General Conformity included VOC, NO_x, CO, and PM_{10}/$PM_{2.5}$ emissions inventories that included the existing diesel locomotive, motor vehicles, and buses within the Regional Study Area.

6.5   Affected Environment

This section summarizes the baseline air quality information for the Project and the existing conditions in the Local Study Area.

6.5.1   Regional Climate Setting

Regional climate and meteorological conditions can substantially affect air quality across the region. Emission, transport, and dispersion of pollutants are highly dependent on wind speed, wind direction, air temperature, precipitation, humidity and other meteorological factors. Generally, the District is characterized as a humid subtropical climate.[98] This category typically experiences hot and humid summers, cold winters with light snowfall, and annual precipitation occurring throughout the year.

Table 6-4 presents the representative monthly climate data for the region based on meteorological observations at Reagan National Airport located in Arlington, VA. The meteorological parameters shown include mean maximum, average and minimum temperatures, mean precipitation, and mean snowfall by month.

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[98]   Koppen Classification: Cfa. Accessed from http://koeppen-geiger.vu-wien.ac.at/usa.htm. Accessed November 28, 2017.

Table 6-4. Representative Climate Data near the Project Area

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Mean Maximum Temperature (˚F)	43.4	47.1	55.9	66.6	75.4	84.2	88.4	86.5	79.5	68.4	57.9	46.8
Average Temperature (˚F)	36.0	39.0	46.8	56.8	66.0	75.2	79.8	78.1	71.0	59.5	49.6	39.7
Mean Minimum Temperature (˚F)	28.6	30.9	37.6	47.0	56.5	66.3	71.1	69.7	62.4	50.6	41.2	32.5
Mean Precipitation (in)	2.81	2.62	3.48	3.06	3.99	3.78	3.73	2.93	3.72	3.40	3.17	3.05
Mean Snowfall (in)	5.6	5.7	1.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.5	2.3

Source: NWS 2016[99]; (˚F) – Degrees Fahrenheit; (in) - inches

All values represent monthly normals based on weather data from 1981-2010.

Wind speed, wind direction and atmospheric stability greatly influence pollutant transport and dispersion. When reviewing historical wind data, a high frequency of a particular wind direction, coupled with low wind speeds and a stable atmosphere, can indicate poor pollutant dispersion and potential concentration hot-spots. The historical wind rose for the District shows that the predominant wind direction in the area is from the west-northwest.[100]

6.5.2 Ambient Air Quality

Ambient air is generally defined to mean the portion of the atmosphere, external to buildings, to which the general public has access. The CAA requires the EPA to set standards on the pollutants that are considered potentially harmful to public health and the environment at ambient concentrations. As outlined in **Table 6-5**, the NAAQS apply to six principal (criteria) pollutants: CO, NO_2, O_3, PM (2.5 and 10), SO_2, and Pb. Air pollution is of concern because of its demonstrated effects on human health. Of particular concern are the respiratory effects of the criteria pollutants and their potential toxic effects.

Ambient air monitoring is the systematic, long-term assessment of pollutant levels by measuring the quantity and types of certain pollutants in the surrounding, outdoor air. In response to the CAA, DOEE has established a District-wide air quality monitoring network. Air quality monitoring is primarily carried out to:

- Determine compliance with the NAAQS;
- Characterize air quality and pollutant trends;

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[99] "DCA Normals, Means, and Extremes" *National Weather Service*. Accessed from http://www.weather.gov/lwx/dcanme. Accessed on June 29, 2017.

[100] "Climate Washington D.C." Accessed from https://www.meteoblue.com/en/weather/forecast/modelclimate/washington-d.c._united-states-of-america_4140963. Accessed November 28, 2017.

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- Estimate health risks and ecosystem impacts;

- Develop and evaluate emission control strategies;

- Evaluate source-receptor relationships;

- Provide input data for models and evaluating models;

- Measure overall progress of air pollution control programs; and

- Inform air quality forecasts and other public outreach air quality reports.[101]

Table 6-5 presents the 2015 background concentrations of pollutants for the Project Area. The table presents concentrations from the monitoring location closest to the Project Area at McMillian Reservoir (2500 First Street NW). This monitoring station is representative of an urban scale and is the most comprehensive ambient air station in the District.

**Table 6-5. 2015 Regional Background Air Quality Concentrations
at the McMillan Reservoir Monitoring Location**

Pollutant	Averaging Period	Background Concentration	NAAQS
Carbon Monoxide (ppm)	8-hour	1.5	9
	1-hour	1.7	35
Nitrogen Dioxide (ppb)	1-hour	49	100
	Annual	13	53
Ozone (ppm)	8-hour	0.068	0.070
Particulate Matter 2.5 ($\mu g/m^3$)	Annual	9.2	12.0
	24-hour	22	35
Particulate Matter 10 ($\mu g/m^3$)	24-hour	-	150
Sulfur Dioxide (ppb)	1-hour	12	75
Lead ($\mu g/m^3$)	3-month	0.0046	0.15

The representative regional background concentrations show that all pollutant concentrations at the monitor nearest WUS are below their respective NAAQS criteria. Most of the pollutants have ambient concentrations well below the NAAQS, while Ozone and PM$_{2.5}$ have measured concentrations approaching the NAAQS. These background concentrations will be added to the project-related pollutant emissions to assess the project-related air quality impacts against the NAAQS.

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[101] "District of Columbia 2017 Annual Ambient Air Monitoring Network Plan" *Department of Energy and Environment, Air Quality Division, Monitoring and Assessment Branch*. June 2016. Accessed from doee.dc.gov/sites/default/files/dc/sites/ddoe/release_content/attachments/DC_Draft%20Annual%20Ambient. Accessed on December 14, 2017.

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The current attainment status of the Local Study Area was determined based on the EPA's Greenbook.[102] WUS is located in the District, which has been designated by the EPA as in Marginal Nonattainment for 8-hour ozone inside the Ozone Transport Region. The District is in a Moderate Maintenance area for CO and PM $_{2.5}$.

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[102]   EPA. "Nonattainment Areas for Criteria Pollutants (Green Book)" Accessed from https://www.epa.gov/green-book. Accessed on June 29, 2017.

7 Greenhouse Gas Emissions and Resilience

7.1 Overview

Greenhouse gases (GHGs) are gases that trap heat in the atmosphere. Pollutants that are considered GHGs affect air quality and climate change. Some major GHGs include carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and fluorinated gases (hydrofluorocarbons, perfluorocarbons, etc.). The precise sources of these pollutants, their effects on human health and general welfare, as well as their final disposition in the atmosphere vary considerably.

In recent years, the District has experienced an increasing number of impacts from changing climate conditions, such as record-breaking heat waves and snowstorms, flooding, and heavy rainstorms. This section reviews the existing and anticipated changing climate conditions (by which the Washington Union Station [WUS] Expansion Project [the Project] may be affected), including rising temperature, changing precipitation patterns, sea level rise, frequency and intensity of extreme weather events, and GHG status.

7.2 Regulatory Context and Guidance

District guidance that pertains to GHG and resilience include the primary GHGs in the earth's atmosphere such as water vapor, CO_2, N_2O, CH_4, and ozone.

The primary pollutant of concern from sources related to human activity is CO_2, which is by far the most abundant and, therefore, the most influential GHG. All combustion processes and some industrial processes cause CO_2 emissions. CO_2 is removed (or sequestered) from the lower atmosphere by natural processes such as photosynthesis and uptake by the oceans. While GHG emissions include several gases, CO_2 was selected for evaluation because it is the most significant component of project-related GHG emissions. The U.S. Environmental Protection Agency (EPA) has not set National Ambient Air Quality Standards (NAAQS) for GHGs; however, they do encourage strategies to reduce emissions and save fuel.

There are no established thresholds for assessing the significance of a project's GHG emissions; instead, the analysis seeks to identify GHG sources and practicable means to reduce them.

Federal policies, regulations, and guidance that may pertain to GHG and resilience include:

- Executive Order (EO) 13783, *Promoting Energy Independence and Economic Growth* (2017) which rescinds EO 13653 and Council on Environmental Quality (CEQ) Final GHG Guidance (withdrawn);

- EO 13677, Climate Resilient International Development (2014);

- EO 13834, Efficient Federal Operations (2018)

- EPA Greenhouse Gas Endangerment Finding (2009);[103] and

- EPA and U.S. Department of Transportation (USDOT) Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards (2011).[104,105]

District guidance that pertain to GHG and resilience include:

- Multiple plans for achieving GHG reduction goals and sustainability objectives such as *The Sustainable DC Plan*[106] and the *Climate Ready DC Plan*.[107] The District is targeting GHG reduction goals of 50 percent by 2032 and 80 percent by 2050.[108] To reduce emissions from buildings, the District set a goal to meet net-zero energy use standards with all new construction projects. Additionally, the District would like to advance physical adaptation and human preparedness to increase the District's resilience to future climate change. To achieve this goal, by 2032 any new building and major infrastructure project will undergo a climate change impact assessment as part of the regulatory planning process.

7.3   Study Area

Climate change is a global phenomenon with localized implications. GHG emissions as it pertains to mobile sources has a regional effect. For the stationary sources, a more Local Study Area will be required. The effects of climate change on the Project (for example,

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[103]   U.S. Environmental Protection Agency. December 15, 2009. *Endangerment and Cause or Contribute Findings for Greenhouse Gases Under Section 202(a) of the Clean Air Act (74 F.R. 66495).* Accessed from https://www.epa.gov/sites/production/files/2016-08/documents/federal_register-epa-hq-oar-2009-0171-dec.15-09.pdf. Accessed June 8, 2017.

[104]   U.S. Environmental Protection Agency, U.S Department of Transportation. May 7, 2010. *Light-Duty Vehicle Greenhouse Gas Emission Standards and Corporate Average Fuel Economy Standards (75 F.R. 25324).* Accessed from https://www.gpo.gov/fdsys/pkg/FR-2010-05-07/pdf/2010-8159.pdf. Accessed June 8, 2017.

[105]   U.S. Environmental Protection Agency, U.S Department of Transportation. October 15, 2012. *2017 and Later Model Year Light-Duty Vehicle Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards (77 F.R. 62624).* Accessed from https://www.gpo.gov/fdsys/pkg/FR-2012-10-15/pdf/2012-21972.pdf. Accessed June 8, 2017.

[106]   Department of Energy and Environment, District Office of Planning, and Office of the Mayor. 2016. *The Sustainable DC Plan.* Accessed from http://www.sustainabledc.org/wp-content/uploads/2017/03/SDC_Plan_2016_compressed2.pdf. Accessed June 8, 2017.

[107]   D.C. Department of Energy and Environment. November 2016. *Climate Ready DC Plan.* Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/CRDC-Report-FINAL-Web.pdf. Accessed June 8, 2017.

[108]   Department of Energy and Environment, District Office of Planning, and Office of the Mayor. 2016. *The Sustainable DC Plan.* Accessed from http://www.sustainabledc.org/wp-content/uploads/2017/03/SDC_Plan_2016_compressed2.pdf. Accessed June 8, 2017.

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extreme heat days, more frequent and intense heavy rain events) will be considered at both regional and local levels.

Greenhouse Gas. The state of dispersion science and health effects of GHG emissions have not sufficiently advanced to accurately consider this resource area at a microscale level, as such the Environmental Impact Statement (EIS) will not consider a Local Study Area for GHG.

Resilience. The Local Study Area for existing conditions and anticipated climate change impacts include the Project Area and the surrounding area within one-half mile (**Figure 7-1**). In addition to directly affecting WUS, impacts from climate, such as heatwaves, flooding, and extreme storm events, could also pose challenges to the immediately adjacent infrastructure.

GHGs are unique from other resource areas and topics considered in the EIS in that the concerns about GHG emissions are primarily related to climate change, which is regional and global in nature. This analysis considers the Study Area for GHGs for mobile sources only on a regional scale. For the Project, the Regional Study Area is defined as the area that encompasses the jurisdictions of the Metropolitan Washington Council of Governments (MWCOG) (**Figure 7-2**).[109]

The Project's Regional Study Area will assess existing and anticipated climate conditions at various scales, based on the referenced reports and publications. For example, while the U.S. Third National Climate Assessment (NCA) provides data for the Northeast region,[110] NOAA's State Climate Summaries provide more localized data for the state of Maryland and the District.[111]

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[109] The member jurisdictions of the Metropolitan Washington Council of Governments are the District of Columbia; Charles, Frederick, Montgomery, and Prince George's Counties in Maryland; the Cities of Bladensburg, Bowie, College Park, Frederick, Gaithersburg, Greenbelt, Hyattsville, Laurel, Rockville, and Takoma Park in Maryland; Arlington, Fairfax, Loudoun, and Prince William Counties in Virginia; and the Cities of Alexandria, Fairfax, Falls Church, Manassas, and Manassas Park in Virginia.

[110] Horton, R., G. Yohe, W. Easterling, R. Kates, M. Ruth, E. Sussman, A. Whelchel, D. Wolfe, and F. Lipschultz, 2014: Ch. 16: Northeast. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 16-1-nn.

[111] Runkle, J., K. Kunkel, D. Easterling, B. Stewart, S. Champion, R. Frankson, and W. Sweet, 2017: Maryland State Summary. NOAA Technical Report NESDIS 149-MD, 4 pp.

Figure 7-1. Resilience Local Study Area

Legend
- Project Area
- Resilience Local Study Area
- Railroad

Source: VHB, ESRI ArcGIS Online, DC GIS (2014-2017)

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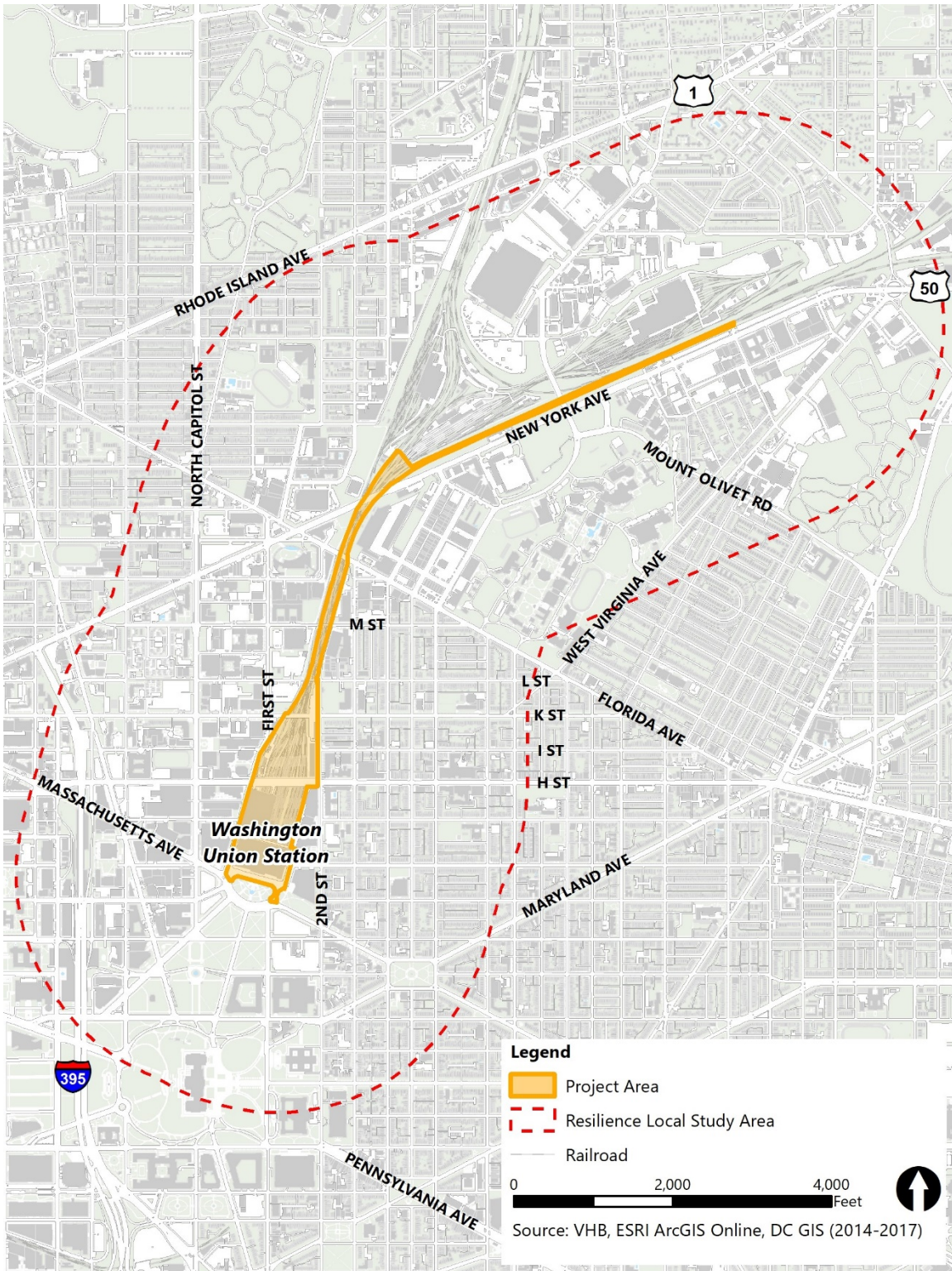
Figure 7-2. GHG Emissions and Resilience Regional Study Area

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7.4   Methodology

Global, national, and regional trends in GHG emissions and climatic changes were used to characterize the affected environment. Existing GHG emissions associated within the local Study Area including the operations and maintenance of the existing station and the existing regional GHGs were developed for the Project Study Areas. Current GHG emissions within the affected environment were defined as a baseline. Existing climate change issues were investigated. The following resources were consulted:

- International Energy Agency analyses and projections of global energy use.

- Intergovernmental Panel on Climate Change (IPCC), *5th Assessment Report*[112] and other reports. Current global assessment of climate change including scientific information on causes of climate change, GHG emissions, and projections of impacts.

- NOAA and Oak Ridge National Laboratory, *Recent Greenhouse Gas Concentrations*.[113]

- U.S. Energy Information Administration, *Annual Energy Outlook*.[114] Assessment of GHG emissions and projects based on energy sectors.

- U.S. Global Change Research Program, U.S. National Climate Assessment.[115] Assessment of climate change and potential impacts in the United States, including potential climate change impacts by region.

- EPA, U.S. Greenhouse Gas Inventory.[116] Assessment of GHG emissions in the U.S. and trends by GHGs and economic sector.

- District Department of Energy and Environment (DOEE), District GHG Inventory.[117]

- DOEE Climate Ready DC Plan.

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[112]   Intergovernmental Panel on Climate Change (IPCC), September 2013 to November 2014, *Intergovernmental Panel on Climate Change, 5th Assessment Report (AR5)*. Accessed from http://www.ipcc.ch/activities/activities.shtml. Accessed on June 6, 2017.

[113]   Blasing, T.J. Oak Ridge National Laboratory. April 2016. *Recent Greenhouse Gas Concentrations*. Accessed from http://cdiac.ornl.gov/pns/current_ghg.html. Accessed on June 6, 2017.

[114]   US Energy Information Administration. January 5, 2017. *Annual Energy Outlook 2017*. Accessed from https://www.eia.gov/outlooks/aeo/pdf/0383(2017).pdf. Accessed on June 8, 2017.

[115]   US National Climate Assessment, US Global Change Research Program. 2014. *Climate Change Impacts in the United States*. Accessed from http://www.globalchange.gov/browse/reports/climate-change-impacts-united-states-third-national-climate-assessment-0. Accessed on June 8, 2017.

[116]   U.S. Environmental Protection Agency. 2017. *Inventory of US Greenhouse Gas Emissions and Sinks: 1990-2015*. Accessed from https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks. Accessed on June 8, 2017.

[117]   District Department of Energy and Environment. *Greenhouse Gas Inventories*. Accessed from https://doee.dc.gov/service/greenhouse-gas-inventories. Accessed on June 8, 2017.

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- DOEE Climate Projections & Scenario Development, Climate Change Adaptation Plan for the District of Columbia.[118]

7.5 Affected Environment

This section summarizes the affected environment of the Project based on the evaluation of current GHG emissions and climate condition and provides context for assessing the potential implications on the Project. Current climate change conditions (primarily temperature, precipitation and sea level rise) will be reviewed on both local and regional scales. In addition, the analysis quantifies the GHG emissions related to the operations and maintenance of WUS.

7.5.1 Regional Greenhouse Gas and Climate Trends

Regional climate and meteorological conditions can substantially affect air quality and GHG emissions across the region. Detailed information on changing climate conditions and the resulting impacts to human, natural, and built infrastructure systems is summarized in reference documents such as the IPCC latest synthesis report,[119] the U.S. Third National Climate Assessment, and Climate Ready DC.[120]

DOEE regularly tracks the District's GHG emissions to determine the region's compliance with its reduction goals. When the inventory was conducted in 2013, the city-wide annual GHG emissions were 7.75 million metric tons of CO_2e. [121] However, this represented an annual GHG emission reduction of 2.35 million metric tons of CO_2e when compared to the base year emissions in 2006. A majority of transportation-related GHG emissions were produced by passenger vehicles, while electricity used in transit only accounted for 6.0-percent of transportation-related GHG emissions. The region has met its 2012 goal to reduce greenhouse gas emissions to 2005 levels. The MWCOG continues to work with its regional partners to meet the 2020 goal of 20-percent below 2005 level. [122]

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[118] District Department of Energy and Environment. June 2015. *Climate Projections & Scenario Development, Climate Change Adaptation Plan for the District of Columbia.* Accessed from https://doee.dc.gov/publication/climate-projections-scenario-development. Accessed on June 8, 2017.

[119] IPCC.Climate Change 2014: Synthesis Report. Contribution of Working Groups I, II and III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change. 2014. Accessed from http://ar5-syr.ipcc.ch/. Accessed on December 4, 2017.

[120] Climate Ready DC, The District of Columbia's Plan to Adapt to a Changing Climate, Department of Energy & Environment, 2013. Assessing Health Impacts of Urban Heat Island Reduction Strategies in the District of Columbia. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/service_content/attachments/CRDC-Report-FINAL-Web.pdf. Accessed on May 1, 2018.

[121] District of Columbia Department of Energy & Environment, *District of Columbia Greenhouse Gas Inventory Update 2012-2013.* Accessed from https://doee.dc.gov/service/greenhouse-gas-inventories. Accessed on June 12, 2017. CO_2e: Carbon Dioxide equivalent.

[122] Metropolitan Washington Council of Governments, Environment Climate & Energy. Accessed from https://www.mwcog.org/environment/planning-areas/climate-and-energy/. Accessed on June 12, 2017.

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According to the U.S. Third National Climate Assessment, the Northeast region has recorded an increase in average annual temperature by almost 2 degrees Fahrenheit and an increase in annual precipitation of approximately 5 inches between 1895 and 2011. It is also reported that the Northeast has been experiencing a 70 percent increase in precipitation volume during extreme storm events. By mid-century (2041-2070), the majority of the Northeast region's southern portion, of which the District is a part, is projected to experience more days per year above 90 degrees Fahrenheit compared to historical record between 1971 and 2000. With regard to precipitation, the frequency and intensity of heavy downpours is increasing, particularly in the winter and spring seasons, a trend likely to continue to increase through the end of the century. Sea level in the Northeast region has risen approximately 1 foot on average since 1990—exceeding the global average of 8 inches—and resulted in increasing coastal flooding in the region. Sea level rise is expected to continue rising at a more rapid rate than global average, due to local land subsidence, and will pose a major threat as it will intensify the impacts of coastal flooding.[123] **Figure 7-3** illustrates the Northeast sea level trends and magnitude of changes.

Specifically, to the District area, the average annual temperature has increased by more than 2 degrees Fahrenheit during the last 50 years. In fact, since 2010, five of the six hottest summers on record since 2010 have taken place in the District. On average, the District experiences about 30 days of dangerous hot days (when temperature is 95 degrees Fahrenheit or above) per year. Heatwaves are also a concern for the area, with the most recent incident in 2012, when the District hit a record-breaking heatwave of temperatures above 95 degrees Fahrenheit for 11 consecutive days. As average temperature is projected to continue rising, the District is expected to experience hot days and heatwaves more frequently. **Figure 7-4** demonstrates the current and projected increase in numbers of extremely hot days which would require the District to activate its heat emergency plan. As for precipitation patterns, while annual precipitation volumes have not changed significantly, it is reported that more precipitation has been occurring in the fall and winter and less in the summer in the District area. Extreme precipitation events are also expected to occur more frequently and intensely by mid- and end of the century as well. **Figure 7-5** shows the significant changes in frequency of extreme rain events; as noted, what is considered as today's 100-year precipitation event will likely become a 25-year event by mid-century. [124]

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[123] Horton, R., G. Yohe, W. Easterling, R. Kates, M. Ruth, E. Sussman, A. Whelchel, D. Wolfe, and F. Lipschultz, 2014: Ch. 16: Northeast. Climate Change Impacts in the United States: The Third National Climate Assessment, J. M. Melillo, Terese (T.C.) Richmond, and G. W. Yohe, Eds., U.S. Global Change Research Program, 16-1-nn. Accessed from http://s3.amazonaws.com/nca2014/low/NCA3_Full_Report_16_Northeast_LowRes.pdf?download=1. Accessed on December 4, 2017.

[124] District of Columbia Department of Energy & Environment, Climate Ready DC: The District of Columbia's Plan to Adapt to a Changing Climate. Accessed from https://doee.dc.gov/climateready. Accessed on December 4, 2017.

Figure 7-3. Regional Trends in Sea Level and Magnitude of Changes in the Northeast
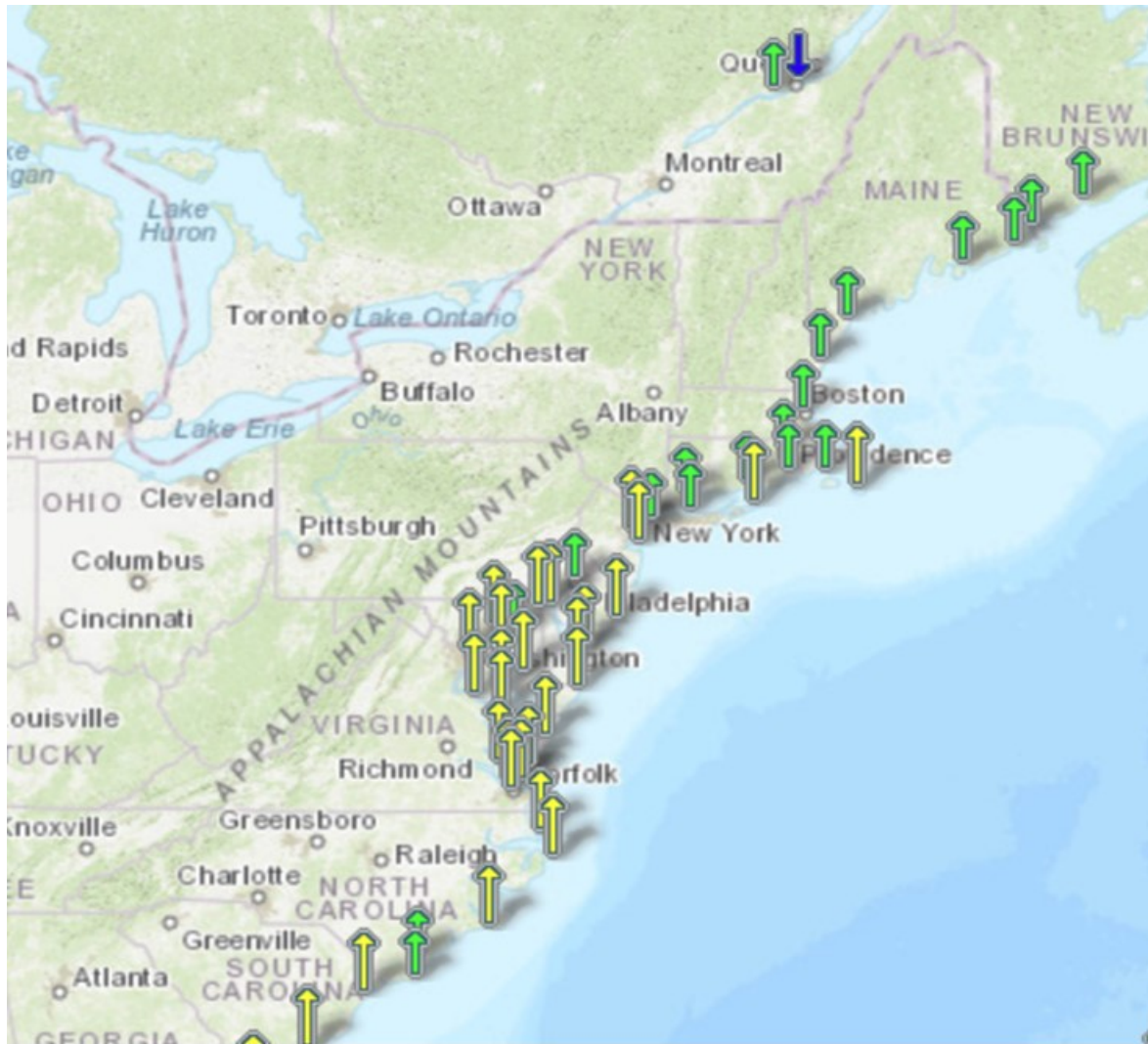
Source: NOAA[125]

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125   NOAA, Sea Level Trends. Accessed from https://tidesandcurrents.noaa.gov/sltrends/sltrends.html. Accessed on December 6, 2017.

Figure 7-4. Current and Projected Number of Dangerously Hot/Heat Emergency Days Per Year in the District

Source: Climate Ready DC: The District of Columbia's Plan to Adapt to a Changing Climate[126]

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[126] *District of Columbia's Plan to Adapt to a Changing Climate.* Accessed from
http://www.adaptationclearinghouse.org/resources/climate-ready-dc-the-district-of-columbia-eys-plan-to-adapt-to-a-changing-climate.html. Accessed on December 4, 2017.

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Figure 7-5. Current and Projected Extreme Precipitation Events in the District

Extreme Rain Events
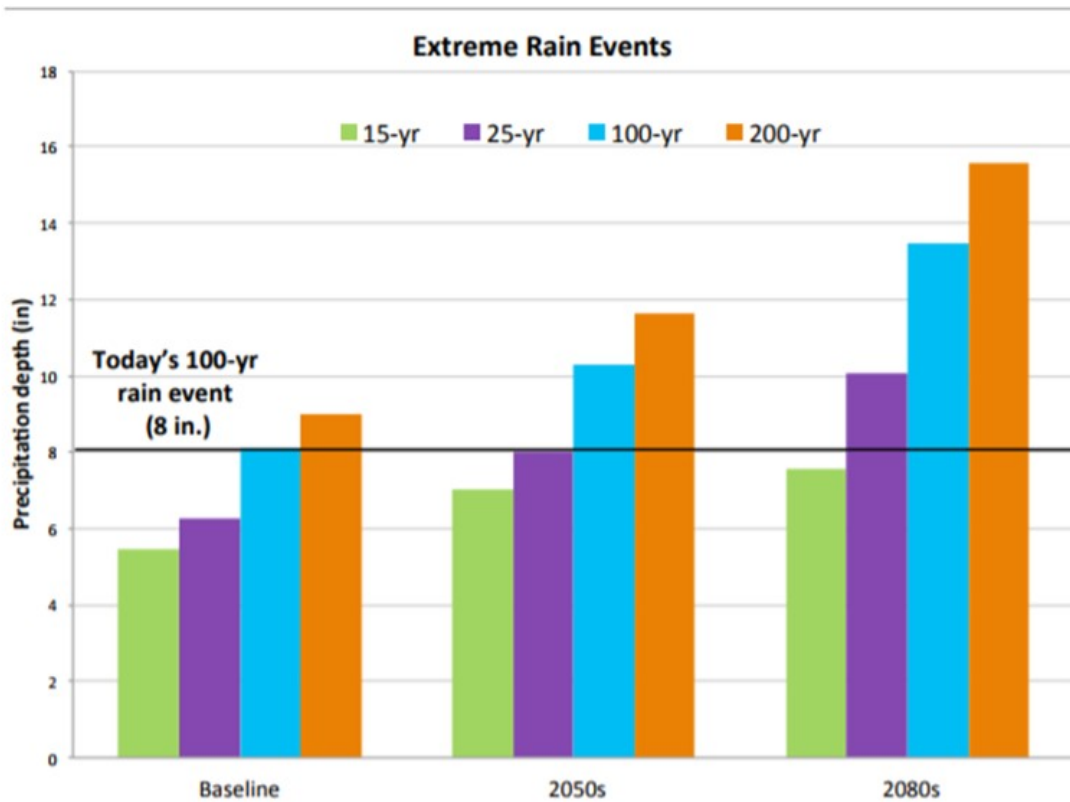
Source: Climate Ready DC: The District of Columbia's Plan to Adapt to a Changing Climate[127]

With regard to sea level rise, water levels of both the Potomac and Anacostia Rivers have reportedly risen 11 inches in the past 90 years, which resulted in 300 percent increase of flooding along the riverfront areas.[128] Similarly, according to EPA report "What Climate Change Means for the District of Columbia," as the land along the shores of Potomac and Anacostia Rivers is sinking, sea level is reportedly rising at a more rapid rate. As a result, extreme high tides may be able to reach farther inland. Overall, the District's sea level is expected to rise between 16 inches to 4 feet in the next century.[129] Climate change will also

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[127]   *The District of Columbia's Plan to Adapt to a Changing Climate.* Accessed from http://www.adaptationclearinghouse.org/resources/climate-ready-dc-the-district-of-columbia-eys-plan-to-adapt-to-a-changing-climate.html. *Accessed on December 4, 2017.*

[128]   District of Columbia Department of Energy & Environment, *Climate Ready DC: The District of Columbia's Plan to Adapt to a Changing Climate*. Accessed from https://doee.dc.gov/climateready. Accessed on November 22, 2017.

[129]   U.S Environmental Protection Agency. November 2016. *Climate Change Indicators in the United States: What Climate Change Means for the District of Columbia*. https://nepis.epa.gov/Exe/ZyPDF.cgi/P100Q5CG.PDF?Dockey=P100Q5CG.PDF. Accessed on November 22, 2017.

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make the District more vulnerable to storm surge flooding from coastal storms and hurricanes. **Figure 7-6** illustrates SLOSH models of current and projected storm surge in the District area for Category 1, 2 and 3 hurricanes.[130]

As noted in *Climate Ready DC Plan*, "energy, transportation, water, and communication systems are essential to keeping the city running… Ensuring the resilience of these systems to future changes in climate is a priority."[131] Overall, the District remains committed to reducing its contribution to climate change by cutting GHG emissions by 50 percent by 2032 and 80 percent by 2050.[121] In addition, the MWCOG facilitates regional coordination on climate adaptation. NCPC support Federal and local agency collaboration on climate change.

7.5.2   WUS Greenhouse Gas Emissions

Operations Energy. The WUS and garage average approximately 1,260 megawatt hour (MWh) of electricity each month supplied by the local electric utility. The electricity use represents operation-related energy including the lights, appliances, and electronic systems in the WUS and garage. To quantify indirect emissions, the purchased electricity usage is multiplied by an emissions factor that calculates the CO_2 emitted through the generation of electricity. The estimated annual CO_2 emissions for the WUS and garage are 9,993 metric tons per year.

Heating and Cooling Energy. Similar factors for existing district heating, cooling or cogeneration plants that will serve the project were gathered from the plant operator.[5] The WUS and garage are cooled using chilled water supplied by the Capitol Power Plant, a central plant that supplies chilled water for cooling to numerous buildings throughout the District. The chillers in the plant used to chill the water are run on electricity. Based on the information collected in Chapter 8, Energy Resources, the average maximum chilled water usage is 13.32 short tons per minute (3,192 gallons per minute). The Capitol Power Plant's chillers have recently been upgraded to more efficient models and can produce, on average, about 1.46 short tons of chilled water per kWh of electricity use. Existing data indicates that WUS consumed approximately 30,999,659,000 BTUs of chilled water in 2014. In addition to the cooling, 15,907 thousand pounds of Capital Power Plant steam was consumed to heat the facilities in the affected environment. The heating and cooling of the WUS equates to approximately 7,264 metric tons per year of GHG emissions.

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[130]   District of Columbia Department of Energy & Environment, *Climate Ready DC, Climate Projections and Scenario Development Technical Report*. June 2015. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/150828_AREA_Research_Report_Small.pdf. Accessed on December 14, 2017.

[131]   Climate Ready DC, The District of Columbia's Plan to Adapt to a Changing Climate, Department of Energy & Environment, 2013. Assessing Health Impacts of Urban Heat Island Reduction Strategies in the District of Columbia. Accessed from https://ddoe.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/20131021_Urban%20Heat%20Island%20Study_FINAL.pdf. Accessed on June 8, 2017.

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**Figure 7-6. SLOSH Modeling Results for Storm Surge in Present Days
Under Category 1, 2, and 3 Hurricanes**
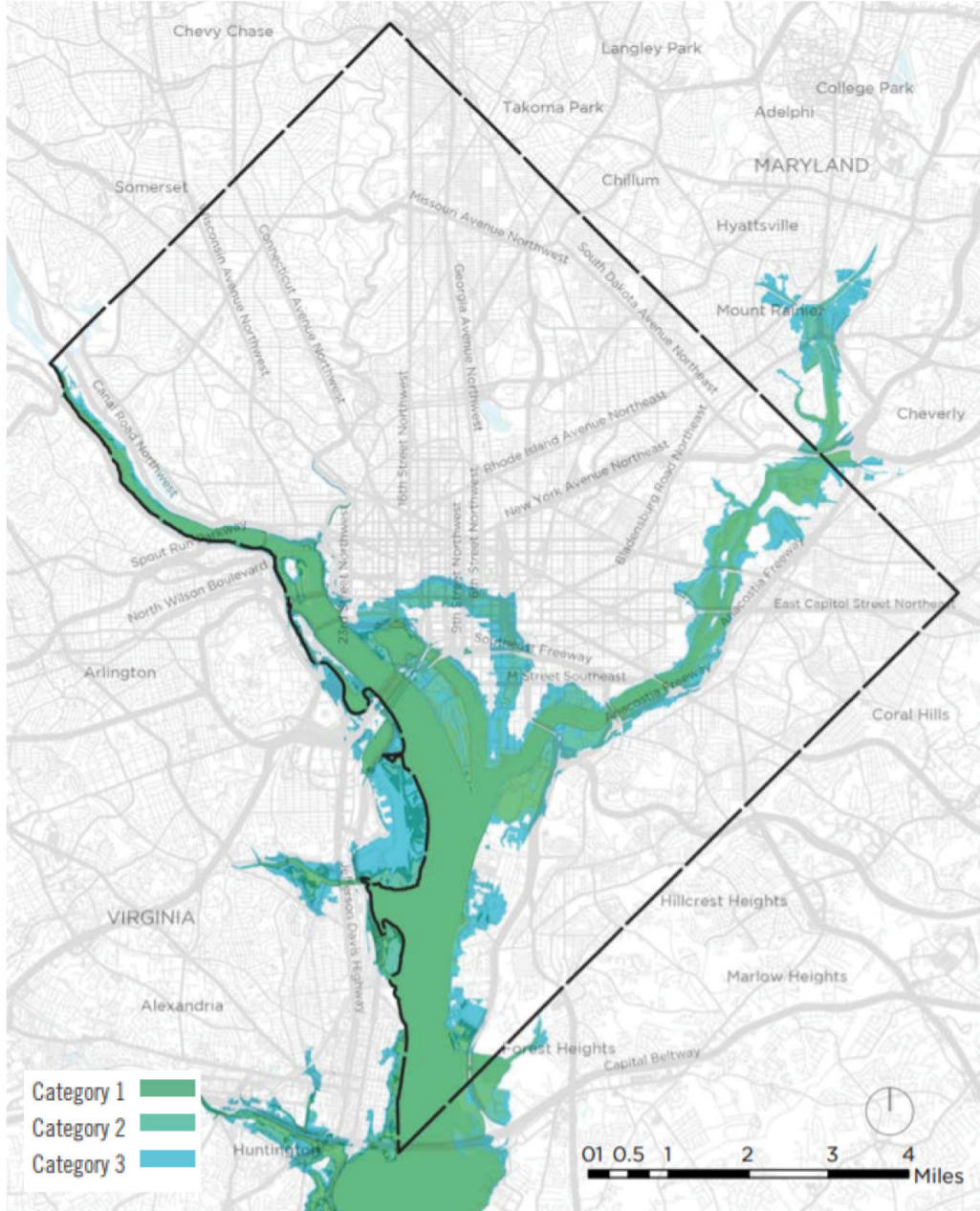
Source: Climate Ready DC, Climate Projections and Scenarios Development Technical Report.

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8 Energy Resources

8.1 Overview

This section describes the use of energy resources such as electricity and fuels in the Affected Environment.

8.2 Regulatory Context and Guidance

Federal policies, regulations, and guidance that may pertain to energy resources include:

- Several sections of 42 United States Code (USC) address energy conservation, decreased dependence on foreign oil, the use of alternative fuels, and increased efficiency in energy use (such as improved gas mileage in motor vehicles). [132]

- EO 13834 Efficient Federal Operations[133].

- The *Energy Independence and Security Act (EISA)* aims to, among other things, increase the efficiency of products, buildings, and vehicles, improve the energy performance of the Federal government, and increase the production of clean renewable fuels. [134]

District policies, regulations, and guidance that may pertain to energy resources include:

- The District Energy Conservation Code (ECC) regulates the design and construction of commercial and residential buildings for the effective use and conservation of energy over the useful life of each building. The ECC is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective. [135]

- The Green Building Act of 2006 phased in green building in the District and requires commercial buildings to be Leadership in Energy and Environmental Design (LEED)

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[132] 42 USC The Public Health and Welfare. Accessed from http://uscode.house.gov/browse/prelim@title42&edition=prelim. Accessed on April 3, 2020.

[133] EO 13834 Regarding Efficient Federal Operations. Accessed from https://www.epa.gov/fgc/executive-order-13834-regarding-efficient-federal-operations. Accessed on April 3, 2020.

[134] Summary of the Energy Independence and Security Act. Accessed from https://www.epa.gov/laws-regulations/summary-energy-independence-and-security-act. Accessed on April 3, 2020.

[135] District of Columbia Department of Consumer and Regulatory Affairs. *2013 District of Columbia Green Construction Code*. Accessed from https://codes.iccsafe.org/content/document/920. Accessed on April 3, 2020.

Silver. Starting January 1, 2009, all new construction or major renovations to non-residential, private buildings of 50,000 square feet or more must submit a green building checklist outlining green features that will be pursued. [136]

- The Clean and Affordable Energy Act of 2008 established a Sustainable Energy Trust Fund and a "Sustainable Energy Utility" to be operated under contract to the District's Department of Energy and Environment (DOEE). The Sustainable Energy Utility administers sustainable energy programs in the District to:

  - Reduce per-capita energy consumption;

  - Reduce energy demand growth among the District's largest energy users;

  - Reduce peak electricity demand growth;

  - Increase renewable energy generating capacity;

  - Increase numbers of green-collar jobs; and

  - Improve energy efficiency adoption in low-income housing. [137]

8.3   Study Area

The Local Study Area includes WUS, the garage, and the immediate property (**Figure 8-1**). Energy use within the Project Area includes operation-related energy as described above. The Regional Study Area includes the District of Columbia.

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[136]   Green Building Act of 2006. Accessed from https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/Green_Building_Act_of_2006_B16-515.pdf. Accessed on April 3, 2020.

[137]   Clean and Affordable Energy Act of 2008. Accessed from http://dcclims1.dccouncil.us/images/00001/20080819161530.pdf. Accessed on April 3, 2020.

Figure 8-1. Energy Local Study Area

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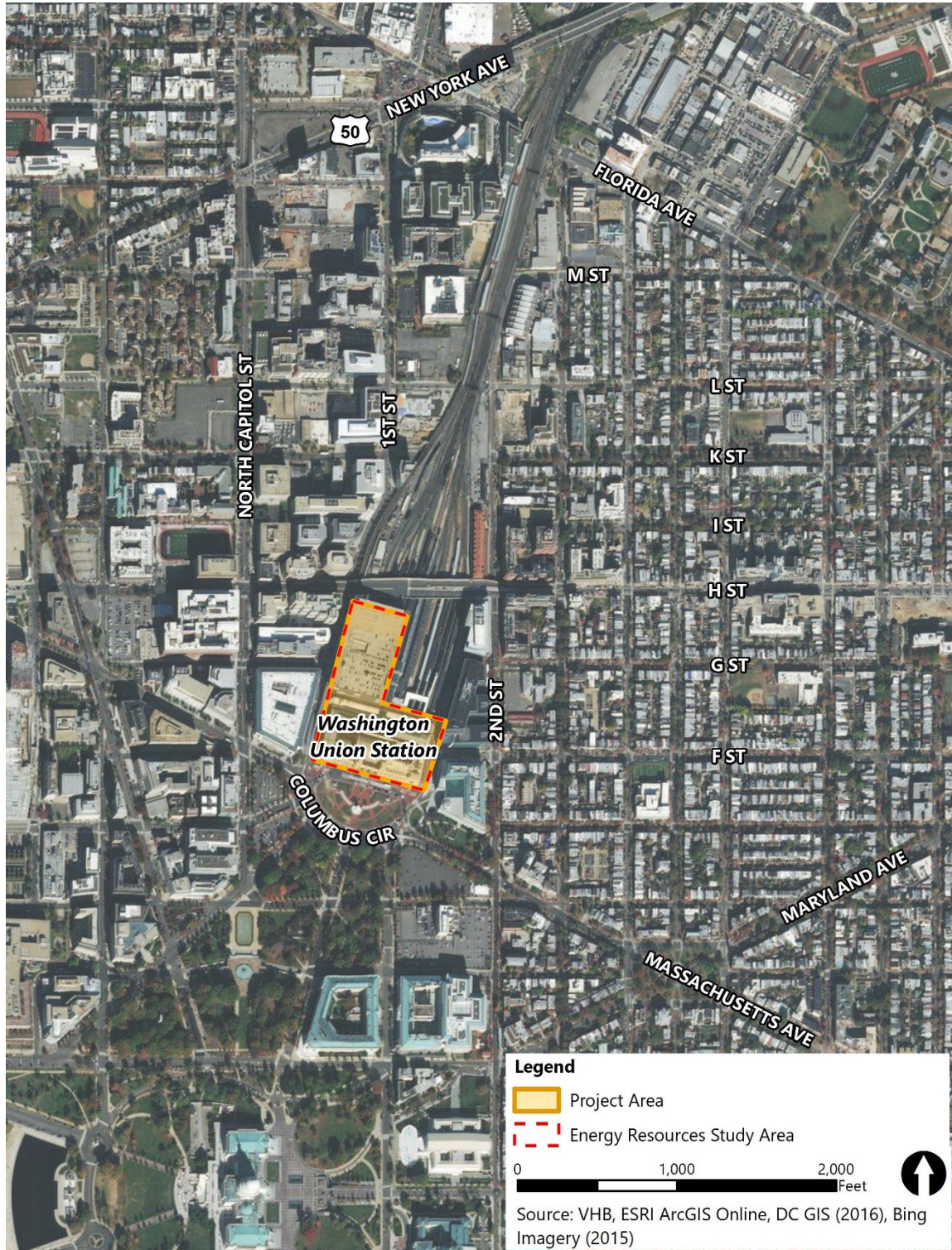
8.4   Methodology

The methodology used for this section focuses on direct energy use within WUS and the parking garage including electricity, steam, and chilled water. The data sources used to measure the use of these types of energy were utility bills from the local electric utility, Pepco, and bills from the Capitol Power Plant which supplies WUS and numerous other federal buildings with steam and chilled water. The methodology in this section differs from the methodology provided in the methodology report in a number of key ways:

- The energy chapter in the methodology report indicated that this chapter would discuss the environmental impacts of energy use in the Affected Environment. Instead, FRA determined that the Air Quality section and the Greenhouse Gas Emissions and Resilience section would adequately address those topics and this section would discuss energy use only.

- The energy chapter in the methodology report indicated that this section will discuss the energy use of mobile sources such as the various service vehicles that are used at WUS. Since the vehicle data was unavailable, FRA decided that it was not feasible to include it in this section.

- The energy chapter in the methodology report indicated that the primary data source that would be used to measure energy use at WUS would be Energy Use Intensity (EUI) factors that provide an energy use per square foot for certain types of buildings. Since the Pepco and Capitol Power Plant bills were provided they were used instead as they are a much more accurate measure of the annual energy use at WUS.

8.5   Affected Environment

Energy resource use in the Affected Environment is categorized as operation-related energy. Operation-related energy is the energy used within the station and the garage for lighting, plug loads, operations related equipment, heating and cooling.

Energy use is directly connected to local public health (as discussed in Section 6, *Air Quality*) greenhouse gas (GHG) emissions, and climate change (as discussed in Section 7, *GHG Emissions and Resilience*). Electricity used within the Project Area is primarily generated from using fossil fuels. Energy used for the Project Area is consumed at the Capitol Power Plant, which delivers steam and chilled water to WUS for heating and cooling. Electricity generation stations that supply the local utility, Pepco, and feed the local District system and the Project Area can be located throughout the Pennsylvania, Jersey, Maryland Power Pool "PJM Interconnection" service area and beyond. PJM is the regional transmission operator, which schedules and dispatches electric generators each day to meet the electricity demands for the utilities in its service area. This service area includes all or part of Delaware, Illinois, Indiana, Kentucky, Maryland, Michigan, New Jersey, North Carolina, Ohio, Pennsylvania, Tennessee, Virginia, West Virginia and the District. The Architect of the Capitol's

(AOC), Capitol Power Plant, which is located outside of the Project Area, uses natural gas to fuel approximately 95-percent of its steam and electricity to produce its chilled water.

WUS uses an average of 1,260,000 kilowatt hours of electricity per billing period (nine billing periods per year) supplied from the local electric utility, Pepco. In 2015, WUS and associated garage facilities, together, used approximately 11,400,000 kilowatt hours. The average electricity use is calculated by averaging the electricity use reported for each billing period over the course of the year. The electrical load of WUS and associated garage facilities are divided between two Pepco electricity meters, each with individual accounts. The Pepco bills are labeled "station" and "garage," though each meter measures a portion of the electricity use in each facility, with the combined total from both meters representing all electricity use within WUS and garage facilities (the Project Area). The electricity measured on each meter is further branched inside the facilities to various other sub-meters that measure the electric use among various locations and businesses in WUS and garage.

The electricity use measured in these bills is for operation-related energy including the lights, appliances, and electronic systems in the Project Area. More detail regarding the GHG emissions impacts of generating this electricity is presented in Section 7, *GHG Emissions and Resilience*.

8.5.1   Cooling

The Project Area is cooled using chilled water supplied by a central plant, the Capitol Power Plant, that also supplies chilled water for cooling to numerous buildings throughout the District. The chillers in the plant run on electricity, but the bills sent to Union Station are measured in British Thermal Units (BTUs). In the Memorandum of Agreement (MOA) between The Union Station Redevelopment Corporation (USRC) and the AOC, executed on July 21, 2014[138], the AOC notes that there is a chilled water capacity of 4,000 gallons per minute that will be supplied to WUS, 24 hours a day. The MOA also notes that WUS' current average maximum chilled water usage is 3,192 gallons per minute. There are 239.65 gallons in a short ton,[139] which means the average maximum chilled water usage is 13.32 short tons per minute. Bills from 2014 and 2015 provided by USRC for the chilled water delivered to the Project Area show 30,999,659,000 BTUs of chilled water was consumed in 2014 to cool the facilities. The highest chilled water consumption took place during the – presumably – hottest month in July 2014 (4,922,527,000 BTUs) and the lowest chilled water consumption took place in February 2014 (1,019,348,000 BTUs). Data for the first eight months of 2015 shows a very similar level of chilled water consumption that year.

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[138] Memorandum of Agreement between The Union Station Redevelopment Corporation and The Architect of the Capitol, Beverly Swaim-Staley, Union Station President and Stephen T. Ayers, Architect of the Capitol. July 21, 2014. 13 pages.

[139] A short ton is a unit of weight equal to 2,000 pounds.

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The Capitol Power Plant's chillers have recently been upgraded to more efficient models and on average can produce about 1.46 short tons of chilled water per kWh of electricity use.[140] In **Table 8-1** below, the monthly chilled consumption for Union Station is broken down into BTUs, kilowatt hours, and an estimate of short tons based on the new chillers' average efficiency.

Table 8-1. Union Station Chilled Water Usage in 2014

Month	Beginning Reading	End Reading	Difference	Rate Factor of 1000 (BTUs/Month)	kWh (3412.14 BTUs/kWh)	Avg. Short Tons of Chilled Water
December	50,868,039	52,415,391	1,547,352	1,547,352,000	453,484	662,087.11
November	49,449,801	50,868,039	1,418,238	1,418,238,000	414,645	606,841.30
October	47,008,000	49,449,801	2,441,801	2,441,801,000	715,622	1,044,807.50
September	42,979,020	47,008,000	4,028,980	4,028,980,000	1,180,778	1,723,935.95
August	38,551,785	42,979,020	4,427,235	4,427,235,000	1,297,495	1,894,342.88
July	33,629,258	38,551,785	4,922,527	4,922,527,000	1,442,651	2,106,270.38
June	29,261,975	33,629,258	4,367,283	4,366,283,000	1,279,925	1,868,690.38
May	26,326,553	29,261,975	2,935,422	2,935,422,000	860,288	1,256,020.01
April	24,657,590	26,326,553	1,668,963	1,668,963,000	489,125	714,122.51
March	23,486,707	24,657,590	1,170,883	1,170,883,000	343,152	501,022.06
February	22,467,359	23,486,707	1,019,348	1,019,348,000	298,742	436,162.67
January	21,415,732	22,467,359	1,051,627	1,051,627,000	308,202	449,974.33
Total			30,999,659	30,999,659,000	9,085,108	13,264,257

8.5.2   Heating

Approximately 15,900 thousand pounds of Capitol Power Plant steam was consumed in 2014 to heat the WUS facilities. The steam was delivered to three locations in the Station identified as Gallery (11,092 thousand pounds), Amtrak (3,413 thousand pounds), and Link (1,402 thousand pounds). The highest steam consumption took place in January, February, and March, the coldest months of the year. Generally, a pound of steam requires 1,194 BTUs to be produced.[141] Based on that measure, WUS used approximately 18,992,958,000 BTUs of natural gas to produce the 15,907 thousand pounds of steam to heat the facility in 2014.

The amount of steam used through the first eight months of 2015 (the only months for which data was provided for 2015) was slightly higher than during the same period in 2014. This equated to a

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140   Rusco, Frank. GAO-15-436. Report to Congressional Committees. September 2015. *Capitol Power Plant: Architect of the Capitol Should Update Its Long-term Energy Plan before Committing to Major Energy Projects.* United States Government Accountability Office, Page 10. Accessed from https://www.gao.gov/assets/680/672302.pdf. Accessed on May 1, 2018.

141   Decker, Fred. Sciencing. June 26, 2017. *How to Convert Steam to BTU.* Accessed from https://sciencing.com/convert-steam-btu-8495235.html. Accessed on October 24, 2017

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3.4-percent increase in steam use in 2015 versus 2014. Without more data it is not possible to determine whether this is a trend or simply related to a colder winter in 2015.

Fuels are also used in the Project Area for cooking and backup electricity generators. Neither of these uses consume a significant enough amount of fuel to be included in this analysis.

9 Land Use, Land Planning, and Property

9.1 Overview

This section describes the Affected Environment in the topic area of land use, land planning, and property. Land uses and zoning for the Washington Union Station (WUS) occur in the Local Study Area of one-half mile around WUS and one-quarter mile north of K Street around the tracks, and in the Regional Study Area encompassing the nearby neighborhoods of Mount Vernon Triangle, North of Massachusetts Avenue (NoMa), the National Mall/Monumental Core, Capitol Hill, and the Atlas District/H Street Corridor.[142] This section identifies existing land uses, property ownership, local zoning, development, and master plans within the local Study Area. For the Regional Study Area, a higher-level analysis of the land uses and master plans is provided. In the District, planning and zoning decisions are largely the domain of the local government, as opposed to regional planning entities. However, NCPC has review authority for Federal projects and develops the Federal Elements of the District's Comprehensive Plan.

9.2 Regulatory Context and Guidance

Federal policies, regulations, and guidance that may pertain to land use, land planning, and property include:

- NCPC, *Comprehensive Plan for the National Capital – Federal Elements*, and the Council of the District of Columbia (DC Council) *Comprehensive Plan for the National Capital – District Elements*. The Comprehensive Plan for the National Capital (the Comprehensive Plan) is a document that guides future planning and development within the District. It is divided into the Federal Elements, written by NCPC, and focuses on planning for the Federal facilities and Federal interests in the region, and the District Elements, written by the DC Council, which serves as the District's master plan document.[143]

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[142] In this section, local land uses and zoning are identified using the Interactive Zoning Map provided by the District of Columbia Office of Zoning.

[143] National Capital Planning Commission. 2016. *Comprehensive Plan for the National Capitol – Federal Elements.* Accessed from https://www.ncpc.gov/compplan/. Accessed on June 5, 2017; District of Columbia. 2006. *Comprehensive Plan.* https://planning.dc.gov/page/comprehensive-plan. Accessed on June 5, 2017. Amended in 2011.

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District policies, regulations, and guidance that may pertain to land use, land planning, and property include:

- District of Columbia Zoning Regulations 2016;[144]

- *Mount Vernon Triangle Action Agenda*. The District produced the *Mount Vernon Triangle Action Agenda* to govern the approach for land use development in the neighborhood.[145]

- *NoMa Vision Plan and Development Strategy*. The District developed the *NoMa Vision Plan* to guide the development of that neighborhood.[146]

- *Northwest One Redevelopment Plan*. Northwest One is the name of residential neighborhoods on the west side of North Capitol Street that are largely low-income housing provided by public and private entities. In 2005, the District of Columbia established a plan for the area.[147]

- *H Street Corridor Strategic Development Plan*. The H Street Corridor is a rapidly changing area with a re-emerging commercial core along the street. In 2003, the District of Columbia developed a plan for the area.[148]

Both *Federal and District Comprehensive Plan* elements and small area plans relate to the land use context of the Local Study and Regional Areas around WUS. The small area plans that cover the affected neighborhoods within the Regional Study Area and address the current plans for land use are the *Mount Vernon Triangle Action Agenda*, the *NoMa Vision Plan*, the *Northwest One Plan*, and the *H Street NE Strategic Development Plan*.

9.3   Study Area

The Project Area is the footprint of the WUS Expansion Project. Because of the potential for land use and transportation changes in the immediate Station area (from the historic entrance to K Street NE above the tracks), the Local Study Area is the Project Area, as well as the zoning districts within one-half mile of the Project Area. North of K Street, where the

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[144]   District of Columbia. 2016. *D.C. Municipal Regulations, Title 11 – Zoning Regulations of 2016*. http://www.dcregs.dc.gov/Search/DCMRSearchByTitle.aspx. Accessed on June 6, 2017.

[145]   District of Columbia Office of Planning. 2003. *Mount Vernon Triangle Action Agenda.* Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/Mount%20Vernon%20Triangle%20Action%20Agenda.pdf. Accessed on June 5, 2017.

[146]   District of Columbia Office of Planning. 2006. *NoMa Vision Plan and Development Strategy.* Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/Section%25201-%2520Introduction.pdf. Accessed on June 5, 2017.

[147]   District of Columbia Office of Planning. 2006. *Northwest One Redevelopment Plan.* Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/NorthwestOneFinal.pdf. Accessed on June 5, 2017.

[148]   District of Columbia Office of Planning. 2004. *H Street NE Strategic Development Plan.* Accessed from https://planning.dc.gov/publication/h-street-corridor-revitalization-main-page. Accessed on June 5, 2017.

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Project consists solely of track modifications, the Local Study Area is the track area, as well as the zoning districts within one-quarter mile of the Project Area (**Figure 9-1**).

The Regional Study Area for the land use impacts of the Project includes the nearby neighborhoods of the H Street Corridor, Capitol Hill, the National Mall, NoMa, and Mount Vernon Triangle. This Regional Study Area was selected because it represents the broader land use context in which the Project is situated within the city (**Figure 9-2**).

9.4   Methodology

Existing land use conditions and local zoning and master plans in the area were identified using data from the District Office of Planning (DCOP). Master plan information from NCPC was consulted. Property ownership was determined using data from the District Office of Zoning (DCOZ) and the Office of Tax and Revenue. Information on zoning districts was based on the DCOZ and the District's Municipal Regulations.

The near-term development projects in the Study Area, were identified using information from the (DCOP), the District Department of Consumer and Regulatory Affairs, DCOZ , the District Zoning Commission (ZC), the District Board of Zoning Adjustment (BZA), the District Office of the Deputy Mayor for Planning and Economic Development (DMPED), the Mount Vernon Triangle Business Improvement District, the NoMa Business Improvement District, the Capitol Hill Business Improvement District, and the local Advisory Neighborhood Commissions.

The analysis relied on District and local development plans and policies such as:

- Comprehensive Plan for the National Capital – District Elements;

- Other local plans consisting of the H Street NE Strategic Development Plan, the Mount Vernon Triangle Action Agenda, the NoMa Vision Plan and Development Strategy, and the Northwest One Redevelopment Plan.

Using the information provided from the above data sources, a land use profile was created for the Local and Regional Study Areas.

Figure 9-1. Land Use, Land Planning, and Property Local Study Area

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Figure 9-2. Land Use, Land Planning, and Property Regional Study Area

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9.5   Affected Environment

WUS is an active transportation hub, shopping destination, and office space. Today, WUS is used for intercity and regional rail as a hub for Amtrak, Maryland Area Rail Commuter (MARC) train, and Virginia Railway Express (VRE) service. The parking and bus facility serves intercity, tour and charter, and transit buses, as well as private vehicles. WUS has approximately 108,000 square feet of retail uses and houses Amtrak office space. That office space is slated to be converted into a hotel in the near future.[149]

WUS and the parking facility are both owned by the United States Department of Transportation (USDOT) and leased to the Union Station Redevelopment Corporation (USRC). As Federal property, they are not subject to local zoning. However, they have been zoned under the Production, Distribution, Repair (PDR)-3 zone. Per the District's Office of Zoning, "The PDR-3 zone is intended to permit high-density commercial and PDR activities employing a large workforce and requiring some heavy machinery under controls that minimize any adverse impacts on adjacent, more restrictive zones."[150] The PDR-3 zone permits a maximum floor area ratio (FAR) of 6.0, a green/vegetated area ratio of 0.3, and a 90-foot height limit.[151]

There are a diversity of land uses in the Local Study Area, within the half-mile vicinity of the existing WUS, as shown in **Figure 9-3.** To the immediate south is the Monumental Core of Washington, including largely government uses involved with Congress. Adjacent to WUS is Columbus Plaza, a park owned by the National Park Service (NPS). Beyond that, parking lots and parks owned by the Architect of the Capitol (AOC) as part of the Senate Parks lie within the Local Study Area. To the west, the NoMa neighborhood is the densest mixed-use neighborhood in the District at build out.[152] To the east are the primarily residential neighborhoods of Capitol Hill and the H Street corridor, which both contain core high-activity streets.

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149   Cooper, Rebecca. "Developer plans new boutique hotel at Union Station. *Washington Business Journal* October 14, 2016.
      http://www.bizjournals.com/washington/news/2016/10/14/developer-plans-new-boutique-hotel-at-union.html

150   District of Columbia Office of Planning. "Production, Distribution & Repair (PDR) Zones – PDR-3."
      http://handbook.dcoz.dc.gov/zones/production-distribution-and-repair/pdr-3/ Accessed on June 23, 2017.

151   Floor area ratio is the measurement of a building's floor area in relation to the size of the parcel that the building
      is located on. FAR is derived by dividing the total square footage area of the building by the total square footage area of
      the parcel.

152   NoMa Business Improvement District. "NoMa Today." https://www.nomabid.org/wp-
      content/uploads/sites/4/2017/09/NoMa- Today-Trifold-9-17.pdf. Accessed on April 20, 2018.

Figure 9-3. Land Uses in the Local Study Area - Station Area
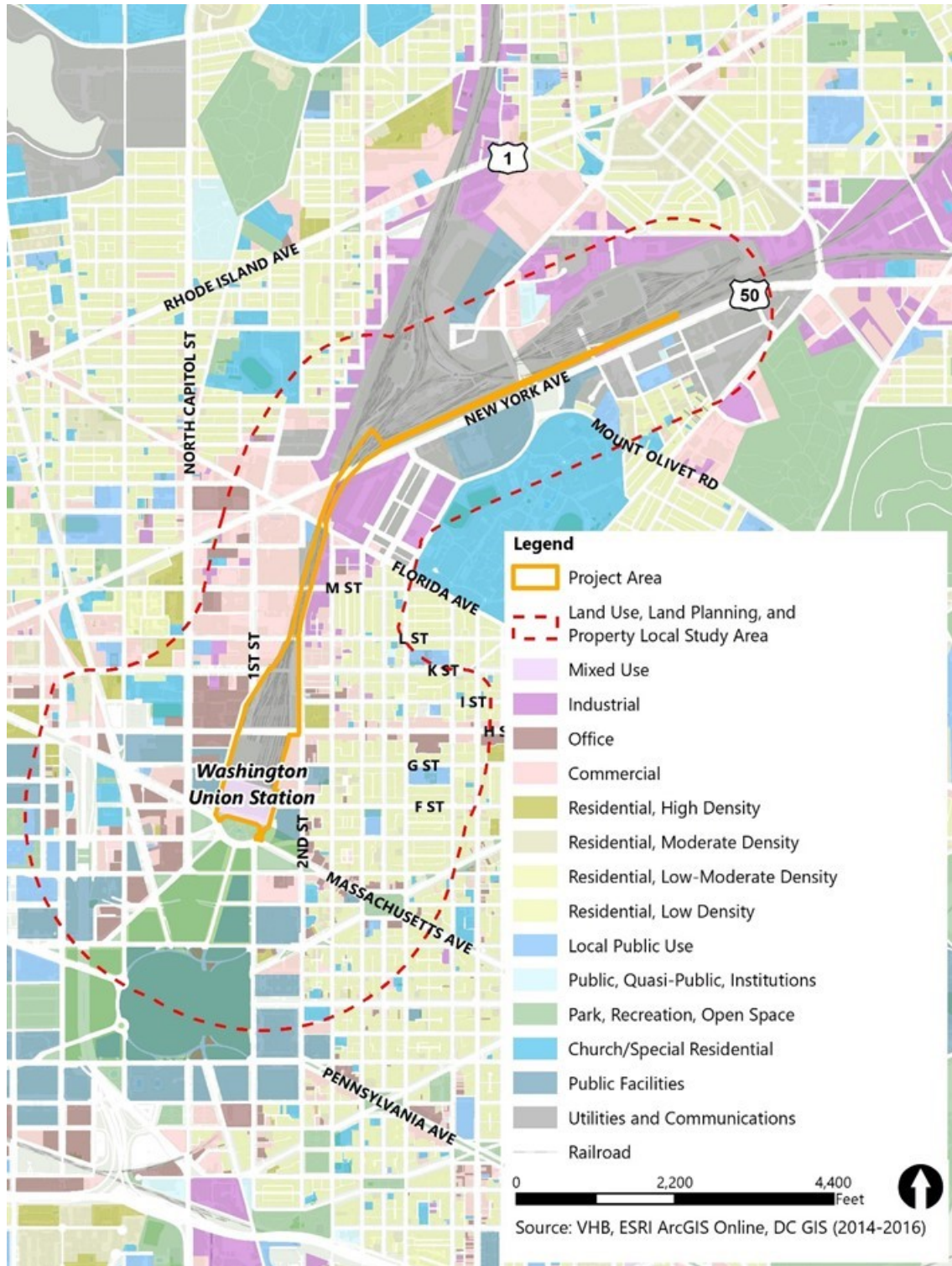
Land use in the Local Study Area is marked by intense development activity. There are 65 developments planned or under construction as of December 2017, comprised of approximately 28,460,000 total square feet. The development is expected to deliver 18,000 residential units, 1,200,000 square feet of retail, 7,300,000 square feet of office space, 1,233 hotel rooms, and 3,214,000 square feet of mixed-use space to the Local Study Area.[153]

The air-rights development area above the WUS rail terminal is owned by a private developer and is presently undeveloped. This area has a special zoning designation of Union Station North (USN). This designation permits maximum heights ranging from 90 feet to 130 feet above the crest of the H Street Bridge sidewalk, with an additional 20 feet of inhabitable penthouse potential on top with 10-foot setbacks from the edge of the roof in all directions. The zoning designation supports mixed uses including residential, retail, hotel, and office.[154] The maximum non-residential FAR for the zone is 5.5. Off-street parking is not required. Zoning in the WUS area is illustrated in **Figure 9-4.**

The Regional Study Area is comprised of several neighborhoods surrounding WUS, as shown in **Figure 9-5**. The neighborhoods consist of varying land uses, property types, and ownership. Land development in several of these localities is guided by local area plans, which are described below.

Capitol Hill: The Capitol Hill neighborhood, southwest of WUS, is typified by rowhouses with some educational uses and some additional dense residential and commercial uses adjacent to WUS. This neighborhood extends from F Street NE to the north, between 11th and 14th Streets NE to the east, the Southeast Freeway (I-695) to the south, and the Congressional office buildings to the west. Capitol Hill is a historic neighborhood, of which a substantial portion is in the Capitol Hill Historic District, which is in the National Register of Historic Places. Two Federal uses adjacent to WUS are the Thurgood Marshall Federal Building owned by AOC and the Securities and Exchange Commission Building owned by the General Services Administration (GSA). Within the Local and Regional Study Areas, the neighborhood is largely zoned RF-1, a zone that promotes rowhouses. The area is largely privately owned with the exception of local education uses. Entertainment uses are concentrated along 8th Street SE near the Eastern Market Washington Metropolitan Transit Authority (WMATA) Metrorail Station.

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[153] Information on the near-term development activity was compiled and sourced from the following agencies: DC Office of Planning, the DC Department of Consumer and Regulatory Affairs, the DC Office of Zoning, the DC Zoning Commission, the DC Board of Zoning Adjustment, the DC Office of the Deputy Mayor for Planning and Economic Development, the Mount Vernon Triangle Business Improvement District, the NoMa Business Improvement District, the Capitol Hill Business Improvement District, and the local Advisory Neighborhood Commissions.

[154] District of Columbia Office of Planning. "Union Station North." http://handbook.dcoz.dc.gov/zones/special-purpose-zones/union-station-north/usn/. Accessed on June 23, 2017.

Figure 9-4. Zoning Designations in the Local Study Area
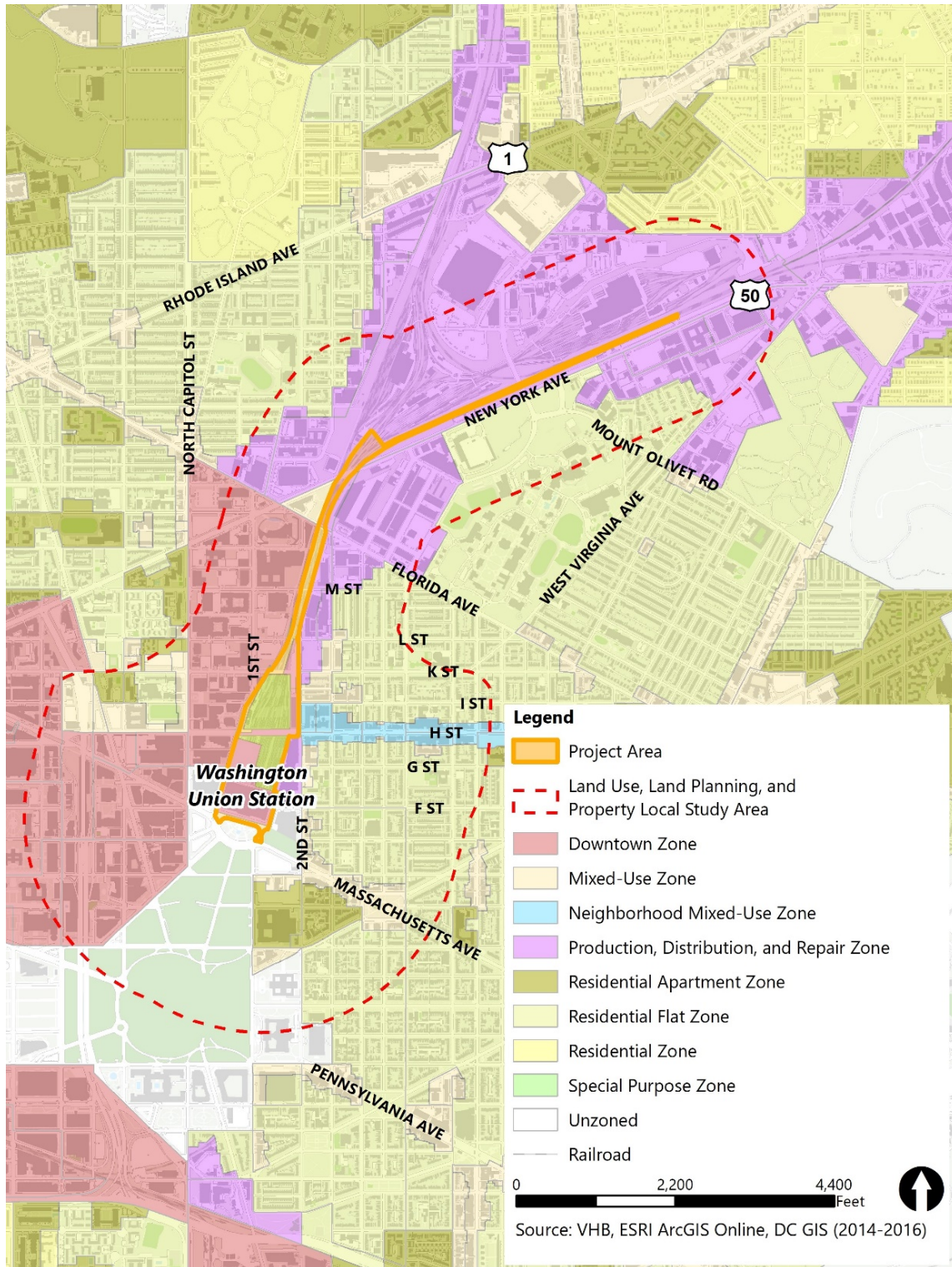
Figure 9-5. Neighborhoods in the Regional Study Area

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Atlas District/H Street Corridor: The H Street Corridor, also referred to as the Atlas District, is bounded by 2nd Street NE to the west, Florida Avenue NE to the north, 15th Street NE to the east, and F Street NE to the south. The H Street Corridor east and northeast of the Station has a mix of commercial and residential uses and is a high-activity street with many restaurants and bars. The neighborhood is largely comprised of rowhouses off H Street, with some local education uses. While much of the neighborhood is zoned RF-1, H Street, the main entertainment district, is zoned within the H Street Mixed Use zone with different sub-districts that promote either housing, neighborhood retail, or entertainment uses. Within the Local Study Area, the predominant sub-district is the residential district. The corridor also has a number of Planned Urban Developments (PUDs)[155] where specific land use proposals can be accommodated, as well as the J.O. Wilson Elementary School.

The District developed the *H Street Corridor Strategic Development Plan* to guide community, private sector, and public agency actions and investments in revitalizing the neighborhood corridor. The Plan recommends positioning the "gateway" location of 3rd and H Street NE for redevelopment; modifying land uses and zoning for preferred development; encouraging new construction and preservation with building design and development guidelines; and diversifying land uses with mixed income housing on the corridor.[156]

NoMa: The NoMa neighborhood is west of WUS. Derived from "North of Massachusetts Avenue," this neighborhood is defined as the area bounded by New York Avenue NW/NE, Florida Avenue NE, the Northeast Corridor and WUS, Massachusetts Ave NE/NW, and New Jersey Avenue NW. Closest to the Station, NoMa is largely commercial and residential, with institutional uses more distant. These buildings are largely owned by private entities, but also have Federal tenants. The exceptions are the Postal Square Building, owned by the United States Postal Service (USPS), the Government Publishing Office (GPO) Warehouse #4, and the District's Housing Authority headquarters. Institutional uses include the Gonzaga College High School, a private school. The areas near WUS are zoned D-5, a downtown zone that promotes high-density commercial and mixed uses. The broader area is notable for a mix of office and residential mixed-use development, with some parking lots that are awaiting redevelopment. In addition to the District's Housing Authority headquarters, there is a substantial amount of public and private low-income housing west of North Capitol Street. The neighborhood has certain Federal uses in the regional Study Area, including buildings belonging the Bureau of Alcohol, Tobacco, Firearms, and Explosives, and public agencies located in privately-owned buildings. The areas east of North Capitol Street are zoned D-5, a zone that promotes high-density commercial and mixed uses. West of North Capitol Street, the neighborhood has mixed-use and residential-only zoning, in line with the more residential nature of that side of the neighborhood. The neighborhood also has PUDs where specific land use proposals can be accommodated.

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[155] PUDs can be implemented throughout the District of Columbia.

[156] District of Columbia Office of Planning. 2004. *H Street NE Strategic Development Plan.* https://planning.dc.gov/publication/h-street-corridor-revitalization-main-page. Accessed June 5, 2017.

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The District developed two plans for the NoMa neighborhood and the residential neighborhoods adjacent to NoMa to the west of North Capitol Street, to guide development of the area. The *NoMa Vision Plan and Development Strategy* proposes development in the neighborhood be a 50/50 mixture of commercial office and residential uses, with a substantial amount of ground floor retail to promote a vibrant, healthy community that serves as an attractive connection between existing neighborhoods. The recommendations of the plan include:

- Providing a diverse mix of uses that create a variety of options for living, working, shopping, recreation, and culture;

- Pursuing a balanced approach to transportation, creating a pedestrian-friendly neighborhood with improved transit accessibility and vehicular circulation;

- Creating a vibrant, highly walkable environment with landscaped streets and attractive open spaces, active ground floors and pedestrian links;

- Preserving and enhancing rowhouse neighborhoods and guiding new development to address unmet community needs; and

- Addressing sustainability with high performance design and environmentally-friendly planning, design, and construction.[157]

The *Northwest One Redevelopment Plan* proposes steps to manage redevelopment and growth for the neighborhood. The main goal is to ensure that low-income families are equipped to live and prosper in their changing neighborhood. The Plan recommends a new public school, recreation center, playing fields and parks, health clinic, and neighborhood library to encourage a vibrant, mixed income community. The Plan also calls for the reconfiguration of streets and creation of new local roads to allow for improved neighborhoods design, land use, access, and relationships. With regard to K Street, the Plan recommends that public space design consistent with the design developed for the Mount Vernon Square District Street should be extended along K Street to link the Northwest One neighborhood to the areas to the east and west. The Plan also singles out New York Avenue and First Street as street deserving special attention. It recommends that New Jersey Avenue should be re-designed possibly as a two-way street.[158]

Mount Vernon Triangle: Mount Vernon Triangle is defined as the area bounded by New York Avenue NW, New Jersey Avenue NW, Massachusetts Avenue NW, and 7th Street NW. The neighborhood has a Community Improvement District (CID) with the same footprint. The area is fast-changing and is characterized by a mixture of residential and office buildings with ground-floor retail, with some remaining surface parking lots that are slated for

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[157] District of Columbia Office of Planning. 2006. *NoMa Vision Plan and Development Strategy.* https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/Section%25201-%2520Introduction.pdf. Accessed June 5, 2017.

[158] District of Columbia Office of Planning. 2006. *Northwest One Redevelopment Plan.* Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/NorthwestOneFinal.pdf. Accessed on June 5, 2017.

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redevelopment. The neighborhood is largely zoned D-4-R, which promotes high-density residential and mixed-use development, and requires the ground floor of buildings to provide windows and entrances to interact with the street.

Monumental Core: The Monumental Core includes important Congressional buildings including the U.S. Capitol and Senate and House office buildings. The National Mall and the Smithsonian museums are included. There are some private office uses in additional to Federal office buildings including the headquarters of many Federal departments. Much of the land is Federally owned and not zoned. Other areas have D zoning that promotes a dense downtown development with a mix of uses and a strong concentration of Federal uses.[159]

The plan produced by the District to govern the approach for land use development in the Mount Vernon Triangle is the *Mount Vernon Triangle Action Agenda*. The *Mount Vernon Triangle Action Agenda* calls for the enhancement of retail, hotel, recreation, nonprofit, and cultural uses along with lively street corridors to create a vibrant new downtown neighborhood. The objectives of the plan include "creating a truly livable, majority residential, mixed-use neighborhood with a core of creative activity; a 'smart' neighborhood that is wired for the latest technology; a great address for institutional, non-profit and corporate tenants; and working within existing zoning requirements, with the exception of new overlays, to achieve a mixed-use build-out of residences, offices, hotels, cultural uses and retail." [160]

Areas Adjacent to the Tracks- North of K Street, the tracks, which are owned by Amtrak via their subsidiary the Washington Terminal Company, is zoned MU-9 between K Street and Florida Avenue NE. This zoning permits high-density mixed-use activities within central areas of the city.[161] Between Florida Avenue NE and the end of the tracks within the Project Area, the tracks are zoned PDR-3.

Between K Street and Florida Avenue, the adjacent uses on the east are mostly industrial with rowhouses beyond. The east is zoned PDR-1, a commercial and industrial zone, immediately adjacent to the tracks while the residential areas are zoned RF-1. On the west, uses are a mix of surface parking lots and mixed-use developments in an area zoned D-5.

Between Florida Avenue and the northern extent of the Project Area, the adjacent land uses are largely industrial, including the Union Market area, the WMATA Brentwood facility, the Amtrak Wedge Yard and Ivy City Yard, and the Brentwood light industrial area. These areas are zoned PDR-4, a commercial and industrial zone, and are owned by transportation agencies including WMATA and Amtrak, private entities, and the USPS at the Brentwood mail

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[159] District of Columbia Office of Planning. "Downtown (D) Zones – D-4." Accessed from http://handbook.dcoz.dc.gov/zones/downtown/d-4/. Accessed on June 23, 2017.

[160] District of Columbia Office of Planning. 2003. *Mount Vernon Triangle Action Agenda.* Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/Mount%20Vernon%20Triangle%20Action%20Agenda.pdf. Accessed June 5, 2017.

[161] District of Columbia Office of Planning. "Mixed-Use (MU) Zones – MU-9." http://handbook.dcoz.dc.gov/zones/mixed-use-2/mu-9/. Accessed on June 23, 2017.

facility. However, other nearby uses on the east side include Gallaudet University and commercial and residential uses in the Ivy City neighborhood near the northern extent of the Project Area. The areas on the east side of the tracks are zoned PDR, or RF-1, a zone that allows rowhouse uses. Properties are largely privately owned, but the Federal Government owns parcels along New York Avenue that are used for NPS maintenance activities or leased to other entities.

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10 Noise and Vibration

10.1 Overview

The noise and vibration impact assessment will consider the potential for the Project to affect people within the Study Area. Improvements to the rail infrastructure and future increases in the number of rail operations may change noise and vibration conditions. Potential increases in noise and vibration could negatively affect sensitive receptors, although some infrastructure improvements can reduce noise and vibration and be a beneficial effect.

This section defines noise, vibration, and ground-borne noise resources and the metrics used to describe them, summarizes the regulatory context of the assessment for Washington Union Station (WUS), defines the noise and vibration Study Area, identifies sensitive receptor locations, characterizes existing noise and vibration conditions, and presents the results of existing noise and vibration measurements.

Noise is typically defined as unwanted or undesirable sound. Noise is evaluated based on its potential to cause human annoyance. Because humans can hear certain frequencies or pitches of sound better than other pitches or sounds, sound levels are measured and reported using a descriptor called the "A-weighted sound level." A-weighted sound levels weight different frequencies of sound to correspond to human hearing and are expressed in decibel notation as "dBA." Because sound levels fluctuate from moment to moment, it is important to characterize the range of levels that may exist over a period. The following sound level metrics are used in the noise assessment for WUS:

- **The Maximum A-weighted Level** (Lmax) represents the highest sound level generated by a source. For mobile sources, the maximum level typically occurs when the source is closest to the measurement or analysis *location*. **Figure 10-1** presents typical maximum sound levels including transit sources and non-transit sources.

- **The Energy-average Level** (Leq) is a single value that is equivalent in sound energy to the fluctuating levels over a period. The Leq accounts for how loud the events are during the period, how long they last, and how many times they occur. Typically, Leq sound levels are used to describe the time-varying sound level over a one-hour period and may be denoted as $Leq_{1h.}$ Leq is commonly used to describe environmental noise and relates well to human annoyance.

- **The Day-night Average Level** (Ldn) is a single value that represents the sound energy over a 24-hour period with a 10-decibel (dB) penalty applied to sound that occurs

between 10:00 PM and 7:00 AM when people are more sensitive to noise. Ldn accounts for how loud events are, how long they last, how many times they occur, and whether they occur at night. Ldn- is commonly used to describe environmental noise and relates well to human annoyance at places people sleep.

- **Sound Exposure Level** (SEL) describes the cumulative noise exposure from a single noise event over its entire duration. In calculating SEL the noise exposure is normalized to a time duration- of one second so that events with different durations can be evaluated in terms of their sound energy.

**Figure 10-1. Typical A-Weighted Maximum Sound Levels
for Transit Sources and Non-Transit Sources**
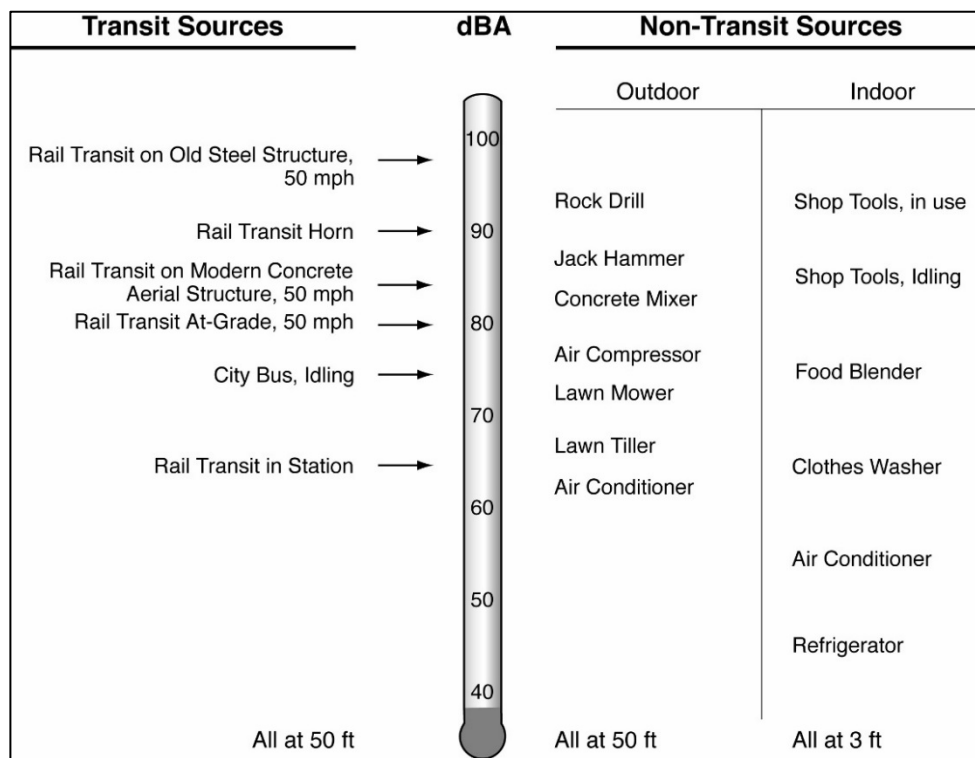
Source: Federal Transit Administration (FTA), 2006.

Trains also generate ground-borne **vibration** (defined as the oscillatory motion of the ground), when forces associated with the wheel-rail interaction are transmitted through the track structure into the ground and into adjacent buildings. Vibration may be perceptible and disturb people or sensitive activities in nearby buildings. Humans generally respond to vibration in a low frequency range between approximately 4 and 80 hertz (Hz).

Vibration levels are expressed in decibel notation as "VdB" to differentiate them from sound decibels. Overall vibration levels reported in this study include frequencies between 4 and 400 Hz. Vibration levels may also be reported at particular frequencies such as one-third octave bands. **Figure 10-2** presents typical ground-borne vibration velocity levels from transportation and construction sources and the typical human and structural response.

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Figure 10-2. Typical Ground-Borne Vibration Levels

Human/Structural Response	Velocity Level*	Typical Sources (100 ft from source)
Threshold, minor cosmetic damage fragile buildings	100	Blasting from construction projects
Difficulty with tasks such as reading a VDT screen	90	Bulldozer
		Freight locomotive
Residential annoyance, infrequent events (e.g. commuter rail)	80	Gravel cars (loaded)
		Coal cars (loaded)
Residential annoyance, frequent events (e.g. rapid transit)	70	Freight cars (empty) / Commuter trains
Limit for vibration sensitive equipment. Approx. threshold for human perception of vibration		Bus or truck over bump
	60	Bus or truck on street
	50	Typical urban ambient

* RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second

Source: FTA, 2006.

Ground-borne noise is generated when vibration propagates into a room and causes the walls, ceilings, and floor to vibrate and generate a low frequency rumble. Ground-borne noise is generally only perceptible in buildings where airborne paths (such as paths through windows or openings) are not present. Ground-borne noise is of particular concern for special-use buildings such as theatres and recording studios.

Ground-borne noise is expressed in A-weighted sound level decibels like airborne noise. Because ground-borne noise is generated by ground-borne vibration, it is most prevalent in a low audible frequency range between approximately 20 and 500 Hz.

10.2 Regulatory Context and Guidance

The following section summarizes the regulatory requirements (Federal and local) and guidance documents for evaluating noise and vibration in the Affected Environment. The

guidance manuals address how to identify and categorize noise and vibration-sensitive land uses, criteria thresholds, and methods to measure and predict noise and vibration.

Federal policies, regulations, and guidance that may pertain to noise and vibration include:

■ Federal Railroad Administration (FRA) *High-Speed Ground Transportation Noise and Vibration Impact Assessment*[162] (FRA guidance manual). Describes the technical approach for assessing noise and vibration for railroad projects in the United States.

■ FTA *Transit Noise and Vibration Impact Assessment*[163] (FTA guidance manual). Describes the technical approach for assessing noise and vibration for transit projects in the United States. The FTA manual provides guidance for projects with passenger train speeds below 90 miles per hour and has been used to assess noise and vibration conditions for the Project.

■ Federal Highway Administration (FHWA), Procedures for Abatement of Highway Traffic Noise and Construction Noise (23 Code of Federal Regulations [CFR] 772). Provides the procedures to help protect the public health and welfare and to supply abatement criteria. Establishes requirements for information to be given to local officials for use in the planning and design of highways that are funded or otherwise subject to FHWA approval. This regulation requires the District Department of Transportation (DDOT) to have a noise policy to implement the FHWA regulation.

District policies, regulations, and guidance that may pertain to noise and vibration include:

■ The DDOT's *Noise Policy*[164] (January 2011) addresses what types of projects are evaluated for noise, how highway traffic noise impacts are defined, how noise abatement is evaluated, and how noise abatement decisions are made.

■ The District of Columbia noise ordinance (Municipal Regulations Chapter 20-27) is intended to promote public health, safety, welfare, and the peace and quiet of the inhabitants of the District, and to facilitate the enjoyment of the natural attraction of the District. Sound generated by trains, other than Washington Metropolitan Area Transit Authority (WMATA) railcars, is exempt from this ordinance. This ordinance applies primarily to construction-period activities and sound generated by stationary equipment such as ventilation equipment and rooftop mechanical equipment.

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[162] Federal Railroad Administration. September 2012. *High-Speed Ground Transportation Noise and Vibration Impact Assessment*. Report DOT/FRA/ORD-12/15. https://www.fra.dot.gov/eLib/Details/L04090. Accessed June 6, 2017.

[163] Federal Transit Administration. May 2006. *Transit Noise and Vibration Impact Assessment*. Report FTA-VA-90-1003-06. https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Noise_and_Vibration_Manual.pdf. Accessed June 6, 2017.

[164] District Department of Transportation. January 10, 2011. *DDOT Noise Policy.* https://comp.ddot.dc.gov/Documents/Highway%20Noise%20Policy.pdf. Accessed June 6, 2017.

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10.3 Study Area

10.3.1 Study Area for Long-Term Operational Noise and Vibration

The Study Areas for noise and vibration during operations include the physical limits of the proposed Project (the Project Area) and noise and vibration-sensitive locations near the Project. As a preliminary indication of the Study Area extents, the FTA guidance manual provides noise and vibration screening distances for different rail and transit projects. These screening distances can be used to determine where there is potential for impacts to occur and, consequently, the Study Area limits. If there are sensitive uses within these screening distances, then there is the potential for impacts. Further evaluation is necessary to verify whether there would be impacts, the context and intensity of those impacts and the need for mitigation.

The FTA noise screening distances are based on typical operational conditions for a range of rail projects and whether there are intervening buildings between the Project and sensitive receptors. To define the specific noise Study Area for the Project, the screening distance is adjusted for the specific project conditions. The general noise screening distance for a new commuter rail station without horn blowing where there is no existing rail infrastructure is 200 feet when there are intervening buildings. Based on the proposed improvements to WUS, future increases in railroad operations, and changes to the infrastructure that will occur in the No Action and proposed Action Alternatives, there could be changes in the noise environment within 500 feet of the Project Area footprint.

The operational noise assessment will also evaluate changes in roadway noise due to the proposed Project. Roadway noise will be evaluated at receptors within 200 feet of roads included in the traffic Study Area and along truck routes near WUS.

The FTA vibration screening distances depend on the type of sensitive land use and the type of rail project. For commuter railroad operations, the vibration screening distance is 200 feet for residential uses, 120 feet for institutional uses, and up to 600 feet for particularly sensitive receptors such as research facilities with vibration-sensitive equipment, theatres, and recording studios. The Study Area could potentially extend farther if particularly sensitive uses are identified or if there are soils with particularly efficient vibration propagation characteristics. All structures within the vibration Study Area will be evaluated for potential structural damage from vibration. Buildings with vibration-sensitive uses, based on FTA receptor categories described in Section 10.4.1, will be evaluated for potential human annoyance.

Overall, the operational noise and vibration Study Area is the greater of 600 feet from the Project Area footprint, which relates to potential railroad-related noise and vibration effects, and the roadway noise study area. The operational noise and vibration Study Area, shown in **Figure 10-3**, is nominally defined by D Street (to the south), 3rd Street (to the east south of M Street), 6th Street (to the east north of M Street), Brentwood Parkway and New York Avenue

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(to the northeast), R Street, Harry Thomas Way NE, and Eckington Place NE (to the northwest), and North Capitol Street (to the west).

10.3.2 Study Area for Construction Noise and Vibration

The Study Areas for construction noise and vibration will evaluate potential effects including:

- Noise from stationary construction sources at the project site,

- Vibration from stationary construction sources at the project site,

- Noise from mobile sources including construction trucks, worker vehicles, and construction trains that will haul muck from the station and deliver materials to the station, and

- Vibration from mobile sources including heavy construction trucks.

The Study Areas for construction noise and vibration, as shown in **Figure 10-4**, will extend sufficiently far from the Project limits to locations where substantial noise and vibration effects may occur.

The stationary source construction noise study area is 500 feet from the edge of construction. This Study Area is based on the most stringent stationary construction noise limit (65 dBA Lmax), the maximum sound emissions from construction equipment not including pile driving (90 dBA at 50 feet), and sound propagation conditions between the project site and nearby receptors (which includes intervening buildings).

The stationary source construction vibration Study Area is 200 feet from the edge of construction. This Study Area is based on the most stringent construction vibration limits for potential human annoyance (65 VdB), and the maximum construction vibration emissions from construction equipment (typical pile driving, 104 VdB at 25 feet).

Figure 10-3. Operational Noise and Vibration Study Area
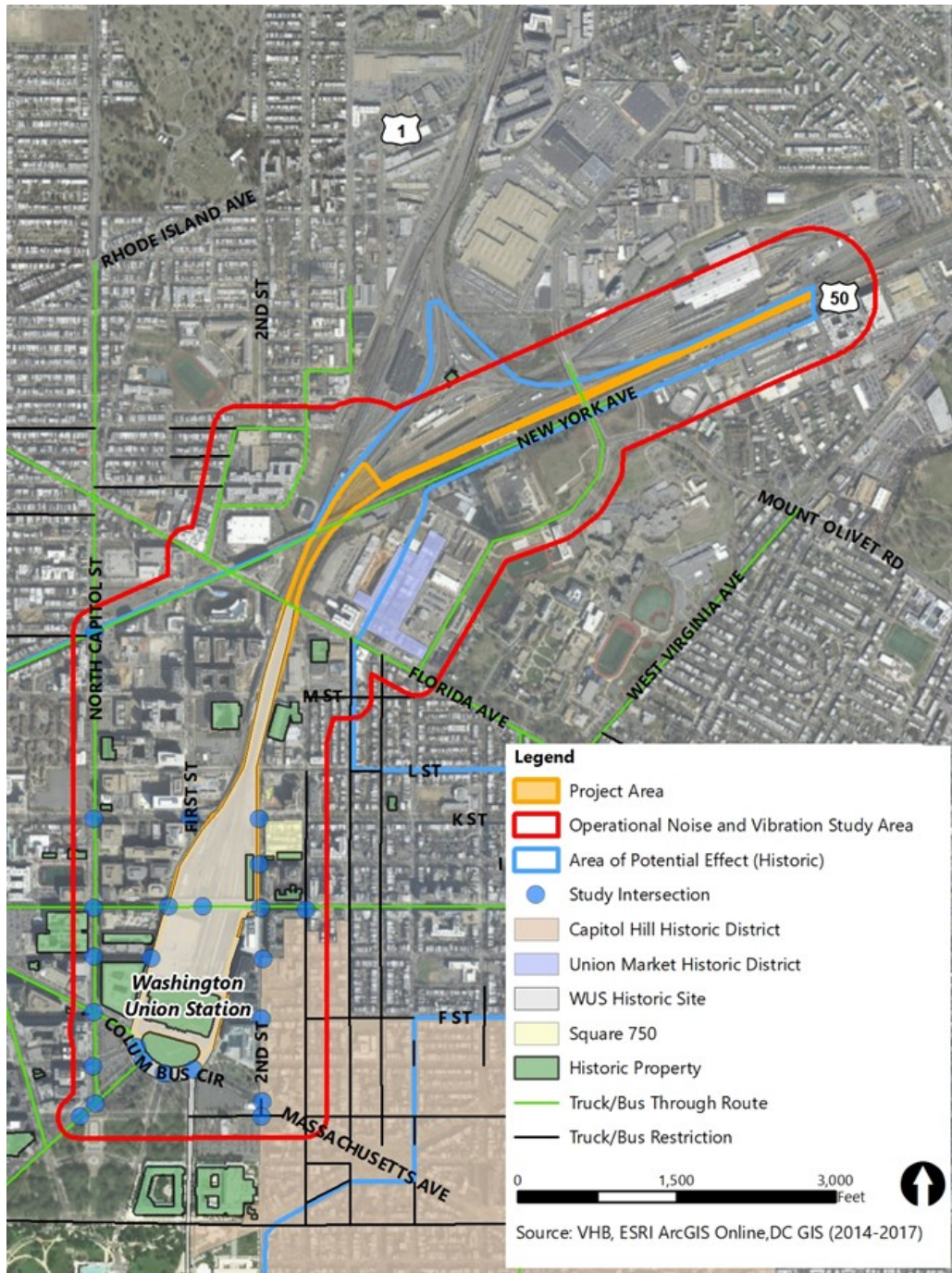
Figure 10-4. Stationary and Mobile Source Construction Noise and Vibration Study Areas

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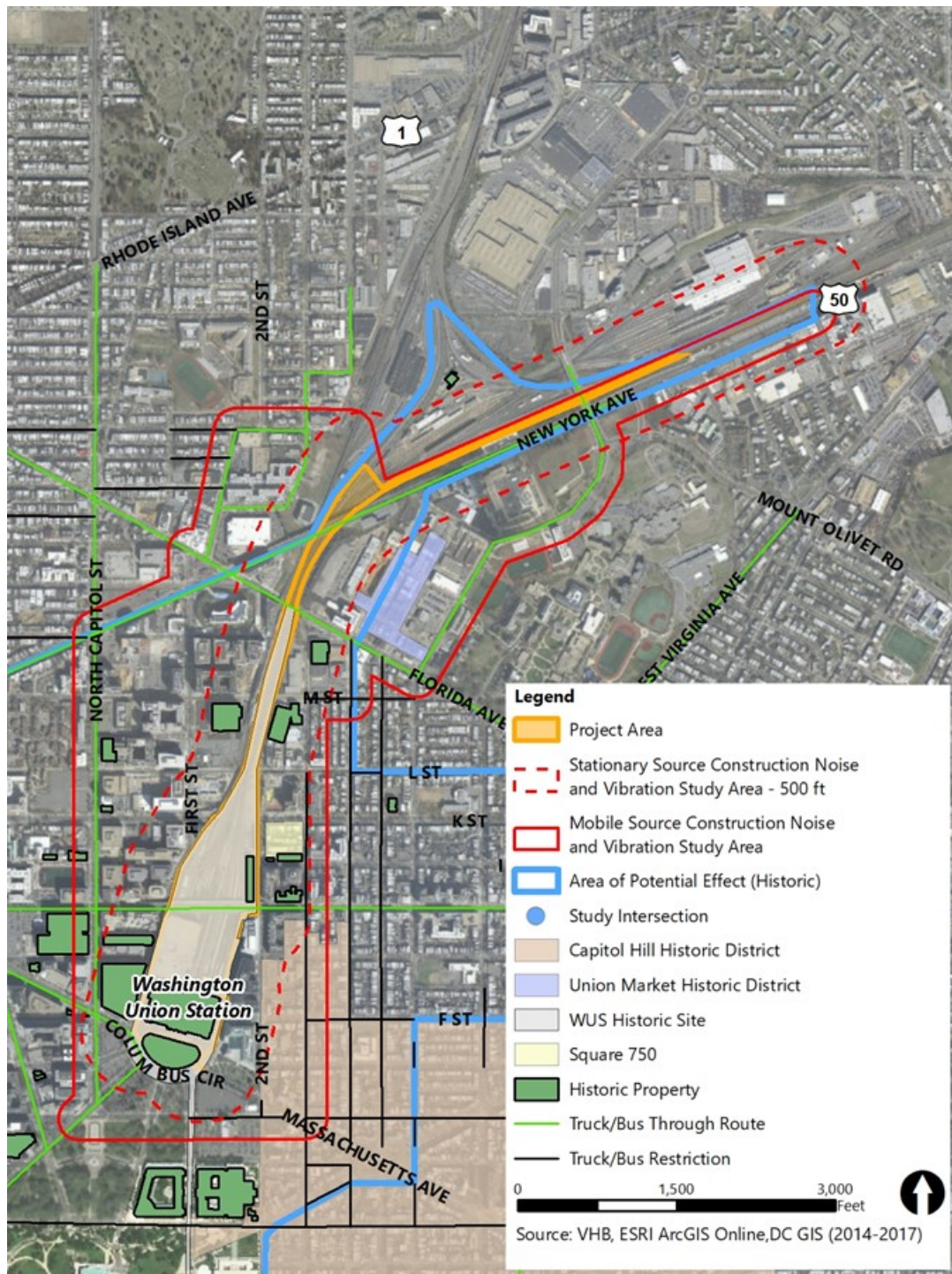
The mobile source construction noise Study Area has been defined based on the traffic Study Area and the location of truck routes in the District. The Study Area includes receptors 200 feet from roads within the Study Area that are anticipated to be construction truck routes. The Study Area is nominally defined by D Street (to the south), 3rd Street (to the east south of M Street), 6th Street (to the east north of M Street), Brentwood Parkway and New York Avenue (to the northeast), R Street, Harry Thomas Way NE, and Eckington Place NE (to the northwest), and North Capitol Avenue (to the west). The study area has been defined to primarily address the potential for noise impact along roadways closer to the project site where there is the greatest potential for noise increases due to construction vehicles. The study area does not extend farther along the truck through-routes such as New York Avenue, 9th Street NE, North Capitol Street, H Street, and Massachusetts Avenue because the relative increase in traffic from construction vehicles would not have a substantial effect on noise conditions.

The mobile source construction vibration Study Area has been defined similarly to the mobile source noise study area, except it includes receptors within 50 feet of the roadways where there may be potential for perceptible vibration and human annoyance from heavy trucks.

These construction noise and vibration Study Areas include several properties and buildings which are on the National Register of Historic Places, DC Inventory of Historic Sites, NPS sites, and AOC Cultural Resources. The Local Study Area will include portions of the Capitol Hill, Union Market, and the proposed Union Station Historic District.

10.4 Methodology

The process to evaluate the Affected Environment for noise and vibration includes identifying noise and vibration-sensitive receptors, understanding the predominant sources of noise and vibration, and characterizing existing noise and vibration conditions through measurements and modeling. The existing conditions are often used as a baseline to compare Project alternatives.

10.4.1 Methodology to Identify Noise and Vibration Receptors

Receptors are categorized based on their use as defined by the FTA (see **Table 10-1**). Category 1 receptors included locations where quiet is an essential element of their use (such as amphitheaters or certain historic landmarks). Category 2 receptors included locations where people sleep such as residences, hospitals, and hotels. Category 3 receptors included locations with institutional uses typically with daytime use where noise could interfere with their use such as schools, places of worship, libraries, and museums. All three categories of noise receptors are based on the human use of the property as it relates to the potential to cause annoyance. Commercial and industrial properties are evaluated only for construction-period activities unless there are outdoor areas of frequent human use.

Vibration-sensitive land uses are like noise-sensitive land uses except that vibration, as it relates to human annoyance, is only evaluated inside buildings and is not evaluated at parks.

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Receptors are primarily located at ground level outdoor areas of frequent human use. If an upper-floor multi-family residence has exterior areas such as balconies or roof decks, then receptors are located at these upper elevations. For some residences and institutional facilities, such as medical facilities, museums, schools and recording studios, receptors may be located inside of the building if there are no areas of frequent outdoor human use.

Section 106 of the National Historic Preservation Act of 1966, as amended requires Federal agencies to consider direct and indirect effects to historic properties, including noise and vibration. As these protections relate to noise, historic properties are categorized based on their use. For example, historic residences are considered to be Category 2 receptors and a historic library would be a Category 3 receptor.

Table 10-1. FTA Land Use Categories and Noise Metrics for Impact Assessment

FTA Land-Use Category	Noise Metric (dBA)	Description of Land-Use Category
1	Outdoor Leq[1]	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as national historic landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor Ldn	Residences and buildings where people normally sleep. This category includes homes, hospitals, and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor Leq1	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches, where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, and museums can also be in this category. Certain historical sites, parks, campgrounds, and recreational facilities are also included.

1. Leq for the noisiest hour of related activity during hours of noise sensitivity.

10.4.2 Noise and Vibration Measurement Methodology

Based on the FTA methods for characterizing existing conditions measurements were not conducted at each receptor location in the Study Area, but rather, measurements were conducted at locations representative of a cluster of sensitive uses (**Figure 10-5**). Existing noise conditions were predicted at all receptor locations based on measurements, FTA modeling procedures and the FHWA Traffic Noise Model (TNM). FTA modeling is used for rail noise sources and FHWA's TNM is used for vehicular traffic sources, as appropriate.

Figure 10-5. Noise and Vibration Measurement Locations

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Most noise and vibration measurements were conducted for 1-hour periods with simultaneous observations and counts of train activity, transit operations, and traffic conditions (volumes and speeds). Long-term (24-hour) noise measurements were conducted at selected locations to determine the relationship of short-term (1-hour Leq) and long-term (24-hour Ldn) noise levels.

At measurement sites representative of FTA Noise Category 3 land uses (such as museums, parks and libraries), the 1-hour noise measurement was conducted during a peak period between 6:00 AM and 9:00 AM or 3:00 PM and 7:00 PM. Category 3 receptors are assessed according to the peak transit hourly Leq noise level.

At measurement sites representative of FTA Noise Category 2 land uses (such as residences and hotels), three 1-hour measurements were conducted during the morning peak (6:00 AM to 9:00 AM), midday (10:00 AM to 4:00 PM) and nighttime (10:00 PM to 7:00 AM) periods. Measurements were used to estimate the day-night average noise level (Ldn) according to methods outlined in Appendix D of the FTA noise guidance manual.

All noise measurements were conducted with equipment that meets American National Standards Institute Type I accuracy and included overall A-weighted and 1/3-octave band sound levels. Observations of train operations were recorded during short-term measurements. Traffic counts by vehicle classification were also conducted and travel speeds were observed during short term measurements. The noise monitoring was used to determine the contribution from different sources including Amtrak, MARC, VRE and Metro trains, streetcar, buses, vehicles, stationary noise sources such as HVAC systems, power sub-stations, and other general ambient sources.

Vibration measurements were primarily conducted at exterior ground-level locations to determine the maximum vibration levels from train pass-bys. Vibration measurements were conducted for approximately one hour at each site and train activity including train type, speed, track, and consist were documented.

10.4.3 Existing Conditions Noise Modeling Methodology

Existing operational noise conditions were modeled throughout the Study Area based on the existing measurements results, train and streetcar operations and the most recent traffic data available. Since the overall noise environment included contributions from trains, roadways, and stationary sources such as rooftop mechanical equipment and traction power substations, and the Study Area is in a dense urban area which includes features that affect sound propagation such as large intervening buildings, retained fill sections, and roadway underpasses, Cadna-A sound prediction software was used.

Railroad noise was predicted using Cadna-A to implement the Detailed Noise Assessment methodology in Chapter 6 of the FTA Manual. The Cadna-A noise predictions were validated by comparing results to predictions using standard methods outlined in the FTA Manual and by comparing the modeled results to the measurements. Roadway noise was predicted using Cadna-A to implement the FHWA's TNM. Similar to railroad noise, roadway noise was

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validated by comparing against measurements and results computed using FHWA's TNM version 2.5.

10.4.4 Existing Sources of Noise and Vibration

Existing noise and vibration sources were identified through a review of VRE, MARC, Amtrak, and Metro current train schedules. This information included the number of train operations throughout a 24-hour period to correspond with the measurement results.

10.5 Affected Environment

The following describes the Affected Environment for Noise and Vibration within the Study Area.

10.5.1 Noise and Vibration

Noise and vibration sensitive receptors for assessing effects on human annoyance in the study areas primarily include multi-family residential condominiums, townhomes, apartments, hotels, museums, medical facilities, schools, TV studios, and parks. Receptors include existing properties, those under construction, and those planned for construction.

As shown in **Table 10-2** residential (Category 2) noise and vibration receptors in the Study Area were identified based on a review of aerial photography, District Office of Zoning database information, and field investigations. Receptors are categorized according to their use as defined by the FTA (see **Table 10-1**).

As described in *Section 12, Cultural Resources*, there are several properties and buildings in the noise and vibration Study Area which are on the National Register of Historic Places, in the DC Inventory of Historic Sites, NPS sites, and AOC Cultural Resources. The noise and vibration Study Area includes the Washington Union Station Railyard, Union Market, and Capitol Hill Historic Districts. Consistent with all other properties, historic properties are identified as noise and vibration receptors and assessed for operational impact.

Table 10-2. Existing, Under Construction, and Planned Residential Properties Near WUS

Location	Existing	Under Construction	Planned
West Side of WUS	Avalon First + M apartments, First Street NE and M Street NE Constitution Square Flats 130 apartments, First Street NE and M Street NE Hilton Garden Inn on First Street NE, between M Street NE and N Street NE Courtyard Marriott, 2nd Street NE	Storey Park apartments, between K Street NE and L Street NE	100 K Street NE apartments NOMA Station Phases II-IV, between L Street NE and M Street NE Washington Gateway Elevation apartments Phases II and III on Florida Ave NE

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Location	Existing	Under Construction	Planned
	The Gale apartments, 100, 151 and 200 Q Street NE		Eckington Yards apartments on R Street NE
Union Market and New York Avenue Area	Homewood Suites Hotel and Hampton Inn Hotel, 501 New York Ave NE Motel 6, 1345 4th Street NE The Edison at Union Market, 340 Florida Avenue NE	Mixed-use residential development, 301/331 N Street Mixed-use residential development, 301 Florida Avenue NE The Shapiro Residences, 1270 4th Street NE The Highline, 320 Florida Avenue NE	The Morse (Kettler) Property, 300 Morse Street Square 3587 (Lots 805, 814 and 817)
East of the Railroad Corridor	Townhomes, 3rd Street NE and Abbey Place NE between M Street NE and L Street NE Loree Grand apartments, 3rd Street NE between L Street NE and K Street NE Historic residential rowhouses, on the block between K Street NE, I Street NE 2nd Street NE, and 3rd Street NE Senate Square apartments, on 2nd Street NE between H Street NE and I Street NE, Landmark Lofts, H Street NE between 2nd Street NE and 3rd Street NE Kaiser Permanente medical facility, 2nd Street NE and H Street NE Station House apartments, 2nd Street NE between H Street NE and G Street NE Residential townhomes, 2nd Street NE between F Street NE and E Street NE	Toll Brothers City Living apartments, 2nd Street NE between L Street NE and K Street NE	Central Armature Works, 1200 3rd Street NE hotel and residential Press House at Union District hotel and apartments 300 M Street NE residential

10.5.2 Existing Noise and Vibration Sources

The predominant sources of noise and vibration in the Study Area include railroad and bus operations, and traffic. The following describes these sources and their noise and vibration characteristics.

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10.5.2.1   Railroad Operations

MARC, VRE, Amtrak (including Acela and northeast regional trains), and WMATA service the Station while the DC Streetcar operated by DDOT services along H Street NE, north of the Station. MARC, VRE and Amtrak trains include diesel-electric locomotives. The Acela trains include electric locomotives. The WMATA Metrorail is a heavy rail electric multiple unit (EMU) system. Train operations include revenue passenger operations and VRE non-revenue movements to and from the Ivy City yard north of New York Avenue. Diesel-electric switcher locomotives also move locomotives and coaches in and out of the Station and run continuously throughout the day. The DC Streetcar is a light rail transit (LRT) system.

Since existing noise conditions are characterized by how loud noise events are, how long they last, how many occur, and whether they occur during the day (7:00 AM to 10:00 PM) or night (10:00 PM to 7:00 AM), the following summarizes existing rail operations in the Study Area:

- MARC operates three separate lines (Penn, Camden, and Brunswick) between Maryland and the Station. These three lines include 78 daytime operations and 17 nighttime operations that total 95 daily train operations on a typical weekday.

- VRE operates 27 daytime trains and five nighttime trains on the Fredericksburg and Manassas lines, totaling 32 daily trains on a typical weekday.

- Amtrak operates multiple lines through the Study Area including the Northeast Regional, the Acela, the Capitol Limited, and the Cardinal lines. There are 63 train operations during the daytime and 10 train operations during the nighttime on an average weekday totaling 73 trains per day.

- WMATA Metrorail Red Line operates with 4 to 8-minute headways during the morning (5:00 AM to 9:30 AM) and afternoon (3:00 PM to 7:00 PM) peak periods, 12-minute headways during the midday, eight to 12-minute headways during the evening (7:00 PM to 9:30 PM), and 15- to 18-minute headways during the late night (9:30 PM to 11:30 PM).

- DC Streetcar operates a street car service that begins at the H Street overpass north of Union Station and travels east along the H Street Corridor to Bennington Rd NE at Kingman Lake. The service operates with headways between 10 and 15 minutes from 6:00 AM to 12:00 AM.

Sources of noise and vibration associated with the rail operations include movements of the trains, diesel-electric locomotives idling at the station, as well as auxiliary equipment such as radiator cooling fans and on-board HVAC equipment operating on passenger coaches and locomotives. There are occasional car coupling activities that generate short noise events. Additional sources of noise include general maintenance activities such as cleaning and servicing the trains. Some trains will sound their bells when approaching or departing the station, but since there are no at-grade crossings in the Study Area and it is not an active freight corridor, commuter trains at the station do not typically sound their horn other than when it may be needed under emergency conditions. The DC Streetcar generally sounds its bell when departing WUS on H Street.

Trains operate at relatively low speeds (approximately 10 miles per hour) in and out of the station and generally below 20 miles per hour throughout the Study Area. The tracks include both continuously-welded-rail (CWR) and jointed rail segments and there are many track turnouts. Jointed rail and track turnouts introduce gaps in the rail running surface which increase noise and vibration.

The rail corridor is elevated on retained fill between the Station and Florida Avenue before transitioning to grade north of New York Avenue. For receptors at ground-level near the rail corridor, the retained fill structure typically shields line of sight to the trains which reduces noise levels.

10.5.2.2   Bus Operations

WUS has a bus facility with 61 slips inside its parking garage which accommodates intercity, tour and DC Circulator city buses. The DC Circulator operates on approximately 10-minute headways. Buses access the facility from H Street and exit onto H Street or a ramp toward Columbus Circle. In front of WUS, sightseeing buses operate along Columbus Circle. Buses idle within the parking garage and in front of WUS. Although the parking garage is an open-air facility, bus noise is generally not audible beyond WUS.

10.5.2.3   Traffic

The Study Area includes traffic into and out of WUS and general traffic on adjacent roadways. As described in Section 5 *Transportation*, the parking facility at WUS has approximately 2,200 parking spaces on four levels. Vehicles access the facility from H Street NE and from the vehicle loop north of WUS. For-hire vehicles such as taxis, limousines and ride-share services have pick-up and drop-off areas in front of WUS. The taxi queue typically extends along the east and north sides of WUS.

The roadway network around WUS include principal arterials such as H Street NE, North Capitol Street, Massachusetts Avenue (west of North Capitol Street), New York Ave NE (US Route 50), and Florida Ave NE. Minor arterial roads include E Street NE, K Street NE, and Massachusetts Avenue (east of North Capitol Street). Connector roads include D Street NE, F Street NE, First Street NE, 2nd Street NE, and Delaware Avenue.

Traffic noise depends primarily on volumes, speeds, and the percentage of trucks. Because the Study Area is in a dense urban area, speed limits are 25 miles per hour unless otherwise marked. The speed limit on New York Avenue is 35 miles per hour.

The 2015 Average Annual Daily Traffic (AADT) volumes range from approximately 15,000 to 30,000 AADT for most principal and minor arterial roads in the Study Area. Connector roads generally have 5,000 to 10,000 AADT. New York Avenue has the highest AADT in the Study Area with approximately 50,000 AADT. Peak morning and peak afternoon volumes are approximately 1,500 to 2,000 vehicles per hour at most principal and minor arterial roads.

Based on these typical volumes and speeds, traffic noise from principal arterial roadways typically ranges from 60 to 70 dBA (Leq) at the first-row receptors adjacent to the roadways.

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Further information on the noise levels from traffic sources is provided in the noise measurement results.

10.5.3 Measurement Results

The FTA methods for characterizing existing conditions recommend that measurements are not conducted at each receptor location in a Study Area, but rather, that measurements are conducted at locations that are representative of a cluster of sensitive uses.

Measurements were conducted from December 28 to 29, 2016 and from July 17 to 20, 2017 to determine the existing noise and vibration conditions in the Study Area. Noise measurements were conducted at 19 locations including two long-term (24-hour) sites and 17 short-term (1-hour) sites as shown in **Figure 10-5**. For measurement locations representative of Category 3 (institutional) receptors, measurements were conducted for one hour during a peak transit period (morning or afternoon) to determine the peak-transit Leq. For measurement locations representative of Category 3 (residential) receptors, measurements were conducted for three one-hour periods including a late-night/early-morning, peak and mid-day period to determine the peak-transit Leq and estimate the Ldn. Ldn levels have been estimated based on the methods described in the FTA guidance manual.

10.5.3.1 Noise Measurement Results

The existing noise environment primarily includes contributions from rail operations and traffic. Since the Study Area is a relatively dense urban location, most noise receptors are located within 25 feet of roadways. Rail operations are the predominant source of noise at receptors immediately adjacent to and close-in to the rail corridor. At distances of 100 feet or farther from the rail corridor and/or where there are substantial intervening buildings, traffic noise is typically the predominant source. **Table 10-3** summarizes the existing ambient noise measurement results and predominant noise sources throughout the Study Area.

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Table 10-3. Existing Ambient Noise Measurement Results

Site Number	Distance to Tracks (Feet)	Location	Date (Time)	Duration	Period	Leq (dBA)	Ldn (dBA)	Predominant Noise Source
N1	650	**Columbus Circle Park** in front of the Station	7/17/2017 (4:30 PM)	1 hour	Afternoon Peak	61.5	59.5[1]	Traffic on Columbus Circle NE Train operations are not audible at this location
N2	625	In front of **Smithsonian Postal Museum** (First Street NE between Massachusetts Ave NE and G Street NE)	7/17/2017 (4:29 PM)	1 hour	Afternoon Peak	65.0	63.0[1]	Traffic on First St NE
N3	25	**Washington Union Station** **Taxi Loop** above the railroad corridor platforms	7/18/2017 (5:07 AM)	1 hour	Night	66.3	71.3[2]	Train operations including locomotives idling and traffic on the taxi loop
			7/18/2017 (6:07 AM)	1 hour	Morning Peak	72.1		
			7/18/2017 (11:08 AM)	1 hour	Midday	67.9		
N4	525	Residences in Capitol Hill Historic District (2nd Street NE and F Street NE)	7/18/2017 (5:04 AM)	1 hour	Night	59.7	65.0[2]	Traffic on 2nd St NE Train operations are not audible at this location
			7/18/2017 (6:05 AM)	1 hour	Morning Peak	63.3		
			7/18/2017 (11:00 AM)	1 hour	Midday	64.1		
N5	50	Façade of **Kaiser Permanente Medical Facility** (H Street NE)	7/18/2017 (5:16 AM)	1 hour	Night	71.1	76.1[2]	Railroad operations
			7/18/2017 (6:16 AM)	1 hour	Morning Peak	71.3		
			7/18/2017 (11:00 AM)	1 hour	Midday	74.9		
N5a	Overhead	**H Street NE** above the railroad corridor (between 1st and 2nd Street NE)	7/18/2017 (7:19 AM)	30 mins	Peak	76.3	74.3[2]	Railroad operations Traffic noise on H St NE
N6	625	**CNN Television Studio** sidewalk (H Street NE and North Capitol Street)	7/18/2017 (8:00 AM)	1 hour	Peak	71.6	69.6[2]	Traffic on H Street NE Noise from Metro trains are occasionally audible, but do not contribute substantially to the overall noise environment
N7	450	Historic Residences on Parker Street NE (between 2nd and 3rd Street NE)	7/20/2017 (4:58 AM)	1 hour	Night	51.1	56.2[2]	Trains at WUS Traffic on 2nd Street and 3rd Street NE
			7/20/2017 (6:01 AM)	1 hour	Morning Peak	53.1		
			7/19/2017 (12:21 PM)	1 hour	Midday	54.9		
N8	250	**Storey Park** on L Street NE (between First Street NE and the railroad corridor)	7/18/2017 (7:45 AM)	1 hour	Peak	65.8	63.8[1]	Traffic on L Street NE and train operations
N9	200	**Historic residences** at 2nd St NE and K Street NE	7/20/2017 (5:00 AM)	1 hour	Night	58.2	63.3[2]	Trains at WUS and traffic on 2nd St NE
			7/20/2017 (6:00 AM)	1 hour	Morning Peak	61.4		
			7/19/2017 (12:24 PM)	1 hour	Midday	61.8		
N10	15	**Metropolitan Branch Trail** (between L Street NE and M Street NE)	7/20/2017 (4:55 AM)	1 hour	Night	72.9	77.8[2]	Metro trains operating within approximately 15 feet of the microphone location
			7/20/2017 (5:59 AM)	1 hour	Morning Peak	74.9		
			7/19/2017 (11:56 AM)	1 hour	Midday	75.6		
N11	15	**Central Armature Works** (1200 3rd Street NE, between N and M Street NE)	7/18/2017 (2:00 PM)	24 hours	24 hours	See figure	71.5	Railroad operations
N12	15	**Metropolitan Branch Trail** (south of Florida Avenue near the Courtyard Marriott hotel)	7/18/2017 (7:27 AM)	1 hour	Peak	67.8	65.8[1]	Metro railroad operations
N13	350	**Residences in Union Market Historic District** on Florida Avenue NE (between N Street NE and 3rd Street NE)	7/19/2017 (5:06 AM)	1 hour	Night	65.7	70.9[2]	Train operations Traffic on Florida Ave NE
			7/19/2017 (6:06 AM)	1 hour	Morning Peak	67.3		
			7/19/2017 (10:00 AM)	1 hour	Midday	69.6		
N14	375	**Residences in Union Market Historic District Morse** Street NE and 4th Street NE	7/19/2017 (7:15 AM)	1 hour	Peak	66.2	64.2[1]	Traffic from nearby roads such as 4th St NE
N15	325	**Gale Apartments** at Harry Thomas Way NE and Q Street NE	7/19/2017 (5:08 AM)	1 hour	Night	56.8	62.7[2]	Trains operations Traffic on Harry Thomas Way NE
			7/19/2017 (6:10 AM)	1 hour	Morning Peak	61.6		
			7/19/2017 (10:04 AM)	1 hour	Midday	62.8		
N16	400	**Motel 6 in Union Market Historic District** at 4th Street NE and Neal Place NE	7/19/2017 (5:02 AM)	1 hour	Night	69.1	73.5[2]	Traffic on local streets and New York Ave

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Site Number	Distance to Tracks (Feet)	Location	Date (Time)	Duration	Period	Leq (dBA)	Ldn (dBA)	Predominant Noise Source
			7/19/2017 (6:03 AM)	1 hour	Morning Peak	68.2		
			7/19/2017 (10:00 AM)	1 hour	Midday	68.8		
N17	1000	**Lower Senate Park** (across from Columbus Circle)	7/17/2017 (4:34 PM)	1 hour	Peak	58.6	56.6[1]	Traffic from surrounding roadways Columbus Circle NE
N18 (V2)	50	**Railway Express Agency (REA) Building** at 900 2nd Street NE	7/20/2017 (7:48 AM)	1.5 hours	Peak	70.3	68.3[1]	Train operations. This building is not a noise-sensitive receptor since it is currently used for office space
N19	200	**NPS Maintenance Facility** at 701 New York Avenue NE	12/28/2016 (10:00 AM)	24 hours	24 hours	see figure	78.9	Traffic on New York Ave NE

[1] Ldn estimated according to FTA guidance for measurements conducted between 7 AM and 7 PM.

[2] Ldn estimated using the three one-hour measurements during the night, morning peak, and midday periods.

Figure 10-7 and **Figure 10-8** present the hourly sound level measurement results at Sites N11 and N19, respectively. These figures show the sound level statistics such as the maximum sound level measured during the hour (Lmax), statistical sound levels (such as L10, L50 and L90) which represent the sound level exceeded 10, 50 or 90 percent of the time during the hour and the hourly Leq. The L90 sound levels are generally representative of the quieter ambient background noise conditions and the L10 sound levels are representative of the louder ambient noise conditions, such as when trains or loud vehicles pass by the microphone.

Figure 10-7 shows that ambient noise levels adjacent to the tracks range between 60 and 70 dBA Leq throughout the entire 24-hour period. There is not a substantial reduction in noise during the late-night/early morning hours which shows that there are still substantial noise sources, such as trains and traffic, in the area during this period. **Figure 10-8** shows that ambient noise levels adjacent to New York Avenue range from 63 to 80 dBA Leq throughout the entire 24-hour period. The noise levels are relatively constant throughout most of the daytime hours except they are louder during the morning peak traffic period.

Figure 10-6. Long-Term Noise Measurements Results for Site N11 (Central Armature Works)

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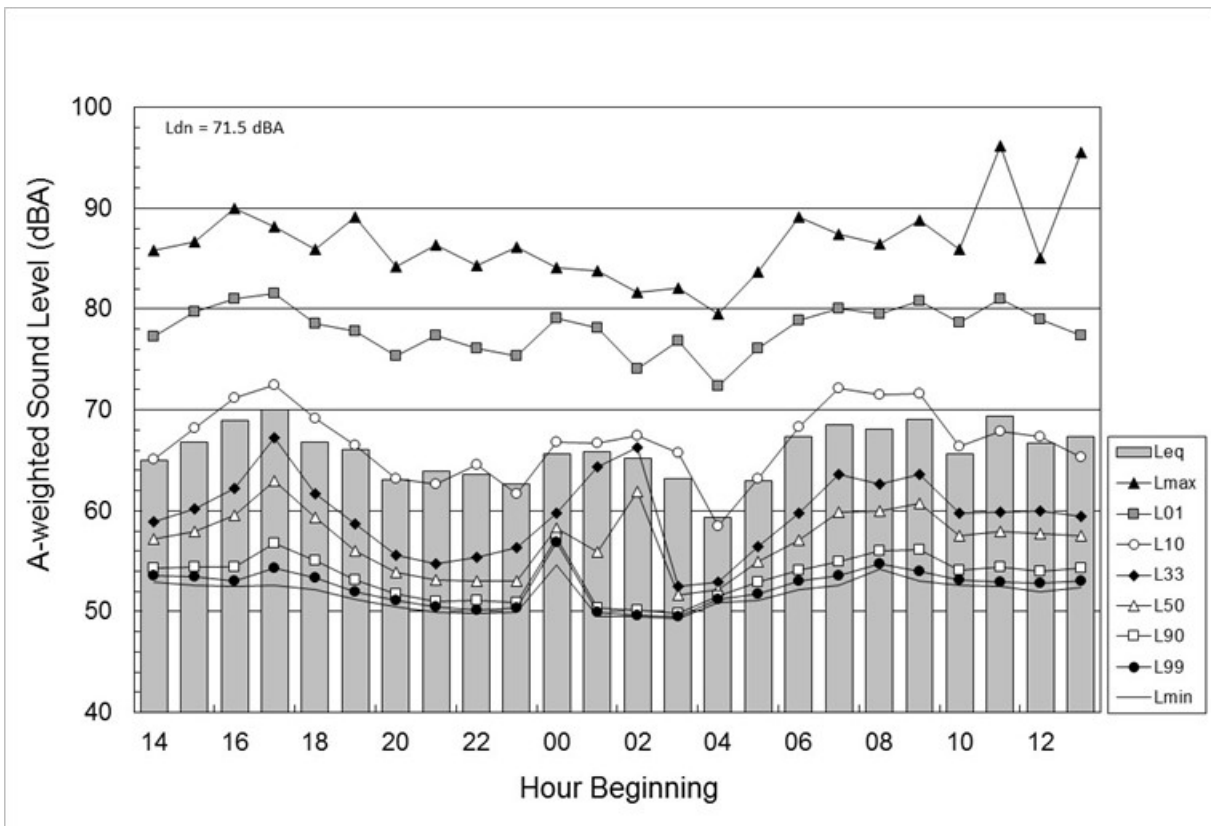
Figure 10-7. Long-Term Noise Measurement Results for Site N19 (NPS Maintenance Facility)
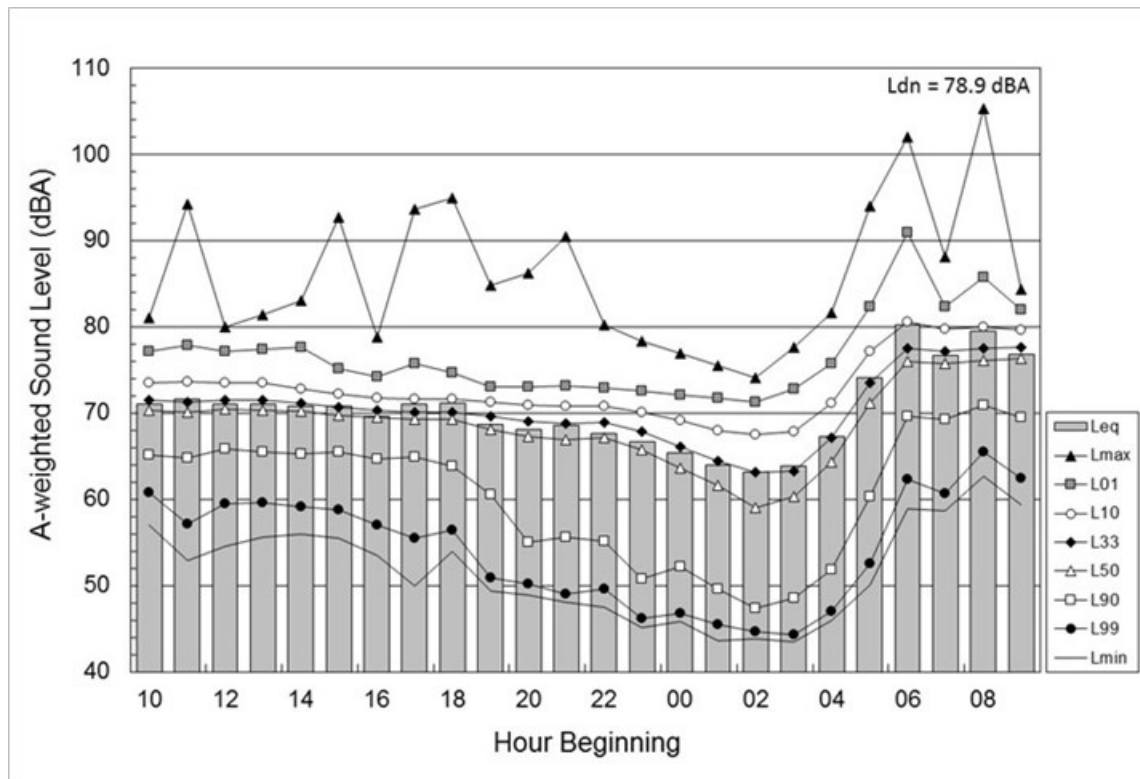
10.5.3.2   Vibration Measurement Results

Vibration measurements were conducted at exterior ground-level locations to determine the maximum vibration levels from train pass-bys. Vibration sensors were located at nearby receptors and at locations between the rail corridor and the receptors near the bridge abutments and retaining walls of the rail corridor. Observations were made of train activity such as train type, speed and track.

As shown in **Table 10-4**, the maximum exterior vibration levels at the closest receptor locations with vibration-sensitive use such as the 840 First St NE (Site V2), Courtyard Marriott (Site V4), and historic residences (Site V5) range from 61 to 65 VdB. These vibration levels are generally below the thresholds of human perception. At historic buildings such as the REA building (V1) and Uline Ice Company Plant and Arena (V3), vibration levels range from 66 to 85 VdB. These vibration levels are below the thresholds for increased risk of structural damage.

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Table 10-4. Vibration Measurement Results

Vibration Site	Location	Sensitive Use	Overall Vibration Velocity (VdB)	Distance to Near Track (Feet)
V1	REA Building (Exterior Deck)	Historic Building	85	22
	REA Building (Façade)		72	35
	REA Building (Setback)		66	60
V2	First St NE (Bottom of Retaining Wall)	None	68	15[1]
	840 First St NE (Façade)	TV Studio	63	80[1]
V3	M St NE (Underneath Rail Bridge)	None	69	Below
	M St NE (Rail Bridge Abutment)		64	20
	Uline Ice Co. Plant and Arena Complex (Façade)	Historic Building	67	60
	Uline Ice Co. Plant and Arena Complex (Setback)		67	75
V4	Florida Ave NE (Metrorail Abutment)	None	75	Below[1]
	Florida Ave NE (Underneath Rail Bridge)		71	Below
	Florida Ave NE (Rail Bridge Abutment)		67	Below
	Courtyard Marriott (Façade)	Residential	63	30[1]
V5	2nd St NE and Parker St NE (Façade)	Residential	65	200
	2nd St NE and Parker St NE (Setback)	Residential	61	250

1. Closest track has Metro operations.

The following summarizes the vibration measurement locations and results:

- **Site V1 at the historic Railway Express Agency (REA) building at 900 2nd St NE**: Although this historic property does not have vibration-sensitive uses, measurements were conducted to understand the typical vibration levels the historic building structure is exposed to due to train operations. Vibration was measured at three locations including the edge of the exterior patio deck on a support column, at the closest part of the building façade and setback 25 feet from the building façade. Trains operating on the closest three tracks (approximately 22 to 50 feet away) generated a maximum vibration level of 85 VdB at the edge of the exterior patio/deck. At the building façade and building setback locations, train operations on the closest tracks generated maximum overall vibration levels of 72 VdB and 66 VdB, respectively.

- **Site V2 at First St NE between H St and K St near the CNN Television Studio:** Vibration was measured at two locations including the building façade at 840 First St NE and at the bottom of the retaining wall adjacent to Metro train operations. Metro train operations typically generated vibration levels of 68 VdB at the retaining wall and 63 VdB at the building at 840 First St NE.

- **Site V3 at the intersection of Delaware St NE and M St NE near the Historic Uline Company Plant and Arena Complex (current REI store)**: Although this historic property

does not have vibration-sensitive uses, measurements were conducted to understand the typical vibration levels the historic building structure is exposed to due to train operations. Vibration was measured at four locations including the closest building façade, a site set back 15 feet from the closest building façade, a location at the edge of the rail bridge abutment and a location underneath the rail bridge. Overall vibration levels at the historic building were 67 VdB and vibration levels underneath and at the rail bridge abutment were 64 to 69 VdB.

- **Site V4 along Florida Ave NE near the Courtyard Marriott**: Vibration was measured at four locations including the closest Marriott Courtyard building façade, at the abutment to the Metrorail bridge, at the end of the rail bridge abutment, and underneath the rail bridge at the abutment. The maximum vibration levels at the Courtyard Marriott were from Metrorail pass-bys which generated overall vibration levels of 63 VdB. Adjacent to the Metrorail guideway column, the maximum vibration level was 75 VdB. At the end of the bridge abutment and underneath the bridge, the maximum overall vibration levels ranged from 67 to 71 VdB.

- **Site V5 historic residential buildings at the intersection of 2nd St NE and Parker St NE**: Vibration was measured at two locations including the closest building façade which is approximately 200 feet from the closest track in the rail corridor and at a location set back 50 feet from front building façade which is approximately 250 feet from the closest track. The maximum overall vibration level from train pass-bys was 65 VdB at the closest site and 61 VdB at the setback location.

11 Aesthetics and Visual Quality

11.1 Overview

The Washington Union Station (WUS) Expansion Project (the Project) is in the heart of the nation's capital with the historic monumental Station headhouse[165] contributing greatly to the visual character of Project Area and affected environment. The urban and cultural environment, including streetscapes, buildings, parks, and monuments contribute to the existing visual character of the Project Study Area.

Aesthetics and visual quality are important environmental considerations that must be evaluated and assessed to ensure that the Project sustains the visible quality and character of the Study Area. Visual quality is determined by the visual resources of the environment and the people, or viewers, who interact with them.

11.2 Regulatory Context and Guidance

Federal policies, regulations, and guidance that may pertain to aesthetics and visual quality include:

- NCPC, *The Comprehensive Plan for the National Capital: Federal Elements, Urban Design Element*;

- Executive Order (EO) 1259 – *Commission of Fine Arts (CFA) Review of Public Buildings in the District of Columbia Proposed by the Federal or DC governments*;

- Shipstead-Luce Act of 1930 (Public Law 71-231, Public Law 76-248);

- Executive Order 1862 – *CFA Review of New Structures and Matters of Art Proposed by the Federal Government in DC*;

- EO 11593 – *Protection and Enhancement of the Cultural Environment*;

- The Historic Landmark and Historic District Protection Act of 1978 (D. Law 2-144, as amended through October 1, 2016); and

- The Height of Buildings Act of 1910.

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[165] Headhouse refers the station building that does not house the tracks and platforms.

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District policies, regulations, and guidance that may pertain to aesthetics and visual quality include:

- District of Columbia Municipal Regulations, *Zoning Regulations Special Purpose Zones*, 11K DCMR § 305.

11.3 Study Area

The aesthetics and visual quality Study Area corresponds directly to the Area of Potential Effect (APE) established in Section 12, *Cultural Resources*. The APE includes culturally significant viewsheds from Arlington National Cemetery, the Old Post Office Building, the Washington Monument, the Capitol, the Washington National Cathedral, and St. Elizabeths west campus. Views from these locations are important within Washington, DC and have been identified in other NEPA undertakings in the District. The APE and significant viewsheds which comprise the Study Area are depicted in **Figure 11-1**.

11.4 Methodology

Existing conditions and views of WUS were characterized from key viewpoints. Such viewpoints may be character-defining and impact the integrity of WUS as a cultural resource.

Visual reconnaissance of views of the Project Area and identification of the existing visual character of the area were conducted. This included an assessment of the views and vistas and urban design context in the study area.

The existing visual character conditions were documented by:

- Describing the urban design context of the Study Area (APE and significant viewsheds)

- Describing the population (the viewers) within the viewshed(s).

- Describing and photographing the street views within the APE at locations from which the Project will be visible, especially those that represent public viewpoints experienced by commuters, residents, and tourists alike and are culturally significant, such as the views along the main streets and avenues of the L'Enfant and McMillan Plans; and

- Describing and photographing culturally significant viewsheds from Arlington National Cemetery, the Old Post Office Building, the Washington Monument, the Capitol, the Washington National Cathedral, and St. Elizabeth's west campus.

Figure 11-1. Aesthetics and Visual Quality Study Area

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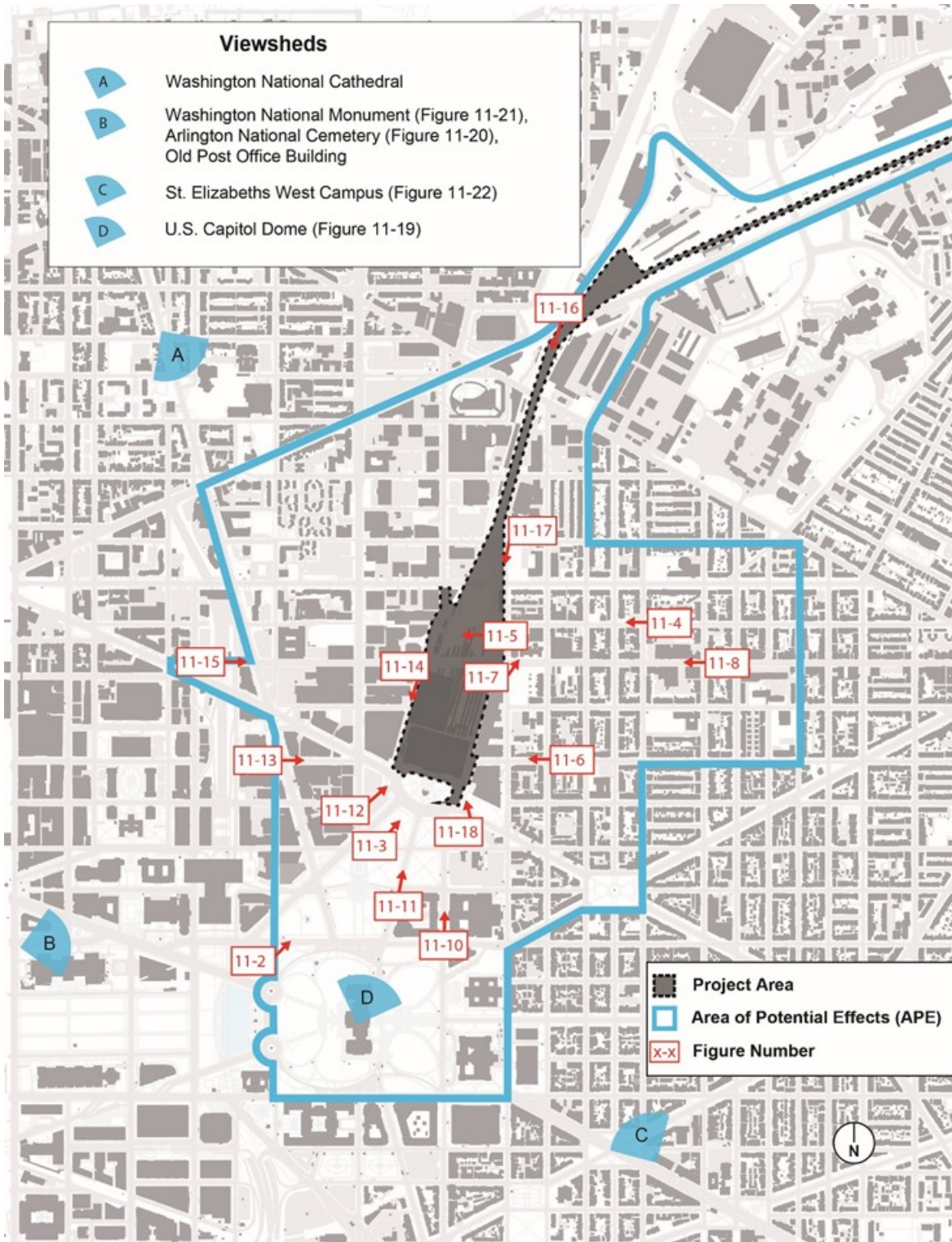
11.5 Affected Environment

11.5.1 Existing Land Use and Population

The existing visual quality of the Affected Environment is largely determined by the existing environment, land use, and population. WUS is surrounded by many different land uses representing many types of people moving in and around the Study Area. Travelers, visitors, commuters, and residents pass through and experience the visual character of the affected environment daily. Refer to Section 9, *Land Use, Land Planning, and Property* for a full description of existing land uses.

Based on the land use analysis, the population to the east of WUS are mostly residents and commuters, those to the south are mostly commuters (government workers), visitors, and tourists, and those to the west and north are commuters and residents. Residents, commuters, travelers, and visitors alike all use WUS and its surrounding environments.

11.5.2 Existing Visual Quality

The visual quality of the environment surrounding WUS may be defined by the topography, open space, and vegetation, as well as the scale, form, location and materials of the built environment. Land use areas for parks and open spaces feature more characteristics of the urban natural environment while areas of commercial, institutional, and high-density use tend to be defined based on characteristics of the cultural or built environment. Low-to-medium density residential areas, as seen to the east of WUS are defined by their strong cultural as well as natural environments. Such neighborhoods feature mostly single-family rowhouses with medium to dense tree cover lining the streets.

11.5.3 Topography

The topography of the Study Area features a slight increase in slope towards WUS from the U.S. Capitol and a decrease in slope westward from First Street NE to First Street SW south of WUS. The Project Area, which includes parts of Union Station Plaza, WUS, and the WUS Terminal Rail Yard, is mostly level. This is due to a re-grading that occurred during WUS construction from 1903 to 1908. To construct the Terminal Rail Yard, railroad engineers found it necessary to lower H, K, L, and M Streets as well as Florida Avenue so that the roads could pass below the railroad tracks. The streets were lowered between 11 and 16 feet, depending on the existing grade, and the grading was extended 300 to 500 feet east and west to avoid drastic grade changes at street level. The great difference in topography between the rail yard and many of the east-west running streets is a defining characteristic of the Study Area

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11.5.4 South of WUS

Senate Park and the Capitol Grounds feature open grassy areas, trees, tree-lined pathways and streets, and other plantings. Trees and other plantings in Senate Park and Capitol Grounds obscure views of WUS, especially when they have their leaves from early spring to late fall (**Figure 11-2** and **Figure 11-3**).

Figure 11-2. View to the Northeast, towards WUS from The Capitol Grounds, across Constitution Avenue NW and along Louisiana Avenue

The slight increase in slope north and east towards WUS and the US Capitol is visible, and the many trees planted along the streets obscure the direct view to WUS. (April 2016)

Figure 11-3. View to the Northeast Towards WUS from Senate Park along Louisiana Avenue Between D Street NE and Columbus Circle NE

The many trees planted along the streets obscure the view towards WUS. (April 2016)

Union Station Plaza and Columbus Fountain also feature panels of grass and vegetation. This area is more open and was designed as a grand entrance forecourt to WUS. Residential neighborhoods to the east of WUS feature dense tree-lined streets, which in the spring through fall obstruct views towards the Project Area along the east-west running streets (**Figure 11-4**).

Figure 11-4. View looking west towards the Project Area and the REA Building from I Street NE and Sixth Street NE

Many trees along the street obscure the view towards WUS. (April 2016)

11.5.5 West of WUS

The affected environment to the west of WUS is largely commercial and public, serving many businesses, institutions, and government entities. Streets feature trees that are less dense than residential neighborhoods to the east. In that sense, the visual character of areas to the west of WUS are more largely defined by the cultural environment (**Figure 11-5**).

Figure 11-5.View Looking West of The WUS Terminal Rail Yard

Commercial, institutional, and high-density residential buildings are prominent.

11.5.6 Cultural Environment

The visual character of the Study Area's cultural environment may be described by the scale, form, and material of constructed elements within the built environment, with the scale or massing corresponding to the land use. Low-to medium dense residential areas to the east of WUS are smaller in scale. Typical buildings include two story single family row houses with flat, parapet, and gabled roofs. Such buildings are constructed of traditional materials including brick, stone masonry, and wood. Sidewalks in this area are typically brick with granite curbing. Commercial and institutional building construction varies, though many feature multi-story buildings of glass curtain wall or are glass and masonry clad. **Figure 11-6** illustrates the change in scale, form, and materials between low-density residential buildings and commercial buildings on F Street NE.

Figure 11-6. View looking west to the Project area and WUS from F Street NE and Third Street NE

Public buildings within the affected area primarily consist of Architect of the Capitol buildings and include the U.S. Capitol, U.S. Supreme Court, the Thurgood Marshall Federal Judiciary Building, the Russell, Dirksen, and Hart Senate Office Buildings, the Library of Congress, and the Cannon House Office Building. All buildings are defined by their monumental massing, Classical or Stripped Classical features, and stone masonry facades.

New commercial and high-density residential buildings are being constructed west, north, and east of WUS. The high volume of construction related activities means the visual environment is constantly changing. In addition, the scale and materials of commercial and mixed-use buildings is also changing. Many small scale commercial buildings fronting H Street NE are being replaced with larger scale mixed use structures. (See **Figure 11-7** and **Figure 11-8**).

Figure 11-7. View looking northeast from I Street NE and Second Street NE

New high-rise residential building among mostly two-story single-family rowhouses.

Figure 11-8. View looking east along H Street NE from Seventh Street NE

New mixed-use buildings constructed at a larger scale than original commercial structures appearing beyond the "Apollo" sign.

11.5.7 Existing Street Views and Significant Viewsheds

Street views and significant viewsheds are important to the visual character of the Study Area. The urban design of much of the area surrounding WUS, especially to the west, south, and east, dates to the 18th century when the L'Enfant Plan was designed to lay out the streets and reservations of Washington, DC. The McMillan Plan of 1901 re-established the L'Enfant Plan and was instrumental in deciding the original location of WUS. The L'Enfant and McMillan Plans established visual corridors directed towards WUS. Due to the historic designation (listing in the NRHP) of both the L'Enfant and McMillian plans, such street views are significant. In addition to significant street views, culturally significant viewsheds have also been identified. Such viewsheds are important within Washington, DC. due to their cultural and historic significance and include views from Arlington National Cemetery, St. Elizabeth's West Campus, the U.S. Capitol Dome, the Washington Monument, the Old Post Office Building, and the Washington National Cathedral.

Significant street views and viewsheds are identified in **Figure 11-9**. Descriptions of what can be seen of the Project Area from these views are provided in **Table 11-1** and photographs of several of the identified views are provided in **Figures 11-10** through **11-19**. Overall, street views of WUS and the Project Area become more impressive as one approaches WUS.

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Figure 11-9. Significant Views and Viewsheds

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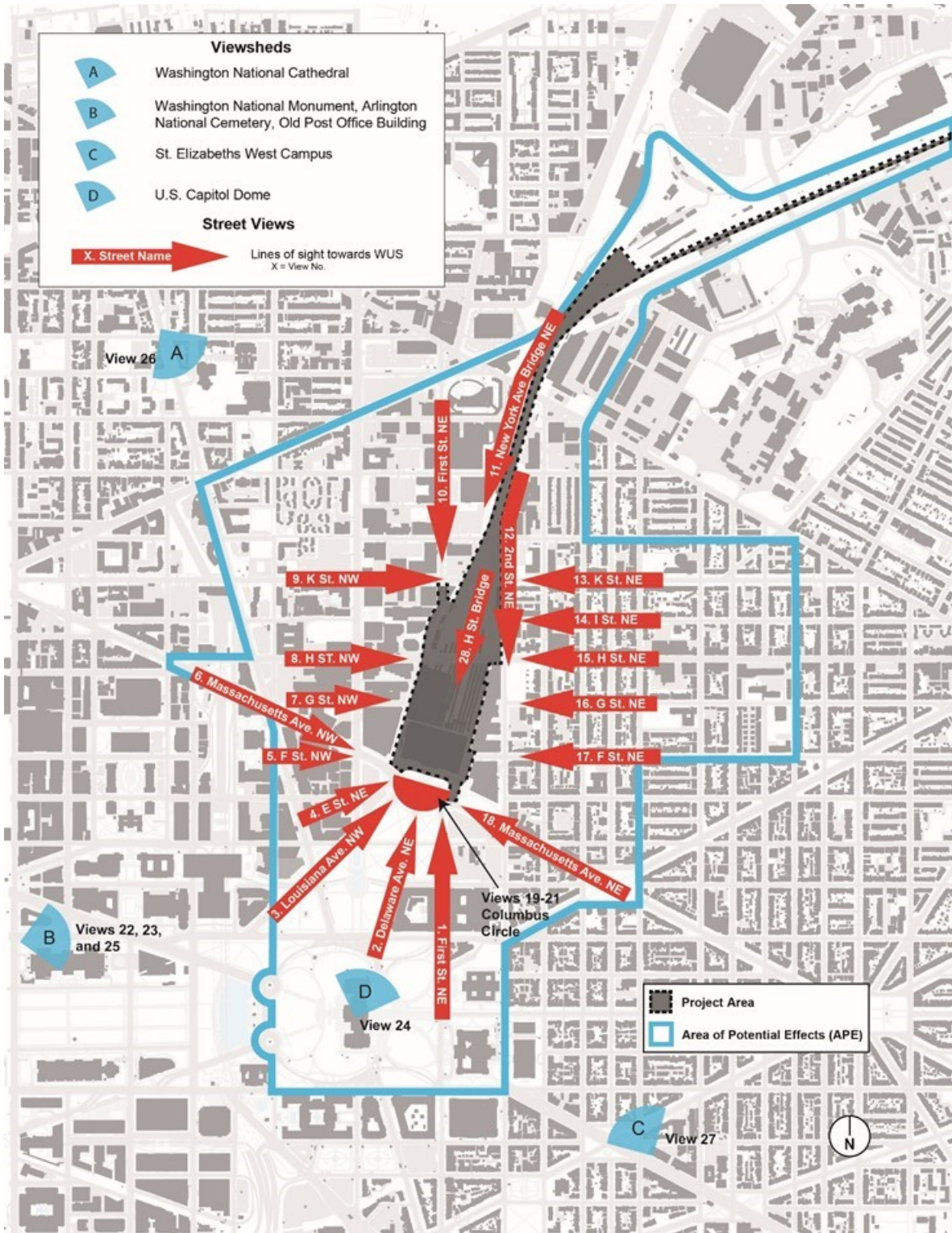
Table 11-1. Street View Descriptions

Street View[1]	Existing Visual Description
1. First Street NE, view looking north	In the distance, especially from Independence Avenue and East Capitol Street, only headhouse roof is visible, however, as one approaches Union Station Plaza, also called Columbus Plaza, the entire south elevation of WUS can be seen. WUS and Union Station Plaza are listed on the NRHP and both contribute to the NRHP eligible Washington Union Station Historic District. The street is characterized by institutional buildings of Capitol Hill, open space used for parking, and the park like space of Lower Senate Park. See **Figure 11-10**.
2. Delaware Avenue NE, view looking northeast	From Constitution Avenue NE, C Street NE, and D Street NE only the center three bays of the WUS headhouse are visible, however, as one approaches Union Station Plaza the entire south elevation of WUS can be seen. The street is characterized by the Russell Senate Office Building, and the open park like setting of Upper and Lower Senate Parks. See **Figure 11-11**.
3. Louisiana Avenue NW, view looking northeast	Along Louisiana Avenue NE only the center pavilion of the WUS headhouse are visible, however, as one approaches Union Station Plaza the entire south elevation of WUS and the far west portion of the WUS parking garage can be seen. The street is characterized by a variety of uses including areas for parking, the Upper Senate Park, the Japanese American Memorial, and institutional and commercial buildings.
4. E Street NE, view looking northeast	From E Street NE and North Capitol St NW portions of the south and west elevations of WUS are visible, however, as one approaches Union Station Plaza the entire south elevation of WUS and the far west portion of the WUS parking garage can be seen. The street is characterized by open parking lots reserved for the U.S. government. See **Figure 11-12**.
5. F Street NW, view looking east	Only the front portion of the WUS headhouse and Union Station Plaza are visible. The street is characterized by multi-story commercial and institutional buildings of various styles and ages. See **Figure 11-13**.
6. Massachusetts Avenue NW, view looking southeast	Only Union Station Plaza is visible until one passes through the plaza or drives through Columbus Circle Northeast. The street is characterized by multi-story commercial and institutional buildings of various styles and ages.
7. G Street NW, view looking east	The WUS parking garage is visible along G Street NW. The street is characterized by institutional and commercial buildings, especially the US Government Publishing Office Building and the former Gales School on the corner of Massachusetts Avenue and G Street NW.
8. H Street NW, view looking east	The H Street Bridge is visible looking east towards the Project Area. From the H Street Bridge (looking south), only the WUS parking garage is visible. The WUS headhouse and Terminal Rail Yard are not visible to pedestrians due to the height of the bridge barrier walls. The street is characterized by its multi-story commercial and institutional buildings, especially the US Government Publishing Office Building. See **Figure 11-15**.
9. K Street NW, view looking east	K Tower and other elements of the Terminal Rail Yard including the K Street underpass and sections of the Burnham Walls are visible looking east towards the Project Area. The Terminal Rail Yard (and its contributing features including underpasses, the Burnham Walls, historic catenaries, signal bridges, K Tower, the Railway Express Agency Building, known as the REA Building; and Substation 25A) is a historic site included in the potentially NRHP eligible proposed Washington Union Station Historic District (**Figure 12-2**). The street is characterized by its many building types which include commercial buildings, a former church, a school, and multi-family residential buildings.
10. First Street NE, view looking south	The WUS parking garage and Burnham Walls are visible looking south towards the Project Area. The street is characterized by the Metropolitan Branch Trail that runs beside it as well as the many multi-story commercial and multi-family residential buildings. See **Figure 11-14**.

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Street View[1]	Existing Visual Description
11. New York Avenue Bridge NE, view looking south	From the New York Avenue NE Bridge, the Terminal Rail Yard, WUS, and WUS parking garage are visible. The U.S. Capitol is also visible beyond. New York is a busy thoroughfare and main access route into Washington, D.C. It is surrounded by industrial, commercial, and residential buildings. See **Figure 11-16**.
12. Second Street NE, view looking south	The view of the Project Area changes as one moves south along Second Street. From M Street NE and L Street NE elements of the Terminal Rail Yard are visible including the Burnham Walls, street underpasses, and several catenaries and signal bridges within the yard. At K Street NE Substation 25A is also visible, and at I Street the REA Building comes into view. Second Street NE is bordered by the Terminal Rail Yard to the west and mostly single-family rowhouses and multi-family apartment buildings of various styles and ages. See **Figure 11-17**.
13. K Street NE, view looking west	Looking west along K Street, the K street underpass and Burnham Walls of the Terminal Rail Yard are visible. K Street NE is characterized by two story traditional row houses as well as new multi-story residential and mixed-use buildings of various styles and ages.
14. I Street NE, view looking west	The REA Building is directly visible looking west along I Street NE. The street is characterized by a mixture of multi-story multi-family apartment buildings and two-story single-family row houses of varying styles and ages. See **Figure 11-4**.
15. H Street NE, view looking west	Looking west along the H Street NE commercial corridor the H Street Bridge and WUS parking garage are visible. From the H Street Bridge portions of the Terminal Rail Yard are also visible, including the REA Building and K Tower. The roof of the WUS headhouse is also visible. H Street is a busy commercial corridor and features many two and multi-story commercial buildings, residences, and mixed-use buildings of various styles and ages. See **Figure 11-8**.
16. G Street NE, view looking west	There is no direct view to the Project Area from G Street NE due to the heights of existing office buildings along Second Street NE. East of Second Street NE, the street is characterized by single-family row houses that are prevalent in the Capitol Hill neighborhood.
17. F Street NE, view looking west	Looking west, the WUS headhouse and a section of the original passenger concourse (currently retail) are visible. Multi-story office buildings line the west side of Second Street; however, the rest of the street is mostly characterized by two-story residences and several small businesses. See **Figure 11-6**.
18. Massachusetts Avenue NE, view looking northwest	Union Station Plaza and Columbus Fountain are visible along Massachusetts Avenue until one approaches Columbus Circle NE where the South elevation of WUS becomes visible. From west of Fourth Street, Massachusetts Avenue is characterized by two and multi-story institutional, commercial, and residential buildings of various styles and ages. The buildings are set-back from the street providing a wide viewshed towards Union Station Plaza. See **Figure 11-18**.
28. H Street Bridge looking south	Looking south from the north sidewalk at the center of the bridge, the view is characterized by the strong presence of the existing WUS parking garage on the west and the open space above the rail terminal on the east. The latter is bordered by multi-story commercial buildings along second street. The foreground of the view is dominated by the street, road traffic, streetcar infrastructure, and the south barrier wall. A portion of the historic passenger concourse roof and barrel vault of the WUS headhouse are visible beyond the barrier wall, parking garage, and parking garage elevator and escalator wing, which is placed on axis with the center of the station.

1. Numbers are those in **Figure 11-9**.

Figure 11-10. Street View Looking North, towards WUS, along First Street NE from Constitution Avenue

Figure 11-11. Street View Looking North, towards WUS, along Delaware Avenue NE from C Street NE

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Figure 11-12. Street View Northeast, towards WUS, along E Street NE from North Capitol Street

Figure 11-13. Street View Northeast, towards WUS, along F Street NE from New Jersey Avenue NW

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Figure 11-14. Street View South, towards the WUS Parking Garage, along First Street NE between G and H Streets

Figure 11-15. Street View Southeast, towards the Project Area, along H Street NE from Second Street NW

Figure 11-16. Street View South, towards the Project Area and WUS from New York Avenue NE

Figure 11-17. Street View Looking South, towards the Project Area, along Second Street NE from L Street NE

Figure 11-18. Street View Looking Northwest, towards WUS and the Project Area, from Massachusetts Avenue NE at the East Side of Union Station Plaza

The significant viewsheds identified in **Figure 11-1** have varying existing conditions. The views of WUS and the Project Area from the U.S. Capitol Dome (**Figure 11-19**) are much more prominent than from the other identified viewshed sites including, the Washington Monument, Old Post Office Tower, National Cathedral, Arlington National Cemetery and St. Elizabeth's West Campus. From these latter sites, WUS becomes almost undecipherable from other buildings in the cityscape. The scale of WUS and surrounding buildings is such that from these viewsheds the built environment becomes one mass on the horizon (**Figures 11-19 through 11-22).**

Figure 11-19. View north of WUS and the Project Area from the Dome of the U.S. Capitol Building

The Station and Project Area is visible in the surrounding cityscape.

Figure 11-20. View East Towards WUS and the Project Area from Arlington National Cemetery

The Station and Project Area are difficult to distinguish from the surrounding cityscape.

Figure 11-21. View east towards WUS and the Project Area from the Washington Monument

The Station and Project Area are difficult to distinguish from the surrounding cityscape.

Figure 11-22. View North Towards WUS and the Project Area from St. Elizabeth's West Campus

WUS is not visible and is obstructed by buildings in the foreground

12 Cultural Resources

12.1 Overview

For the Environmental Impact Statement (EIS) analysis, historic properties (cultural resources) are identified within the Area of Potential Effects (APE), which is the geographic area or areas in which an undertaking may directly or indirectly cause alterations in the character or use of historic properties.[166] This methodology is consistent with the Section 106 Process of the National Historic Preservation Act. Historic properties within the APE include districts, buildings, sites, structures, and objects included in or eligible for inclusion in the National Register of Historic Places (NRHP) and the District of Columbia Inventory of Historic Sites (DC Inventory). Historic properties identified also include those that fall within the purview of the Architect of the Capitol (AOC) and are listed as AOC Heritage Assets and those that are under the jurisdiction of the National Park Service's National Mall and Memorial Parks.

12.2 Regulatory Context and Guidance

Federal policies, regulations, and guidance that are relevant to this section include:

- Section 106 of the National Historic Preservation Act (NHPA) of 1966, as amended (16 USC 470);

- *Protection of Historic Properties* (36 CFR 800);

- The Secretary of the Interior's *Standards for the Treatment of Historic Properties* (36 CFR 68);

- *Assumption of Responsibility for Preservation of Historic Property* (54 USC 306101);

- National Register of Historic Places (36 CFR 60); and

- AOC Heritage Assets.[167]

District policies, regulations, and guidance relevant to this section include:

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[166] 36 CFR Part 800.16. Protection of Historic Properties. 2004. Accessed from http://www.achp.gov/regs-rev04.pdf. Accessed on April 27, 2018.

[167] AOC, Order 37-1, *Preservation Policy and Standards*, February 6, 2012.

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- The Historic Landmark and Historic District Protection Act of 1978 (DC Law 2-144, as amended);

- DCMR, *Preservation Regulations*, Title 10-C; and

- DC Inventory of Historic Sites.[168]

12.3 Study Area

The Local Study Area consists of the APE defined as part of the Section 106 process for the Project (**Figure 12-1**).

12.4 Methodology

WUS is in an area that has been thoroughly studied by many public and private historic preservation entities to identify historic properties. FRA engaged consulting parties in the identification of the APE (the EIS cultural resources study area), and historic properties within it (see **Section 12.5.1**.) No further research or studies to identify historic properties, except for a Determination of Eligibility (DOE) for the WUS Historic Site.

12.5 Affected Environment

Multiple resources were consulted for the identification of cultural resources including the NRHP[169], the *DC Inventory of Historic Sites[170]*, the AOC's *List of Heritage Assets[171]*, and the list of memorials and monuments within the National Park Service's National Mall and Memorial Parks.[172] In addition, properties that are potentially eligible for historic designation have also been identified. The *Union Station Historic Preservation Plan* (HPP)[173], written in 2015, identified several potentially eligible properties that are located within the APE. Additional potentially eligible properties have been identified through consultations with Consulting Parties and the DC State Historic Preservation Office (SHPO).

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[168] DC Inventory of Historic Sites. Accessed from https://planning.dc.gov/node/924472. Accessed on December 3, 2018.

[169] The National Register of Historic Places is the official list of the Nation's historic places worthy of preservation; authorized by the National Historic Preservation Act of 1966. See https://www.nps.gov/subjects/nationalregister/index.htm.

[170] The DC Inventory of Historic Sites is the list of historic landmarks and historic districts in the District of Columbia. Properties listed in the Inventory are protected by the District's historic preservation law, which promotes compatible alterations and adaptation for current use. See https://planning.dc.gov/page/dc-inventory-historic-sites

[171] The List of Heritage Assets is an internal document.

[172] Historic properties recognized as part of a National Park are automatically listed on the NRHP. See https://www.nps.gov/nama/index.htm

[173] BCA, *Washington Union Station Historic Preservation Plan* Volume 1 (2015).

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12.5.1 Defining the APE

In accordance with ACHP regulations for implementing the Section 106 process (36 CFR 800.4), the Federal agency must determine and document an APE to identify historic properties. As stated above, the APE is defined in the Section 106 regulations as:

> "… the geographic area or areas within which an undertaking may directly or indirectly cause alterations in the character or use of historic properties, if any such properties exist. The area of potential effects is influenced by the scale and nature of an undertaking and may be different for different kinds of effects caused by the undertaking."[174]

The regulations also require the Federal agency to seek information from and consult with Consulting Parties. To help determine the APE, a visual survey was conducted to identify surrounding streets and viewsheds that provided direct and indirect views to the Project Area. The visual survey also identified areas of high traffic volume and confirmed the routes typically used by trucks and busses. Together, the surveys and consultation with the Consulting Parties, determined the preliminary boundaries of the draft APE.

To inform the identification of the APE, FRA identified a "Proposed Study Area" at the second Consulting Parties[175] meeting on May 9, 2016[176]. The Proposed Study Area was based on a visual survey conducted to identify surrounding streets and viewsheds that provided direct and indirect views to the Project Area. It was intended to be a starting point for ongoing consultation while the Project's preliminary concepts were being developed, screened, and refined into Preliminary Alternatives. FRA presented the Preliminary Concepts to the Consulting Parties at the third Consulting Parties meeting on October 6, 2016.[177] At this meeting, the Proposed Study Area was again presented along with the known historic properties within and surrounding the Proposed Study Area. Having received no comments on the Proposed Study Area and identification of historic properties after the October meeting, FRA sent an email to the Consulting Parties on February 10, 2017 requesting their confirmation and concurrence with and/or provide any final comments on the Proposed Study Area and the identification of historic properties within 30 days.

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[174]   36 CFR Part 800.16.

[175]   The Project Consulting Parties are Advisory Council on Historic Preservation, Akridge, Amtrak, ANC 6C, Architect of the Capitol, Capitol Hill BID, Capitol Hill Restoration Society, Commission of Fine Arts, Committee of 100 on the Federal City, DC Historic Preservation Office, DC Preservation League, Department of Transportation including FRA, FTA, FHA; District Department of Transportation, Government Printing Office, Greyhound, MARC/MTA, Megabus, Metropolitan Council of Governments, National Capital Planning Commission, National Park Service, National Mall and Memorial Parks, National Railway Historical Society, DC Chapter, National Trust for Historic Preservation, Union Station Redevelopment Corporation, VRE, and WMATA.

[176]   Washington Union Station Expansion Project, Second Consulting Parties Meeting. Accessed from https://www.fra.dot.gov/eLib/Details/L18344. Accessed on November 20, 2017.

[177]   Washington Union Station Expansion Project, Third Consulting Parties Meeting. Accessed from https://www.fra.dot.gov/eLib/Details/L18589. Accessed on November 20, 2017.

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In February and March 2017, five Consulting Parties, including the SHPO, provided comments. Notably, the Consulting Parties were concerned that the Proposed Study Area did not extend far enough to adequately address potential visual and traffic related effects. In response, another visual survey was initiated that also identified areas of high traffic volume and confirmed the routes typically used by trucks and busses. The SHPO also asked that a DOE be prepared for the WUS Rail Yard, which the FRA is currently preparing.

Together, with the additional surveys, consultation with the Consulting Parties, and selection of the Preliminary Alternatives, the Proposed Study Area was refined and developed into the draft APE. The draft APE was presented at the fourth Consulting Parties meeting on September 7, 2017. FRA requested that comments on the presented APE be submitted by September 29, 2017. During this time two letters were received from the SHPO and the ACHP accepting the proposed APE as an appropriate basis upon which to continue Section 106 consultation.

The APE (**Figure 12-1**) is bound by Independence Avenue SW and SE to the south; First Street SW and NW, and New Jersey Avenue NW to the west; and New York Avenue NW and NE, the Eckington Rail Yard, and Ivy City Rail Yard tracks to the north. The east boundary follows New York Avenue NE southwest to Fourth Street NE, and continues to L Street NE. The APE then runs along L Street NE to Tenth Street NE, before running south to F Street NE, and turning south again on Sixth Street NE to the southern edge of Stanton Park at C Street NE. The boundary follows Maryland Avenue NE to Second Street NE until Independence Avenue SE.

12.5.2 Identification of Historic Properties

Historic properties within the APE were identified by analyzing the various data sources available (see above). A letter from the SHPO provided a list of additional properties that were potentially eligible for the DC Inventory of Historic Sites and NRHP. Because WUS is located in an area that has been thoroughly studied by many public and private historic preservation entities, all cultural resources have been identified through previous studies. No further research or studies, except for the DOE for the WUS Historic Site.

12.5.3 Historic Properties (Cultural Resources)

Constructed in the city center several blocks north of the U.S. Capitol, WUS is surrounded by many cultural resources that date from the early 1800s to the present day. Historic properties within the APE include historic districts, buildings, sites, structures, and objects recognized by the National Historic Landmarks Program, NRHP, District of Columbia Inventory of Historic Sites, AOC's List of Heritage Assets, and National Mall and Memorial Parks. Further properties have been identified as potentially eligible for listing on the DC Inventory of Historic Sites and the National Register of Historic Places. For a site to be listed or considered eligible for listing, it must meet one of the four NRHP Criteria for Evaluation.

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Figure 12-1. WUS Expansion Project APE

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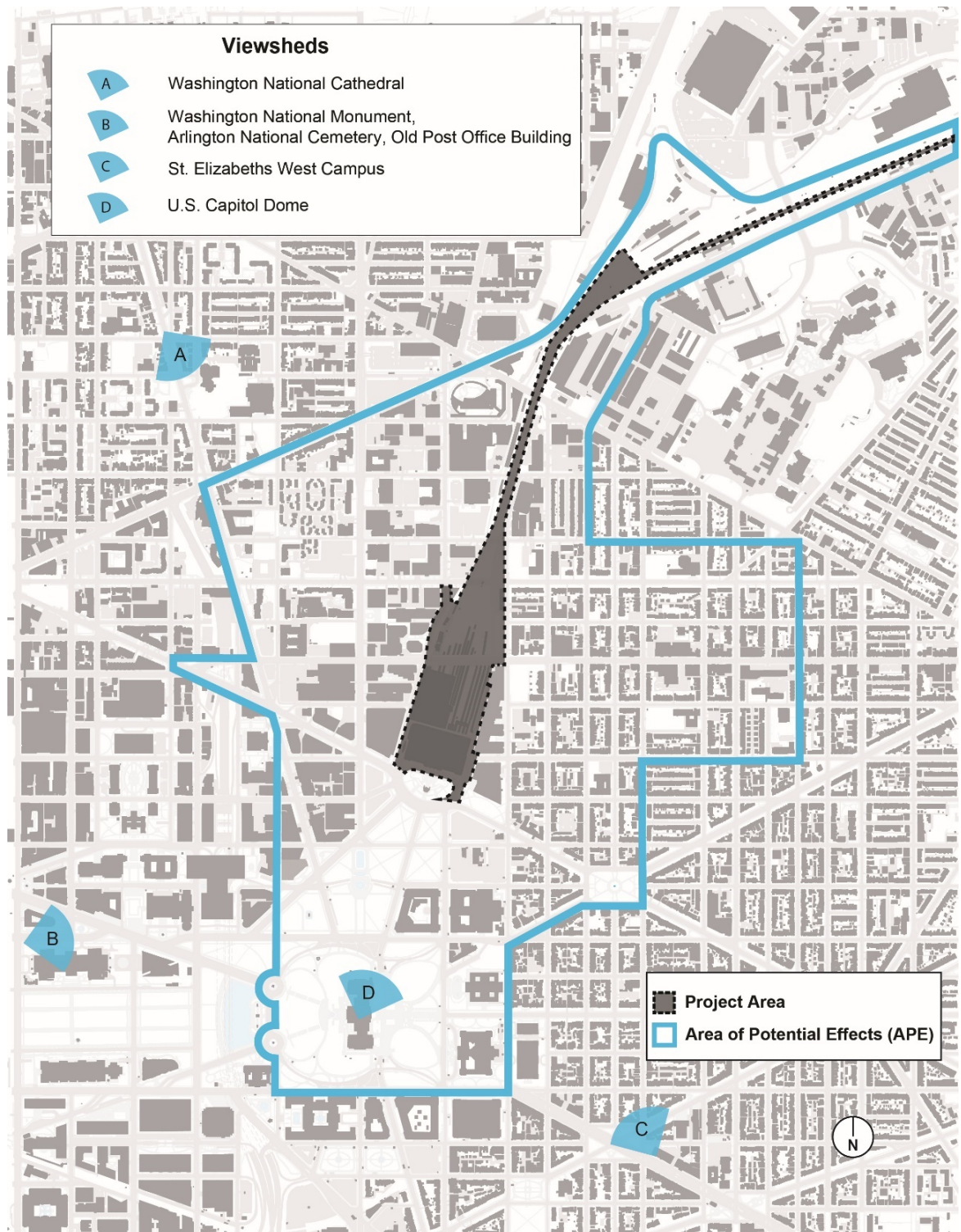
The Criteria for Evaluation state that the quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity of location, design, setting, materials, workmanship, feeling, and association, and that:

- Are associated with events that have made a significant contribution to the broad patterns of our history; or

- Are associated with the lives of persons significant in our past; or

- Embody the distinctive characteristics of a type, period, or method of construction, or represent the work of a master, or possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction; or

- Have yielded, or may be likely to yield, information important in prehistory or history.[178]

Located within the Project Area, WUS and Union Station Plaza – also called Columbus Plaza – are both considered District landmarks and are listed on the NRHP as properties that are associated with events that have made a significant contribution to the broad patterns of history and that embody the distinctive characteristics of the early twentieth century Beaux Arts style. The WUS Historic Site is also located within the Project Area. In addition to the historic station building, the WUS Historic Site includes the rail terminal and associated structures and facilities. Renowned architecture firm D.H. Burnham and Company designed the main structures and buildings within the rail terminal. Within the rail terminal are many character-defining objects and structures, including the REA Building, K Tower, the WUS umbrella sheds and track platforms, the retaining walls (known as the Burnham walls), the bridge underpasses which allow(ed) H Street NE, K Street NE, L Street NE, M Street NE, and Florida Avenue NE to pass below the rail yard; three remaining signal bridges, single catenaries, a catenary with cross beam, an ownership marker, pneumatic switch valves, and the electric substation 25A. The period of significance for the WUS Historic Site is 1903-1935.

A list of the cultural resources within the APE is provided in **Table 12-1**. Their locations are shown in **Figure 12-2**.

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[178] National Park Service, National Register Criteria for Evaluation. Accessed from https://www.nps.gov/nr/publications/bulletins/nrb15/nrb15_2.htm. Accessed on May 4, 2018.

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Table 12-1. Cultural Resources within the Area of Potential Effect

Name	Historic Designation	Date of Construction / NRHP Criteria
Properties listed in the National Register of Historic Places and/or the DC Inventory of Historic Sites		
Augusta Apartment Building (and Louisa Addition)	National Register and DC Inventory	Constructed in 1900-1901 Meets NRHP Criteria A and C
Capitol Hill Historic District	National Register and DC Inventory	Period of Significance spans 1790-1945. Meets NRHP Criteria A and C
C&P Telephone Company Warehouse	National Register and DC Inventory	Constructed in 1927 Meets NRHP Criteria A and C
City Post Office (Postal Museum)	DC Inventory Listed	Constructed in 1914 Listed under NRHP Criteria A and C.
Engine Company No. 3	DC Inventory	Constructed in 1916 Meets NRHP Criteria A and C
Government Printing Office	DC Inventory	Constructed in 1904 Meets NRHP Criteria A and C
Hayes School	DC Inventory	Constructed in 1897 Meets NRHP Criteria A and C
Holodomor Ukrainian Holocaust Memorial	NPS memorial	Constructed in 2015
Japanese American Memorial to Patriotism During WWII	NPS memorial	Constructed in 2001
Joseph Gales School	DC Inventory	Constructed in 1881 Meets NRHP Criteria A and C
L'Enfant – McMillan Plan	National Register and DC Inventory	Period of Significance spans 1790-1942 Meets NRHP Criteria A and C
M Street High School (Perry School)	National Register and DC Inventory	Constructed in 1890-1891 Meets NRHP Criteria A and C.
Major General Nathanael Greene Statue	National Register and DC Inventory	Constructed in 1877 Meets NRHP Criteria A and C.
Mountjoy Bayly House	National Register Listed; National Historic Landmark	Construction unknown Predates War of 1812 Meets NRHP Criteria B.
National Mall Historic District	National Register and DC Inventory	Periods of Significance include for Criterion A: 1791-present, and for Criterion C: 1791-1965
Pennsylvania Avenue National Historic Site	DC Inventory (National Register Eligible)	Period of Significance spans 1891-1938 Meets NRHP Criteria A and C
Sewall-Belmont House	National Historic Landmark; National Register and DC Inventory	Constructed in 1800 Meets NRHP Criteria A and B

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Name	Historic Designation	Date of Construction / NRHP Criteria
St. Aloysius Catholic Church	National Register and DC Inventory	Constructed in 1857-1859 Meets NRHP Criteria C
St. Philip's Baptist Church	DC Inventory	Constructed in 1892 Meets NRHP Criteria C
Uline Ice Company Plant and Arena Complex	National Register and DC Inventory	Constructed in 1931 Meets NRHP Criteria A and C
Union Market Historic District	National Register and DC Inventory	Period of Significance 1929-1939 Meets NRHP Criteria A and C
Victims of Communism Memorial	NPS memorial	Constructed in 2007
Washington Union Station	National Register and DC Inventory	Constructed in 1908 Meets NRHP Criteria A and C
Washington Union Station Plaza and Columbus Fountain	National Register and DC Inventory, managed by the National Park Service	Constructed in 1912 Meets NRHP Criteria C
Woodward and Lothrop Service Warehouse	National Register and DC Inventory	Constructed in 1937-1939 Meets NRHP Criteria A and C.
Properties Potentially Eligible and Eligible for Listing in the National Register of Historic Places and/or DC Inventory of Historic Sites		
Acacia Building	Potentially National Register and DC Inventory Eligible	Constructed in 1936 Potentially eligible under NRHP Criteria A and C
Capital Press Building (Former)	Potentially National Register and DC Inventory Eligible	Constructed in 1931 Potentially eligible under NRHP Criteria A and C
Eckington Power Plant	DC Inventory Eligible	Constructed in 1907 Meets NRHP Criteria A
Gonzaga College High School	Potentially National Register and DC Inventory Eligible	Constructed in 1859 Potentially eligible under NRHP Criteria C
Government Printing Office Warehouse No. 4	Potentially National Register and DC Inventory Eligible	Constructed in 1937 Potentially eligible NRHP Criteria A and C
Railway Express Agency (REA) Building	DC Inventory Eligible	Constructed in 1908. Meets NRHP Criteria A and C.
Square 750 Rowhouse Development	Potentially National Register and DC Inventory Eligible	Constructed ca 1882 Potentially eligible under NRHP Criteria A and C
St Joseph's Home (Former)	Potentially National Register and DC Inventory Eligible	Constructed in 1872-1874 Potentially eligible under NRHP Criteria A and C

Name	Historic Designation	Date of Construction / NRHP Criteria
Sun Trust Bank (Former Childs Restaurant)	Potentially National Register and DC Inventory Eligible	Constructed in 1926 Potentially eligible under NRHP Criteria A and C
Tophams Luggage Factory (Former)	Potentially National Register and DC Inventory Eligible	Constructed in 1928. Eligible under NRHP Criteria A and C
WUS Historic Site	National Register and DC Inventory Eligible	Period of Significance spans 1903-1935. Eligible under NRHP Criteria A and C
901 Second Street NE	National Register and DC Inventory Eligible	Constructed in 1907 Potentially eligible under NRHP Criteria A and C
Architect of the Capitol (AOC) Heritage Asset		
Dirksen and Hart Senate Office Buildings	AOC Heritage Asset	Constructed in 1958 and 1982, respectively As an AOC property, it is exempt from listing in the NRHP
Garfield Monument	AOC Heritage Asset	Constructed in 1958 and 1982, respectively As an AOC property, it is exempt from listing in the NRHP
Library of Congress, Thomas Jefferson Building	AOC Heritage Asset	Constructed in 1897 As an AOC property, it is exempt from listing in the NRHP
Peace Monument	AOC Heritage Asset	Constructed in 1878 As an AOC property, it is exempt from listing in the NRHP
Robert A. Taft Memorial	AOC Heritage Asset	Constructed in 1959 As an AOC property, it is exempt from listing on the NRHP.
Russell Senate Office Building	AOC Heritage Asset	Constructed in 1909 As an AOC property, it is exempt from listing in the NRHP
Senate, Underground Parking and Fountain	AOC Heritage Asset	Constructed in 1932 As an AOC property, it is exempt from listing in the NRHP
The Summerhouse	AOC Heritage Asset	Constructed in 1880-1881 As an AOC property, it is exempt from listing in the NRHP
Thurgood Marshall Federal Judiciary Building	AOC Heritage Asset	Constructed in 1992. As an AOC property, it is exempt from listing in the NRHP

Name	Historic Designation	Date of Construction / NRHP Criteria
United States Capitol	AOC Heritage Asset	Construction dating to 1798 As an AOC property, it is exempt from listing in the NRHP
United States Capitol Grounds	AOC Heritage Asset	Design dating from 1874-1892. As an AOC property, it is exempt from listing on the NRHP
United States Supreme Court	AOC Heritage Asset	Constructed in 1935 As an AOC property, it is exempt from listing on the NRHP

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Figure 12-2. Cultural Resources within the APE

Project Area

Area of Potential Effects (APE)

Historic Districts and Sites

Capitol Hill Historic District	NR; DC	Pennsylvania Avenue National Historic Site	NR; DC
National Mall Historic District	NR; DC	Union Market Historic District	NR; DC
L'Enfant - McMillan Plan	NR; DC	WUS (Proposed Designation Expansion)	[NR and DC Eligible]
		First Street Tunnel (Below-grade)	

Historic Properties ■ **Architect of the Capitol Heritage Assets**

AOC Architect of the Capitol NPS National Park Service
NHL National Historic Landmark DC District of Columbia Inventory of Historic Sites
NR National Register of Historic Places

1	Acacia Building	[Potentially NR and DC Eligible]	24	Russell Senate Office Building	AOC
2	Augusta Apartment Building (and Louisa Addition)	NR; DC	25	Senate Parks, Underground Parking and Fountain	AOC
3	C&P Telephone Company Warehouse	NR; DC	26	Belmont-Paul Women's Equality National Monument	NHL; NR; DC
4	Capital Press Building (Former)	[Potentially NR and DC Eligible]	27	Square 750 Rowhouse Development	[Potentially NR and DC Eligible]
5	City Post Office (Postal Museum)	DC	28	St. Aloysius Catholic Church	NR; DC
6	Dirksen and Hart Senate Office Buildings	AOC	29	St. Joseph's Home (Former)	[Potentially NR and DC Eligible]
7	Eckington Power Plant; Coach Yard Power Plant	[DC Eligible]	30	St. Phillip's Baptist Church	DC
8	Engine Company No. 3	DC	31	SunTrust Bank (Former Childs Restaurant)	[Potentially NR and DC Eligible]
9	Garfield Memorial	AOC	32	The Summerhouse	AOC
10	Gonzaga College High School	[Potentially NR and DC Eligible]	33	Thurgood Marshall Federal Judiciary Building	AOC
11	Government Printing Office	DC	34	Topham's Luggage Factory (Former)	[Potentially NR and DC Eligible]
12	Government Printing Office Warehouse No. 4	[Potentially NR and DC Eligible]	35	Uline Ice Company Plant and Arena Complex	NR; DC
13	Hayes School	DC	36	United States Capitol	AOC
14	Holodomor Ukrainian Holocaust Memorial	NPS	37	United States Capitol Square	AOC
15	Japanese American Memorial to Patriotism During WWII	NPS	38	United States Supreme Court	AOC
16	Joseph Gales School	DC	39	Victims of Communism Memorial	NPS
17	Library of Congress, Thomas Jefferson Building	AOC	40	Washington Union Station (WUS)	NR; DC
18	M Street High School (Perry School)	NR; DC	41	WUS Plaza (Columbus Plaza) and Columbus Fountain	NR; DC
19	Major General Nathaneal Greene Statue	NR; DC	42	Woodward and Lothrop Service Warehouse	NR; DC
20	Mountjoy Bayly House	NHL; NR	43	901 Second Street NE	[Potentially NR and DC Eligible]
21	Peace Monument	AOC			
22	Railway Express Agency Building	[DC Eligible]			
23	Robert A. Taft Memorial	AOC			

Viewsheds

A Washington National Cathedral

B Washington Monument, Arlington National Cemetery, Old Post Office Building

C St. Elizabeths West Campus

D U.S. Capitol Dome

12.5.4 Archaeological Resources

An Archaeological Assessment was completed and included in the WUS Historic Preservation Plan (HPP). The assessment concluded that the Project Area is likely to contain a range of prehistoric and historic archaeological materials from isolated artifacts to significant cultural features. However, certain areas are more likely to contain significant archaeological remains than others. **Figure 12-4** illustrates areas of low and moderate to high potential for archaeological resources. Areas unlikely to contain archaeological resources have low potential and are shaded in green, while areas of moderate to high potential are shaded in red.

Figure 12-3. Baist Real Estate Map (1903)
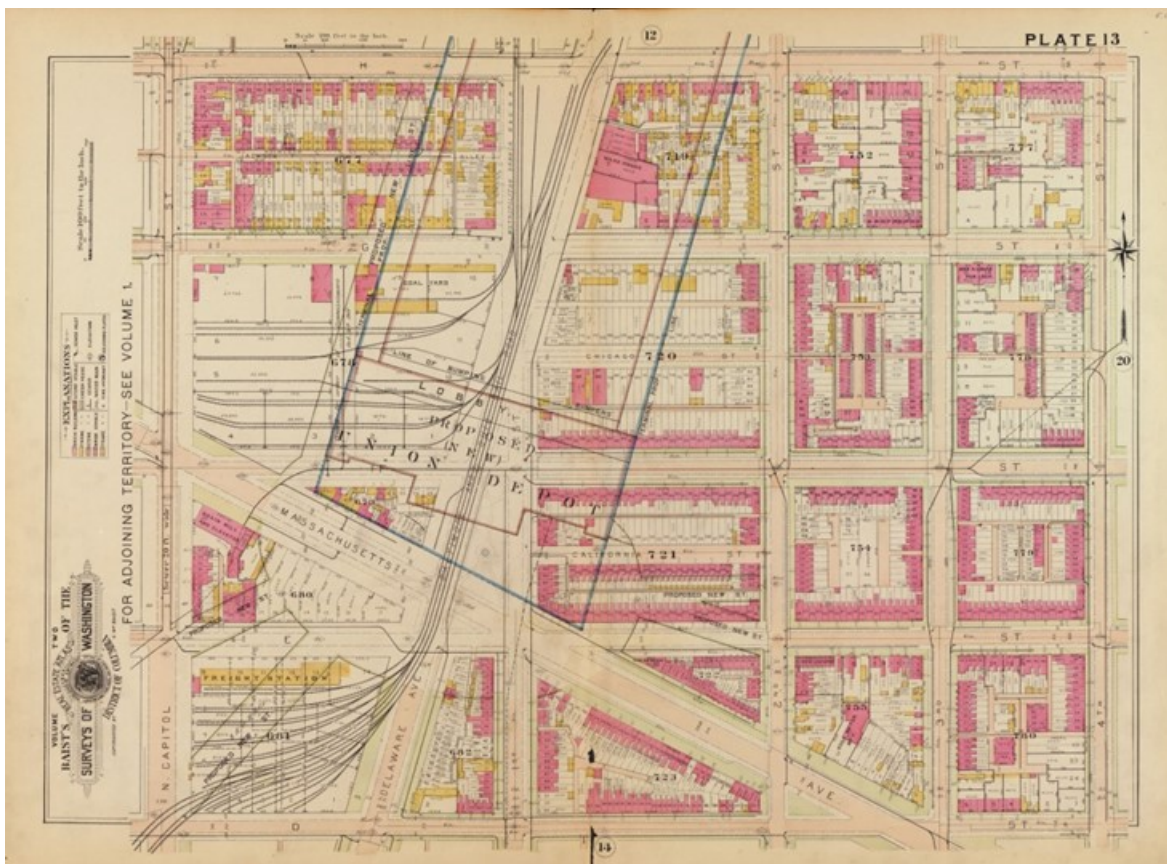
The area with the greatest potential for archaeological resources is in the rail yard south of L Street, NE and beneath Columbus Plaza (Area B in **Figure 12-4**). Fill deposited on top of these areas to raise the grade has buried pre-1903 cultural resources, suggesting an increased likelihood of preservation. The ground below the WUS headhouse, passenger concourse, and garage is unlikely to contain archaeological remains since such features would have been removed in the subsurface excavations for the buildings' foundations. However, a brick

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masonry sewer catch basin and two terracotta pipes was discovered during a 2015 project to stabilize the subbasement of WUS.[179]

Areas that have been regraded and leveled, such as the rail yard between L Street NE and New York Avenue NE, are unlikely to contain significant archaeological remains. Areas C and E in **Figure 12-4**, between L Street NE and New York Avenue NE, have low archaeological potential. Area D also has low archaeological potential except for the remains of the 18th century Casanovia farm house. Artifacts, likely associated with the Casanovia farm house, were discovered during the NoMa-Gallaudet Metrorail Station's construction. All areas north of New York Avenue NE were not surveyed for archaeological potential.

Overall, the 2015 *Archaeological Assessment* found there is low to moderate potential that significant prehistoric material is present, and moderate to high potential that significant historic material (mostly dating from the nineteenth and early twentieth centuries) is present. Historic archaeological resources that may be present likely relate to the Swampoodle neighborhood, and include building foundations, wells, privies, street infrastructure, and trash pits. Before the construction of WUS, the site was occupied by the Swampoodle neighborhood, in addition to portions of the Baltimore and Ohio Railroad rail yard (**Figure 12-3**). The Swampoodle neighborhood was generally bordered by First Street NW to the west, 2nd Street NE to the east, K Street in the north and G Street to the south, and was home to many working-class laborers and immigrants, especially of Irish descent. Over 300 buildings in Swampoodle were demolished during the construction of WUS between 1903 and 1907.

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[179]   Karell Archaeological Services, "Union Station Archaeological Feature 1," *DC Preservation Office Determination of Eligibility Form* (2015).

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Figure 12-4. Potential for Archaeological Resources within the Project Area
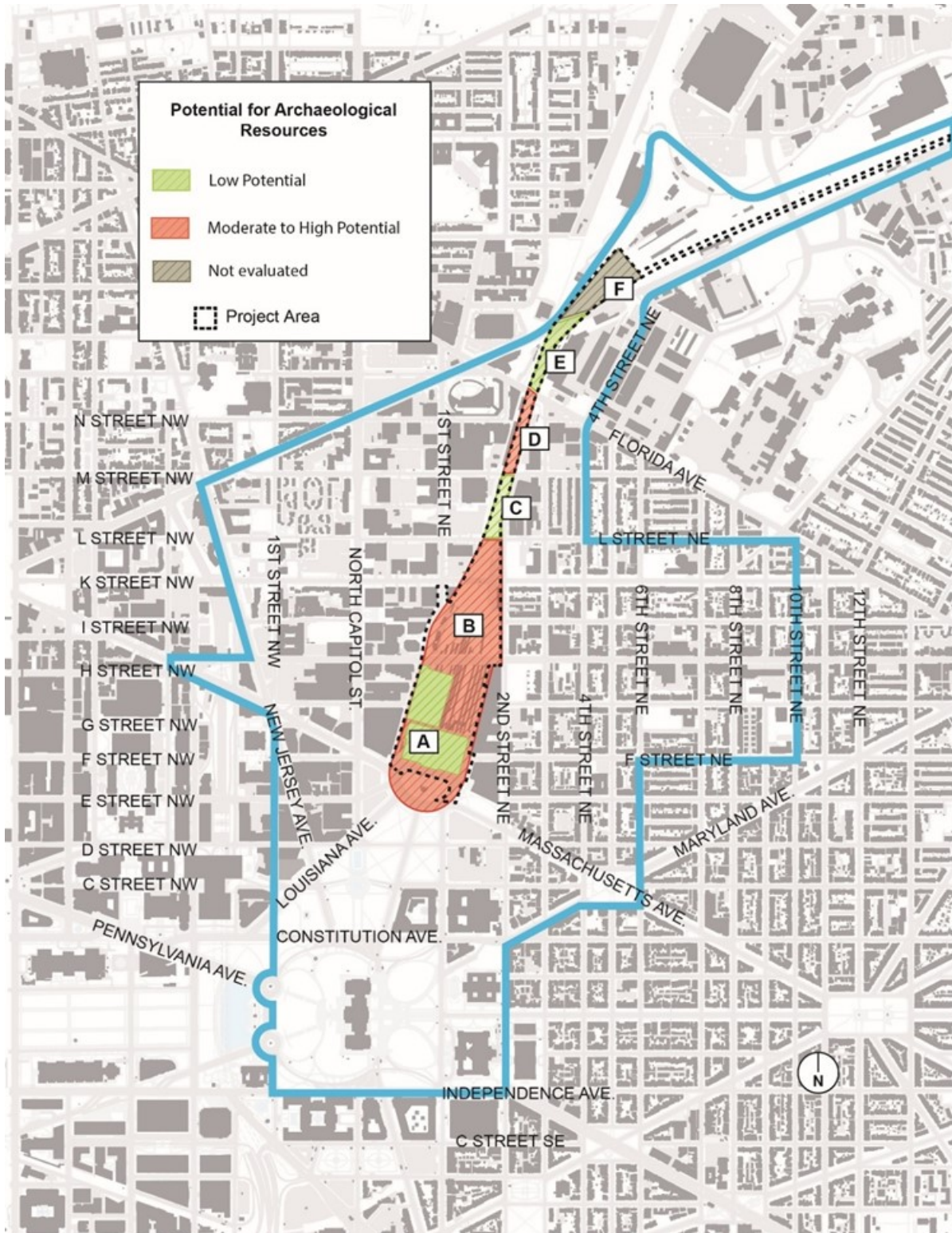
13 Parks and Recreation Areas

13.1 Introduction

This section describes the existing parks and recreation areas near Washington Union Station (WUS). The National Environmental Policy Act (NEPA) requires consideration of the potential effects of Federal actions on parks and recreation areas. This section describes the regulatory setting and the affected environment of parks and recreation areas. This evaluation of parks and recreation areas includes public parks, private parks open to the public, offstreet bicycle trails, walking paths, and areas used for general recreation. This section does not contain a discussion of onstreet bicycle and pedestrian routes; onstreet routes are identified and described in **Section 5**, *Transportation*.

13.2 Regulatory Context and Guidance

Since Washington, DC is a Federal District, only Federal and local regulations, plans, and policies that apply to parks and recreation areas in the District; there are no state regulations.

Federal policies, regulations, and guidance that may pertain to parks and recreation areas include:

- National Park Service (NPS) Organic Act (16 United States Code [USC] Sections 1-4). The NPS was created under the NPS Organic Act (16 USC Sections 1-4) to administer the nation's national parks, which are areas of national significance afforded special recognition and protection. The NPS is an agency within the Department of the Interior and is a cooperating agency for this EIS. The NPS has jurisdiction over some of the parks and recreation areas near the proposed Project.

- NPS *Director's Order 12*[180] (DO-12). This is a resource that sets the policies and procedures by which the NPS complies with NEPA.

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[180] United States Department of the Interior, National Park Service. October 5, 2011. *Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-Making.*

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- NPS *NEPA Handbook*.[181] This is another resource that sets the policies and procedures by which the NPS complies with NEPA.

- NPS National Mall Plan (2010).[182] The plan was developed as a long-term plan to restore the National Mall and serve as an overarching organizational document for subsequent project implementation. The *National Mall Plan* seeks to address cultural resource protection, natural resource protection, demonstrations and special events, access and circulation, visitor information, education, and enjoyment, visitor amenities, health, public safety, and security, and park operations.

District policies, regulations, and guidance that may pertain to parks and recreation areas include:

- NCPC and DC Parks and Recreation (DCPR), *Comprehensive Plan for the National Capital* (2011)[183]. The plan contains both Federal and District specific elements. The Federal elements include a section on parks and open space, and the District specific elements include additional guidance on parks and recreation areas at a higher resolution than the Federal elements.

- NCPC *Capital Space Plan* (2010), and subsequent progress report (2012). The plan was developed in coordination with the NPS, the DCPR, and the DC Office of Planning (DCOP). The plan coordinates existing management plans to create a unified park system development plan for the District.

- Architect of the Capitol (AOC) *Capitol Complex Master Plan* (2011).[184] Provides the framework for the development and management of the grounds, monuments, and structures under the jurisdiction of the AOC.

- DC Office of Planning's *Downtown East ReUrbanization Strategy* (2015). Establishes the framework for coordination between the various stakeholders in eastern downtown Washington for creating development recommendations and investment strategies.

- *Mount Vernon Square District Project Study* (2010). Area study designed to develop solutions to transportation, public space, and real estate challenges in the areas surrounding Mount Vernon Square.

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[181] United States Department of the Interior, National Park Service. 2015. *NEPA Handbook.* https://www.nps.gov/subjects/nepa/upload/NPS_NEPAHandbook_Final_508.pdf. Accessed June 7, 2017.

[182] National Park Service (NPS). 2010. *National Mall Plan.* https://www.nps.gov/nationalmallplan/FEISdocs.html. Accessed June 01, 2017.

[183] Title 10, Part A8, published pursuant to Section 9a of the District of Columbia Comprehensive Plan Act of 1994, effective April 10, 1984 (D.C. Law 5-76; D.C. Official Code Section 1-301.66)

[184] United States Architect of the Capitol (AOC). 2011. *Capitol Complex Master Plan*. http://www.nxtbook.com/nxtbooks/aoc/masterplan/index.php?startid=82#/1. Accessed July 7, 2017.

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- ▪ *Center City Action Agenda* (2008). Economic and placemaking initiative for Central Washington intended to encourage investment in places, transportation, corridors, and the economy.

13.3 Study Area

The Project Area is the direct footprint of the proposed Project. The Study Area for parks and recreation areas includes the Project Area and the areas immediately adjacent to WUS and to the tracks in the Project Area within one to two city blocks depth (**Figure 13-1**). Impacts to parks and recreation areas on a regional scale are not anticipated and were therefore not analyzed.

13.4 Methodology

Parks and recreation areas in the Study Area were identified by coordinating with relevant local, national, and regional recreation area authorities. Information was collected on local and regional trail networks and areas used for non-site-specific activities like hiking and cycling; and individual parks or recreation areas within the Study Area, including:

- ▪ Columbus Circle;
- ▪ Lower and Upper Senate Parks;
- ▪ The US Capitol Grounds;
- ▪ The Metropolitan Branch Trail;
- ▪ Reasonably foreseeable planned parks and recreation areas; and,
- ▪ Other parks and recreation areas open to the public.

Local and regional parks and open space plans were also reviewed, including:

- ▪ NPS National Mall Plan;
- ▪ NCPC Capital Space Plan and 2012 Progress Report;
- ▪ DC Office of Planning Center City Action Agenda;
- ▪ DC Office of Planning Downtown East Re Urbanization Strategy; and
- ▪ DC Office of Planning Mount Vernon Square District Project.

Figure 13-1. Parks and Recreation Areas, Study Area, and Surrounding Neighborhoods

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13.5 Affected Environment

This section identifies and describes the existing parks and recreation areas within the Study Area. Data sources used to describe the existing conditions for parks and recreation areas include the plans and policies identified under Section 13.2 *Regulatory Context and Guidance*, GIS based resources, and aerial photography. FRA is coordinating with the NPS, DCDPR, DC Public Schools (DCPS), and the AOC to verify the current status and condition of parks and recreation areas of their respective jurisdictions within the Study Area (**Figure 13-1**).

Table 13-1 identifies and describes the parks and recreation areas within the Study Area, the agency with jurisdiction over the property, the estimated property size, and the approximate distance from the Project Area.

Table 13-1. Parks and Recreation Areas in the Study Area

Name	Description	Jurisdiction	Est. Size (Square feet)	Approx. Distance (Feet)
Columbus Circle	Plaza and landscaped areas immediately across from the primary entrance to WUS; serves as the gateway between Union Station and the Capitol Complex.	NPS	1,400	25
Metropolitan Branch Trail	Off-street multiuse trail.	DDOT, DCDGS	Linear	25
"NOMA Green" (planned)	Planned public park with plaza and landscaped areas, walking paths, a dog park, a playground, and seating areas. Construction anticipated to begin in 2018.	Private	1,800	80
Playground at Capitol Hill Montessori (Elementary School)	Children's playground associated with the Capitol Hill Montessori Elementary School.	DCPS	300	600
Plaza at 750 First Street NE	Pedestrian plaza open to public use in a commercial/office setting.	Private	750	120
Plaza at 899 North Capitol Street NE	Pedestrian plaza open to public use in a commercial/office setting.	Private	250	500
Plaza at Storey Park Development	Planned plaza and open/seating space open to public use and associated with a planned commercial, residential, and retail development.	Private	400	800
Upper and Lower Senate Parks	Part of the Capitol Complex, and within the National Mall; lawns, plazas, and landscaped areas on the north side of the Capitol Complex (known as the senate side); fountains and small memorials present throughout.	Federal Land; AOC	5,700	420

There are eight parks and recreation areas resources within the Study Area, including neighborhood and community parks, school recreational facilities, memorials, plazas, and other open areas. The public is not allowed to use the DCPS school recreational facilities in the Study Area after school hours without specific permission. All the parks in the Study Area are easily accessible by pedestrians and visitors in vehicles. The ease of access to these parks generally attracts users from the surrounding area.

Columbus Circle is the closest parks and recreation areas resource to the Project Area. The resource consists of a plaza and landscaped areas and is visually prominent from the WUS entrance. Columbus Circle is managed by the NPS and is described by the AOC as part of the gateway experience for visitors visiting the Capitol Complex from the north as they exit the station.

The Upper and Lower Senate Parks are part of the Capitol Complex, which anchors the eastern end of the National Mall. The Upper and Lower Senate Parks are the most significant parks and recreation areas resource within the Study Area. These parks are nationally important, serve as major sites of tourism for walking and cycling, and are used for major events, gatherings, and demonstrations. The grounds contain a range of lawns, plazas, and landscaped areas, with fountains, sculptures, and memorials throughout.

The Metropolitan Branch Trail is a paved linear multi-use path that runs along the railroad ROW on the northern portion of the Project Area. The trail is open to public use and serves pedestrians and cyclists who use the trail for commuting and recreational purposes. Other than the paved pathway, there are no special amenities or parking accommodations.

The "NoMa Green" is a planned public park with a plaza and landscaped areas, walking paths, a dog park, a playground, and seating areas. The NoMa Parks Foundation acquired the property, worked with the surrounding community and contractors to prepare the park design, and has planned construction to begin in 2018. The final name of the park has not yet been determined.

The playground at Capitol Hill Montessori Elementary School is a children's playground that is operated and maintained by the school. The playground is not open to public use without special permission from the DCPS. The playground contains seating benches and a small play structure.

The plaza at 750 First Street NE and the plaza at 899 North Capitol Street NE are pedestrian plazas associated with commercial and office building complexes. The plazas contain hardscaped areas with seating and vegetative landscaping and are accessible to the public. The plaza at 750 First Street NE is accessible from the street frontage along G Place NE, and the plaza at 899 North Capitol Street NE is accessible from the street frontage along I Street NE and North Capitol Street NE.

The plaza at the Storey Park development is a planned pedestrian plaza open to the public. The plaza is associated with a multi-use development that includes residential, restaurant, retail, and hotel uses. The plaza is anticipated to include outdoor seating areas associated

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with ground-floor restaurants in the development, as well as hardscaping and vegetative landscaping.

14 Social and Economic Conditions

14.1 Overview

This section describes the Affected Environment related to demographics, jobs, current economic conditions, taxes, revenue, local government services and commercial activity at Washington Union Station (WUS).

14.2 Regulatory Context and Guidance

Federal policies, regulations, and guidance that may pertain to social and economic resources include:

- U.S. Department of the Interior, National Park Service (NPS), *NPS NEPA Handbook;*[185]

District policies, regulations, and guidance that may pertain to social and economic resources include:

- DC Code 8-109.01 – 8.109.12, Subchapter V: Environmental Impact Statements;
- DC Workforce Investment Council, *Workforce Innovation and Opportunity Act (WIOA) 2016-2020 Unified State Plan*;[186] and
- DC Office of the Deputy Mayor for Planning and Economic Development, *DC's Economic Strategy: Strategy Report*.[187]

14.3 Study Area

The Local Study Area includes the WUS Project Area, which spans from the historic entrance to K Street NE above the tracks, as well as the 21, 2010 U.S. Census block groups within one-half mile of the Project Area. No social or economic impacts are anticipated north of K Street, where the Project involves only modifications to the tracks. **Figure 14-1** identifies the

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[185] U.S Department of the Interior, National Park Service. 2015. *National Park Service NEPA Handbook.* https://www.nps.gov/subjects/nepa/upload/NPS_NEPAHandbook_Final_508.pdf. Accessed June 6, 2017.

[186] D.C. Workforce Investment Council. 2016. *Workforce Innovation & Opportunity Act (WIOA) 2016-2020 Unified State Plan.* https://dcworks.dc.gov/sites/default/files/dc/sites/dcworks/publication/attachments/WIOA_DC_Unified_State_Plan_Final.pdf. Accessed June 6, 2017.

[187] D.C. Office of the Deputy Mayor for Planning & Economic Development. 2017. *DC's Economic Strategy, Strategy Report.* http://dceconomicstrategy.com/wp-content/uploads/2017/03/Econ-Strategy_Full-Report-for-Distribution_03.07.17-1-1.pdf. Accessed June 6, 2017.

geographic boundary of the Local Study Area. The Regional Study Area is comprised of the entirety of the District of Columbia and is referred herein as "the District."

14.4 Methodology

A socioeconomic profile and a baseline for existing social, demographic, and economic conditions in each of the Study Areas was established. Existing social, demographic, economic, and commuting characteristics of the Study Areas were identified using data from the 2010 Census, the 2012-2016 American Community Survey (ACS) 5-year Estimates, and the DC Office of Tax and Revenue. Bureau of Labor Statistics data were also used. The analysis was also based on existing Federal and local plans, including:

- DC Office of Planning, *The Comprehensive Plan for the National Capital: District Elements – Transportation Element* (Vol. 1, Ch. 4);[188] and

- DC Office of Planning, *The Comprehensive Plan for the National Capital: District Elements – Central Washington Area Element* (Vol. 2, Ch. 16).[189]

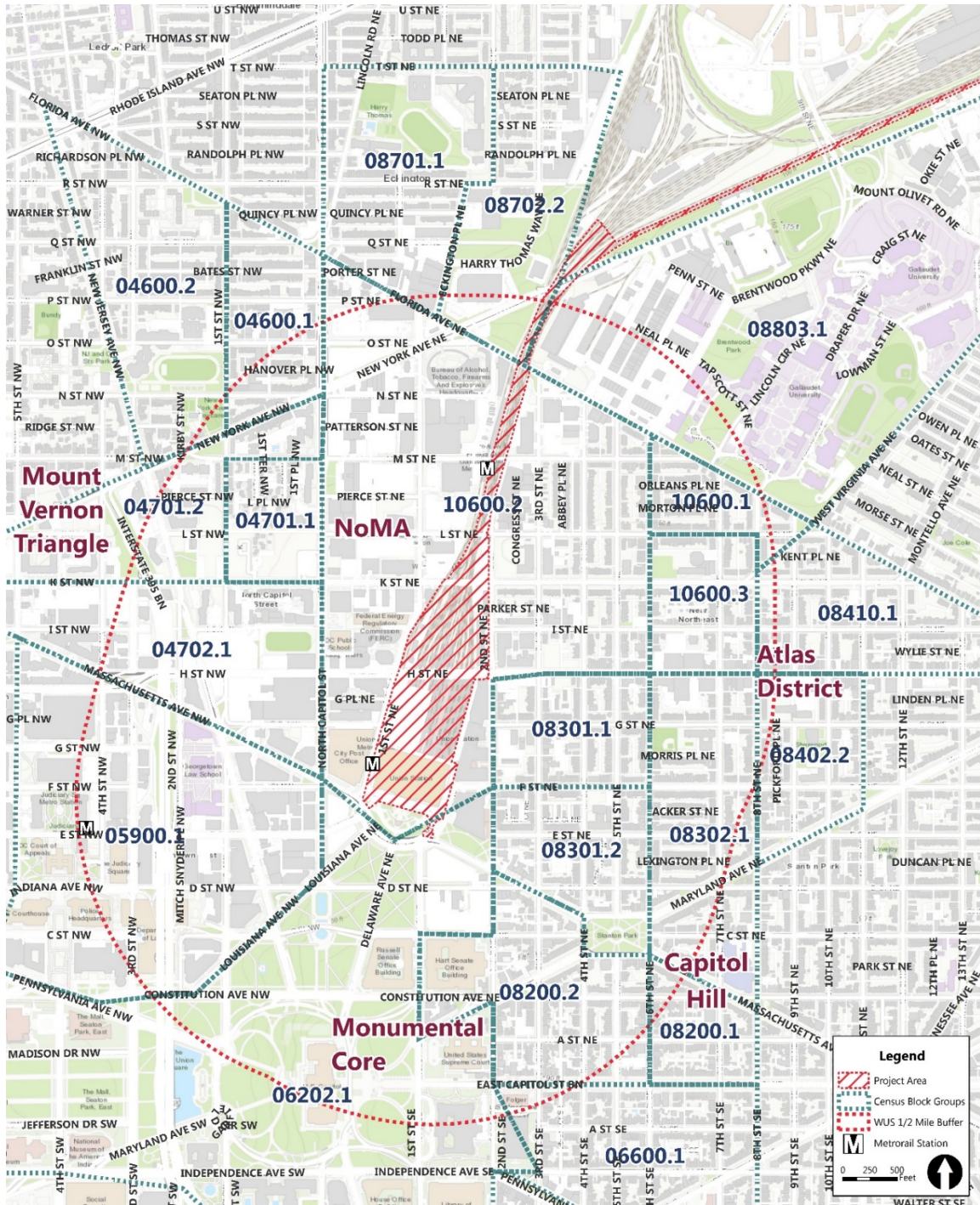These socioeconomic profiles include the following indicators:

- Demographics (age, gender, race, median income);

- Minority-owned business (to the extent that such data is available through District resources)[190];

- Jobs (type and location);

- Tax and other public revenues;

- Current economic conditions of the neighborhood(s);

- Commercial activity; and

- Local government services.

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[188] DC Office of Planning. 2006. *The Comprehensive Plan for the National Capital: District Elements.* Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20I_Chapter%204_April%208%202011.pdf. Accessed on June 7, 2017.

[189] DC Office of Planning. 2006. *The Comprehensive Plan for the National Capital: District Elements.* Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20II_Chapter%2016_April%208%202011.pdf. Accessed on June 7, 2017.

[190] Note that data regarding minority owned businesses was not obtainable and therefore not included in this section.

Figure 14-1. Washington Union Station Local Study Area and Block Groups

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14.5 Affected Environment

This section presents an overview of the demographic characteristics of the Local Study Area and the District; economic conditions, employment, economic planning policies, taxes, public revenue and local government services in the District; employment and neighborhoods in the Local Study Area; and, commercial and retail activity within WUS. WUS plays a critical role in the mobility in the District, and therefore is vital to the economic well-being of not just WUS but the entire District.

Data sources for social and economic demographics include the 2010 US Census and 2011-2015 ACS 5-year Estimates. Information was also gathered from the following sources:

- *The Comprehensive Plan for the National Capital: District Elements*, adopted in 2006 and amended in 2011, prepared by the DC Office of Planning;

- *DC's Economic Strategy, Strategy Report*, prepared by the DC Office of the Deputy Mayor for Planning and Economic Development in March 2017;

- *Fiscal Year 2016 Approved Budget by Agency and Fund*, prepared by the DC Office of the Chief Financial Officer;

- *DC Tax Facts*, 2016, prepared by the DC Office of the Chief Financial Officer;

- Washington Union Station website,[191] and

- Union Station Redevelopment Corporation (USRC) website.[192]

14.5.1 Demographics

14.5.1.1   Age

According to the 2011-2015 ACS 5-Year Estimates, the total population of the Local Study Area in 2015 was 34,895, an increase of 3,203, or 10.1-percent, from 2010 (**Table 14-1**). The Local Study Area population amounted to approximately 5.4-percent of the total population in the District in 2015, up slightly from approximately 5.3-percent in 2010. Local Study Area age groups with the largest population increases from 2010 were 25 to 34 years old (+37.3-percent), 55 to 64 years old (+14.7-percent), and under five years old (+13.8-percent). Age groups with the greatest declines in population from 2010 were 45 to 54 years old (-12.7-percent), 20 to 24 years old (-10.9-percent), and 15 to 19 years old (-10.6-percent).

The total population of the District increased as well between 2010 and 2015, though at a slightly slower rate of 7.6-percent (from 601,723 to 647,484) compared with the Local Study Area. Similar to the Local Study Area, age groups in the District with the largest population increases during that time included under five years old (+24.0-percent) and 25 to 34 years

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[191]   Washington Union Station Website. http://www.unionstationdc.com/

[192]   Union Station Redevelopment Corporation Website. http://www.usrcdc.com/

old (+16.6-percent), while only two age groups declined in population, including 15 to 19 and 20 to 24 years old.

Table 14-1. Study Area Population by Age

Age Group	Local Study Area			District of Columbia		
	2010	2015	Percent Change	2010	2015	Percent Change
Under 5 Years	1,605	1,826	13.8%	32,613	40,433	24.0%
5-14 Years	1,939	1,906	-1.7%	51,188	55,231	7.9%
15-19 Years	1,281	1,145	-10.6%	39,919	38,439	-3.7%
20-24 Years	4,048	3,607	-10.9%	64,110	59,429	-7.3%
25-34 Years	8,757	12,020	37.3%	124,745	145,477	16.6%
35-44 Years	4,303	4,614	7.2%	80,659	89,941	11.5%
45-54 Years	3,762	3,284	-12.7%	75,703	76,763	1.4%
55-64 Years	3,078	3,529	14.7%	63,977	68,472	7.0%
65-74 Years	1,648	1,832	8.8%	36,969	41,097	11.2%
75-84 Years	871	804	-7.7%	21,525	21,690	0.8%
85 and Older	364	328	-9.9%	10,315	10,512	1.9%
Total	31,692	34,895	10.1%	601,723	647,484	7.6%

Source: 2010 U.S. Census and 2011-2015 ACS five-year estimates[193]

14.5.1.2 Gender

Gender of the Local Study Area population has remained consistent from 2010 to 2015. In 2015, the male population was 17,083, or approximately 49-percent and the female population of the Local Study Area was 17,812, or approximately 51-percent. Both male and female populations increased from their 2010 population totals, as noted in **Table 14-2**. Compared with the Local Study Area, the District has a lower male population (approximately 47-percent of the total population) and a higher female population (approximately 53-percent). The gender breakdown remained consistent from 2010 to 2015 in the District.

Table 14-2. Study Area Population by Gender

Gender	2010	2015
Male	15,451	17,083
Female	16,241	17,812
Total	31,692	34,895

Source: 2010 U.S. Census and 2011-2015 ACS five-year estimates.

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[193] 2010 U.S. Census and ACS five-year estimates. Accessed from https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml, accessed on July 6, 2017 and April 17, 2018

14.5.1.3 Race

As noted in **Table 14-3**, about half of the Local Study Area was White in 2015 (17,548). The White population also increased by 22.3-percent from 2010. Approximately 35-percent of the 2015 Local Study Area population was Black or African American (12,144), however, this decreased 8.3-percent from the 2010 total (13,249). Hispanic and Latino populations increased by 46.2 percent in 2015 and consisted of 6.75-percent of the total Study Area population. Although Native American and Alaska Native populations increased by 130.1-percent in 2015, this population was only 0.6-percent of the total Local Study Area population. Native Hawaiian and other Pacific Islander populations decreased by 22.7-percent from 2010 to 2015, however this population only represents less than 0.01-percent of the Study Area population. While the population identified as two or more races increased by 15.9-percent in 2015 (795), the "other"[194] race population remained the same from 2010 (58). Section 17, *Environmental Justice*, also considers race and ethnicity within the Local Study Area.

Compared with the Local Study Area, in 2015, the District contained a lower percentage of White residents (approximately 35.6-percent) and a higher percentage of Black or African American and Hispanic or Latino residents (approximately 48.0-percent and 10.2-percent respectively). While the Native American and Alaska Native population increased from 2010 to 2015 in the Local Study Area, this population decreased by 4.3-percent in the District. The Hispanic or Latino populations in both the Local Study Area and the District increased significantly between 2010 and 2015.

Table 14-3. Race or Ethnicity of Study Area Population

Race or Ethnicity	2010	2015	Percent Change
White	14,346	17,548	22.3%
Black or African American	13,249	12,144	-8.3%
Hispanic or Latino	1,611	2,356	46.2%
Asian	1,636	1,785	9.1%
Native American and Alaskan Native	83	191	130.1%
Native Hawaiian and other Pacific Islander	22	17	-22.7%
Other race	58	58	0.0%
Two or more races	687	796	15.9%
Total	31,692	34,895	10.1%

Source: 2010 U.S. Census and 2011-2015 ACS five-year estimates.

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[194] The Census Bureau defines "other" as ethnic origin or race from American Samoa, the Commonwealth of the Northern Mariana Islands, and Guam (U.S. Island Areas).

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14.5.1.4   Median Household Income

The weighted average of the median household incomes for the 21 block groups within the Local Study Area was $88,798 in 2015, up from $65,915 in 2010.[195] This is $17,950 higher than the 2015 median household income for the District overall ($70,848). The median household income in the District was $62,009 in 2010, $3,906 less than the Local Study Area in 2010.

14.5.2 Washington, DC's Current Economic Conditions

The Federal government comprises a large share of the economy of the District (approximately 30-percent of Gross Domestic Product [GDP]) and is the largest employer in the District. Other significant industries include tourism, education, and professional services. According to the 2017 *DC's Economic Strategy* report, the District has experienced substantial economic growth in the past five years with an increase in GDP, jobs, tax revenue and population, and a decrease in unemployment.[196] Specifically, since 2012 Washington DC's economy has undergone significant growth with its real GDP increasing 11.6-percent, and the District's median household income of $75,628 is second-highest among states. The District's unemployment stands at 6.1-percent, down from 8.7-percent in 2012. Tourism topped at a record 21.3 million visitors in 2015 which included more than 2 million overseas visitors. Visitor spending in 2015 totaled $7.1 billion.[197] In addition, the District continues to operate as a center for meetings, conventions, and exhibitions.

14.5.3 Employment

According to the 2017 *DC's Economic Strategy* report there were an estimated 783,200 jobs in the District as of October 2016. Within the Local Study Area, there were a total of 120,032 jobs in 2015, up approximately 4.0-percent from 115,421 jobs in 2010.[198] As shown in **Table 14-4**, the leading industries of employment within the Study Area included public administration (51.1-percent); educational services (8.8-percent); and professional, scientific, and technical services (6.7-percent).

In addition, *The Comprehensive Plan for the District of Columbia* (2011) provides jobs data within the various planning areas identified in the Plan. The following information was obtained from the Plan.[199] Several of these planning areas fall within the Local Study Area

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[195] 2011-2015 American Community Survey, 5-Year Estimates, 2006-2010 American Community Survey, 5-Year Estimates. Accessed from https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml. Accessed on April 17, 2018.

[196] Washington DC. 2017. *DC's Economic Strategy* report, 2017. Accessed from http://dceconomicstrategy.com/wp-content/uploads/2017/03/Econ-Strategy_Full-Report-for-Distribution_03.07.17-1-1.pdf. Accessed on December 6, 2017.

[197] Washington DC. 2017. *DC's Economic Strategy* report, 2017. Accessed from http://dceconomicstrategy.com/wp-content/uploads/2017/03/Econ-Strategy_Full-Report-for-Distribution_03.07.17-1-1.pdf. Accessed on December 6, 2017.

[198] U.S. Census Bureau, OnTheMap Application and LEHD Origin-Destination Employment Statistics (Beginning of Quarter Employment, 2nd Quarter of 2002-2015). Accessed from https://onthemap.ces.census.gov/. Accessed on April 19, 2018.

[199] District of Columbia Office of Planning. 2011. The Comprehensive Plan for the National Capital: District Elements. Accessed from https://www.ncpc.gov/plans/compplan/. Accessed on May 2, 2018.

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boundaries, which include portions of Central Washington and Capitol Hill, and small portions of Mid-City, Upper Northeast, and Near Northwest. Within the Central Washington Planning Area, there were approximately 423,000 jobs in 2005, representing approximately 57-percent of the District's job base. These jobs were mostly in the public, professional, and non-profit sectors. Central Washington residents represented 47-percent of its job base.

The Capitol Hill Planning Area is in the southern and eastern portion of the Local Study Area. There were approximately 17,900 jobs in Capitol Hill in 2005. Many of these jobs were in local businesses, public schools, and the public sector. Capitol Hill is surrounded by large employment centers, including the U.S. Capitol Complex and the Southeast Federal Center. Approximately 37-percent of the jobs within Capitol Hill were held by District residents.

A small portion of the Mid-City Planning Area is within the Local Study Area at its southeastern border. In 2005, there were 28,300 jobs in Mid-City. Significant employers in Mid-City include Howard University and Howard Hospital, District government, and retail businesses and services. Approximately 44-percent of the jobs in Mid-City were held by District residents.

The portion of Near Northwest Planning Area that falls within the Local Study Area is located towards the far eastern border of the Planning Area. Approximately 33-percent of the residents worked in the District. In 2005, 89,400 jobs were located in Near Northwest or 12-percent of the District's employment base. Many of these jobs were at universities and hospitals affiliated with the universities.

The portion of the Upper Northeast Planning Area that is situated within the Local Study Area includes the area closest to its southern border where Gallaudet University resides. There were 39,000 jobs present in Upper Northeast in 2005 and approximately 70-percent of its residents worked in either Central Washington or elsewhere in the District.

Many of the jobs in the District are held by commuters who live outside of Washington DC, with the main sources of daily commuters originating from Prince George's County, Maryland (140,000), Montgomery County, Maryland (110,000), Fairfax County (95,000), and Arlington County (50,000). Almost 25-percent of District residents commute outside of the District for work.[200]

As noted below in **Table 14-5**, approximately 35.5-percent of workers within the Local Study Area used public transportation to travel to work. The majority of these public transportation commuters traveled by subway (77.1-percent; 27.4-percent overall). Slightly over one-fifth (20.9-percent) of commuters walked to work and approximately 6.5-percent commuted by bicycle. Of the workers who traveled by car, truck, or van (30.6-percent), approximately 85.5-percent (26.2-percent overall) drove alone and 14.5-percent carpooled (4.4-percent overall). Approximately 5.1-percent of workers worked from home.

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[200]   *DC's Economic Strategy* report, 2017 pg. 17. Accessed from http://dceconomicstrategy.com/wp-content/uploads/2017/03/Econ-Strategy_Full-Report-for-Distribution_03.07.17-1-1.pdf. Accessed on December 6, 2017.
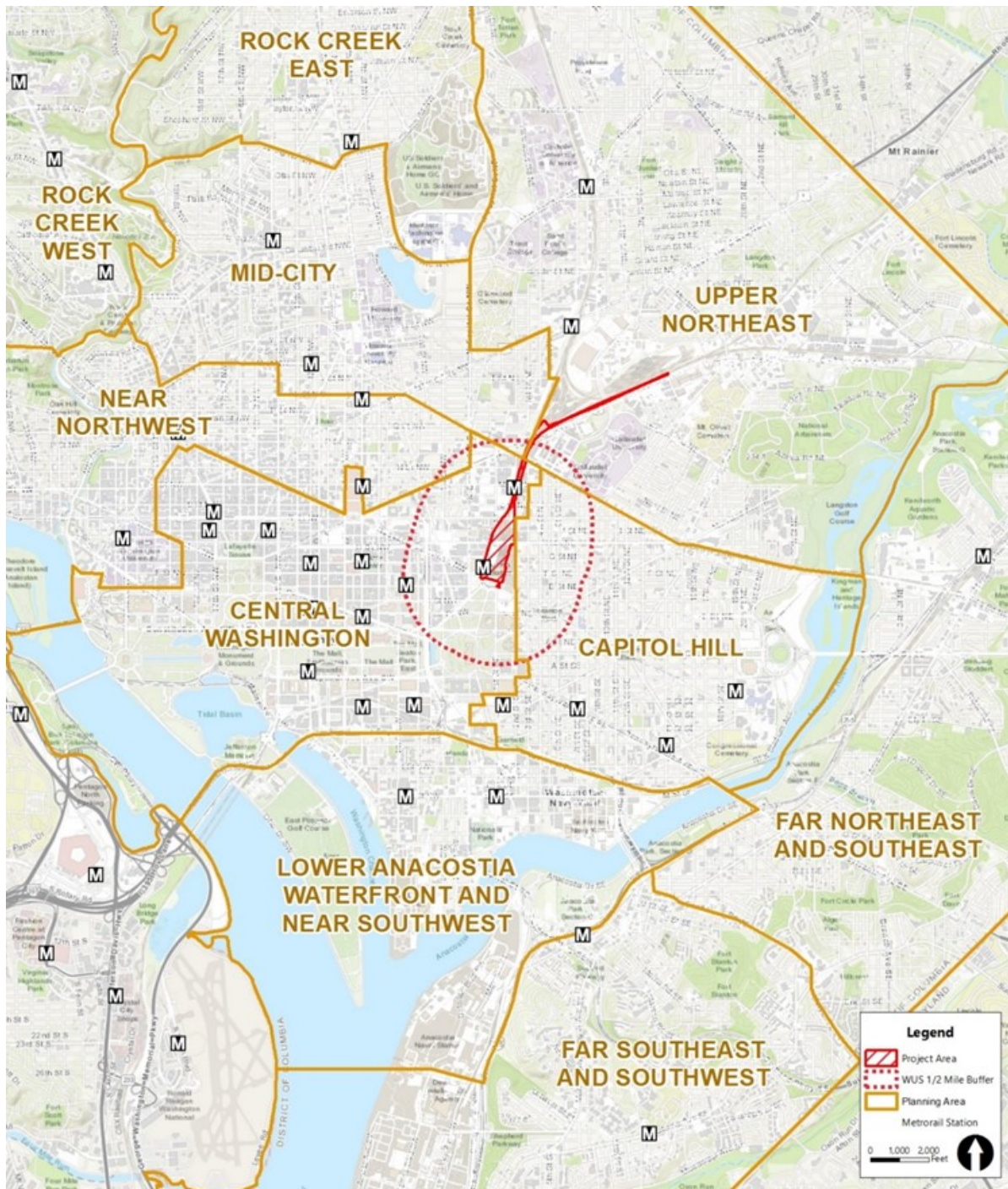
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Table 14-4. Jobs by North American Industry Classification System (NAICS) Industry Sector in the Local Study Area

Industry Sector	2010		2015	
	Number of Jobs	Share of Total	Number of Jobs	Share of Total
Agriculture, Forestry, Fishing and Hunting	0	0.0%	0	0.0%
Mining, Quarrying, and Oil and Gas Extraction	0	0.0%	0	0.0%
Utilities	197	0.2%	231	0.2%
Construction	787	0.7%	1,551	1.3%
Manufacturing	2,162	1.9%	2,133	1.8%
Wholesale Trade	988	0.9%	556	0.5%
Retail Trade	1,153	1.0%	2,085	1.7%
Transportation and Warehousing	1,067	0.9%	711	0.6%
Information	4,152	3.6%	3,900	3.2%
Finance and Insurance	1,793	1.6%	1,690	1.4%
Real Estate and Rental and Leasing	411	0.4%	414	0.3%
Professional, Scientific, and Technical Services	7,688	6.7%	8,079	6.7%
Management of Companies and Enterprises	84	0.1%	60	0.0%
Administration & Support, Waste Management and Remediation	6,391	5.5%	7,132	5.9%
Educational Services	10,776	9.3%	10,617	8.8%
Health Care and Social Assistance	4,489	3.9%	5,345	4.5%
Arts, Entertainment, and Recreation	1,650	1.4%	2,260	1.9%
Accommodation and Food Services	4,649	4.0%	5,279	4.4%
Other Services (excluding Public Administration)	6,820	5.9%	6,614	5.5%
Public Administration	60,164	52.1%	61,375	51.1%
Total	115,421		120,032	

Source: U.S. Census Bureau, LEHD Origin Destination Employment Statistics[201]

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[201] U.S. Census Bureau, LEHD Origin Destination Employment Statistics. Accessed from https://onthemap.ces.census.gov/. Accessed on April 19, 2018

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Figure 14-2. The Comprehensive Plan for the District of Columbia Planning Areas

Source: DC Office of Planning, 2011

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Table 14-5. Means of Transportation to Work Within the Study Area

Transportation Mode	Number of Commuters	Percent
Car, truck, or van	6,506	30.6%
Drove alone	5,564	26.2%
Carpooled	942	4.4%
Public transportation	7,552	35.5%
Bus	1,544	7.3%
Street car or trolley	76	0.4%
Subway or elevated	5,824	27.4%
Railroad	108	0.5%
Taxicab	170	0.8%
Motorcycle	44	0.2%
Bicycle	1,378	6.5%
Walked	4,445	20.9%
Other means	88	0.4%
Worked at home	1,076	5.1%
Total	21,259	

Source: 2011-2015 American Community Survey, 5-year estimates[202]
Note: Workers are 16 years old or older.

According to the 2015 *Washington Union Station Master Plan* there were more than 37.1 million transit trips taken to or from WUS in 2014. This includes passengers on Amtrak, Metro, commuter rail, and intercity buses.

14.5.4 Economic Planning Policy

Economic planning policy in the District is guided by *DC's Economic Strategy* report developed in March 2017 and *The Comprehensive Plan for the National Capital* which was adopted in 2006 and amended in 2011.

DC's Economic Strategy report provides two specific goals to guide overall economic strategy in the District: raise the private sector GDP by 20-percent and reduce unemployment rates below 10-percent by the end of 2021. To support these goals, the plan outlines an action framework that includes improving the District's business environment, expanding access to capital and funding for local businesses, promoting and preserving the District's unique identity, attracting and retaining workforce talent, fostering social capital, and promoting affordable housing, quality public schools and safe and healthy neighborhoods.

Some general policy initiatives addressed in *The Comprehensive Plan for Central Washington* include promoting mixed-use development, encouraging office space growth, retaining and expanding arts and entertainment, and strengthening the retail core. Central Washington is

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[202] 2011-2015 American Community Survey, 5-year estimates. Accessed from https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml. Accessed on April 17, 2018.

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expected to growth significantly over the next 20 years as it is anticipated that the population will double.[2] Central Washington includes WUS and neighborhoods to the west of WUS in the Local Study Area such as Mount Vernon Square, Downtown East and portions of NoMa. Applicable policy initiatives indicated in *The Comprehensive Plan for the National Capital* for Capitol Hill include directing growth, upgrading commercial districts, and addressing inappropriate commercial uses.[203] This planning area, which includes the Near Northeast, Stanton Park and Capitol Hill neighborhoods located just east of WUS in the Local Study Area, is expected to grow modestly, with medium-density mixed-used development over the next 20 years.[204] *The Comprehensive Plan for the National Capital* for Mid-City includes encouraging infill development and mixed-use districts, directing growth in the form of transit-oriented development, and protecting small businesses and local services that serve Mid-City.[205] *The Comprehensive Plan for the National Capital* for Near Northwest includes enhancing stable commercial areas, improving and revitalizing neighborhood shopping areas, and directing growth to lead to reinvestment.[206] Applicable general policies described in *The Comprehensive Plan for the National Capital* for Upper Northeast include Metro Station development, improving neighborhood shopping areas, encouraging larger-scale retail development, addressing untapped economic development potential, and reconsider regulations of industrial and warehousing uses.[207]

14.5.5 Taxes, Public Revenue, and Local Government Services

The District provides services and collects revenues typical of states and local municipalities. The District's largest revenue sources are real property taxes, individual income taxes, and sales taxes. In 2016, the District collected approximately $7.9 billion in revenue from taxes, fees, and other sources. Real property tax rates vary according to property type; however, all nonexempt real property is taxed at 100-percent of estimated market value. Owner occupied residences receive a homestead deduction and cap on increases. The 2016 tax rate for owner occupied residences was $0.85 per $100.00 of assessed value. Commercial and industrial

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[203] *The Comprehensive Plan for the National Capital: District Elements, Capitol Hill*, pg. 15-13 to 15-14. Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20II_Chapter%2015_April%208%202011.pdf. Accessed on July 11, 2017.

[204] *The Comprehensive Plan for the National Capital: District Elements, Capitol Hill*, pg. 15-8. Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20II_Chapter%2015_April%208%202011.pdf. Accessed on July 11, 2017.

[205] *The Comprehensive Plan for the National Capital: District Elements, Mid-City* pg. 20-12. Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20II_Chapter%2020_April%208%202011.pdf. Accessed on July 11, 2017.

[206] *The Comprehensive Plan for the National Capital: District Elements, Near Northwest*, pg. 21-13 to 21-14. Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20II_Chapter%2021_April%208%202011.pdf. Accessed on July 11, 2017.

[207] *The Comprehensive Plan for the National Capital: District Elements, Upper Northeast*, pg. 24-12 to 24-13. Accessed from https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20II_Chapter%2024_April%208%202011.pdf. Accessed on July 11. 2017.

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properties are subject to a split tax structure with the first $3 million in assessed value taxed at $1.65 per $100.00 of assessed value and additional assessed value taxed at $1.85 per $100.00 of assessed value. By law, the amount of total revenue received annually from real property tax is capped by property type. The 2016 retail sales tax rate was 5.75-percent, although some goods and services are taxed at a higher rate, such as restaurant meals, which are taxed at 10-percent; hotel rentals which are taxed at 14.5-percent, and parking in commercial lots, which is taxed at 18-percent). Sales taxes apply to goods and services, except grocery-type foods, prescription and non-prescription drugs, and professional services, but include construction materials and business purchases of public utility services. Individual income taxes are progressive and vary according to income levels.[208]

Some tax revenue streams are dedicated to specific funds or services, such as revenue from the motor vehicle fuel tax, which is deposited into the District's Highway Trust Fund). However, most revenue is allocated to the District's general fund. Government services include: police, fire, emergency medical services, public education, human services, child and family services, parks and recreation, environmental protection, public health services, and sanitation services. Several of these services are described in *Section 13, Parks and Recreation Areas*; *Section 15, Public Safety and Security*; and *Section 16, Public Health, Elderly, and Persons with Disabilities.* Other governmental services typical of state and local governments are also provided such as employment services, economic development, housing and community development, public works, and emergency planning.[209]

14.5.6 Commercial Activity at WUS

Revenue generated by retail and commercial rents within WUS is used by USRC to manage WUS and to sustain ongoing operations. Existing retail space at the WUS is under a long-term (99-year) lease between USRC and Union Station Investco, LLC (USI), a private entity controlled by Ashkenazy Acquisition Corporation. USRC leases the WUS parking garage to the Union Station Parking Group, LLC. In fiscal year 2016 (FY2016), WUS revenue from retail was $3,200,505 and revenue from the parking garage operations was $8,532,403.[210]

There are approximately 206,000 square feet of retail space in WUS, currently occupied by approximately 100 shops, services, and restaurants. WUS is one of the District's largest retail shopping centers and serves a variety of clientele and needs. As of 2015, 36-percent of the retail space at WUS were food and beverage stores, 27-percent were clothing and

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[208] *DC Tax Facts* 2016. Accessed from https://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/2016%20Revised%20Tax%20Facts.pdf. Accessed on July 13, 2017,

[209] *Fiscal Year 2016 Approved Budget by Agency and Fund.* Accessed from https://cfo.dc.gov/sites/default/files/dc/sites/ocfo/publication/attachments/Gross%20Funds%20FY%202016%20Approved%20Budget.pdf. Accessed on July 13, 2017.

[210] *USRC Annual Report* 2016. Accessed from https://www.usrcdc.com/wp-content/uploads/2017/02/usrc_annual_report_2016_final_spreads.pdf. Accessed on July 18, 2017.

accessories stores, and 10-percent were health and personal care stores. [211] Larger anchor tenants include Walgreens and H&M. Food and beverage stores range from quick-service eateries to upscale dining. The primary consumer groups for WUS retail and services are local residents, local workers, commuters passing through the station, and tourists. Workers from the surrounding office buildings and commercial uses within one-half mile of the station frequent WUS during afternoon breaks for lunch or convenience shopping. Likewise, local residents use WUS for meals and shopping while commuting and as a destination. Several tour buses park at WUS, making WUS, with its historic features and amenities, a significant tourist destination.

Current retail rents in WUS range from approximately $75.00 to $125.00 per square foot. Areas within WUS with higher foot traffic command the higher rents. These rents are higher than those in the Local Study Area and competitive with higher-end rents throughout the District. The neighborhoods surrounding WUS primarily contain convenience-oriented retail such as neighborhood grocery stores, rather than destination retail such as clothing stores. However, some destination stores and restaurants have recently opened along the H Street Corridor and in the NoMa neighborhood.

The WUS parking garage is a multi-level parking facility that provides parking for intercity buses (such as Greyhound, Peter Pan, Megabus, Boltbus, DC2NY, Washington Deluxe, etc.), charter buses, tour buses, private vehicles, and rental vehicles. The WUS parking garage has 2,194 spaces, including specific parking spaces dedicated to local office workers, retail workers, retail customers and other station visitors, buses and rental cars. Use of the parking garage is described in detail in *Section 5, Transportation*.

14.5.7 Surrounding Neighborhoods

The population of the half-mile Study Area was 34,895 in 2015.[212] According to the 2015 WUS Master Development Plan, the Local Study Area was expected to grow by approximately 3,400 residents and future planned developments could support an additional 14,000 residents. New office development in the Local Study Area is also taking place and in 2015 was expected to generate approximately 5,000 new workers to the area with future planned development that could support an additional 29,400 workers.

The Local Study Area generally includes the following neighborhoods: NoMa, Near Northeast, H Street Corridor, Stanton Park, Capitol Hill, Downtown East, North Capital Street and Mount Vernon Square. The NoMa neighborhood is largely commercial but rapidly being redeveloped with residential and mixed uses. Near Northeast, Stanton Park, and Capitol Hill are residential neighborhoods to the east of WUS typified by rowhouses. H Street Corridor is the commercial spine of the neighborhoods located to the east of WUS. Retail uses along the H Street Corridor are a mix of convenience-oriented stores and services and destination

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[211]   Beyer Blinder Belle/Grimshaw. 2015. *Washington Union Station Master Development Plan*.

[212]   2011-2015 American Community Survey 5-Year Estimates 2011-2015. Accessed from https://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml. Accessed on July 6, 2017.

entertainment. Downtown East is primarily offices and institutional uses, while other neighborhoods on the west side of WUS, such as Mount Vernon Square and North Capital Street contain high density residential uses which are slated for additional development.

WUS is accessible to all these neighborhoods and serves as a transportation and retail hub for these areas. However, due to the locations of other Metro stations and proximity of residential areas, the residents of Near Northeast, Stanton Park, and Capitol Hill neighborhoods are more likely to use WUS for transportation and retail uses.

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15 Public Safety and Security

15.1 Overview

This section describes the affected environment as it relates to the issues of public safety and security. The Affected Environment includes conditions at Washington Union Station (WUS) itself, as well as in the Local and Regional Study Areas.

15.2 Regulatory Context and Guidance

Safety and security issues for rail stations and travel are overseen by the Federal Railroad Administration (FRA), the Transportation Security Administration (TSA), the Department of Homeland Security (DHS), and Amtrak (including Amtrak Police).

At the local level, safety and security issues are enforced through local code requirements. The DC Fire and Emergency Medical Services Department, Metropolitan Police Department, and Homeland Security and Emergency Management Agency are the local agencies responsible for safety and security issues. The following are safety and security regulations and guidance relevant to the Project.

Federal policies, regulations, and guidance that may pertain safety and security include:

- FRA Safety Standards (49 Code of Federal Regulations [CFR] 200 – 299);
- FRA High-Speed Passenger Rail Safety Strategy;[213]
- Rail Safety Improvement Act of 2008 (Public Law 110-432);
- US Code on Railroad Safety (49 United States Code [USC] 20101 et seq);
- Emergency Planning and Community Right-to-Know Act (42 CFR 116);
- Architectural Barriers Act of 1968 (42 USC);
- U.S. Department of Transportation Climate Adaptation Plan: Ensuring Transportation Infrastructure and System Resilience;[214]

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[213] U.S. Department of Transportation, Federal Railroad Administration. 2009. *High-Speed Passenger Rail Safety Strategy.* Accessed from https://www.fra.dot.gov/eLib/Details/L03624. Accessed June 7, 2017.

[214] U.S. Department of Transportation. 2014. *Climate Adaptation Plan 2014: Ensuring Transportation Infrastructure and System Resilience.* https://www.transportation.gov/sites/dot.gov/files/docs/2014-%20DOT-Climate-Adaptation-Plan.pdf. Accessed June 7, 2017.

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- Americans with Disabilities Act of 1990 (42 USC 504);

- Department of Homeland Security/Transportation Security Administration Regulations concerning Rail Transportation Security (49 CFR 1580); and

- Transportation Security Administration— Security Directive RAILPAX-04-01 and RAILPAX-04-02.[215]

Other guidance that may pertain safety and security include:

- Amtrak safety and security procedures;[216]

15.3 Study Area

Unless otherwise noted, the Local Study Area includes the Project Area and one-half mile immediately adjacent to the construction footprint (Figure 15-1). It includes WUS grounds, tracks, and platforms, as well as the portions of the First Street Tunnel where track modifications will be made.

The Regional Study Area for safety and security includes service boundaries for fire, law enforcement, and emergency services in the larger District area (**Figure 15-2**). These service boundaries will include specific forces relevant to WUS and the District, including Amtrak Police, Metro Transit Police, U.S. Park Police, and U.S. Capitol Police.
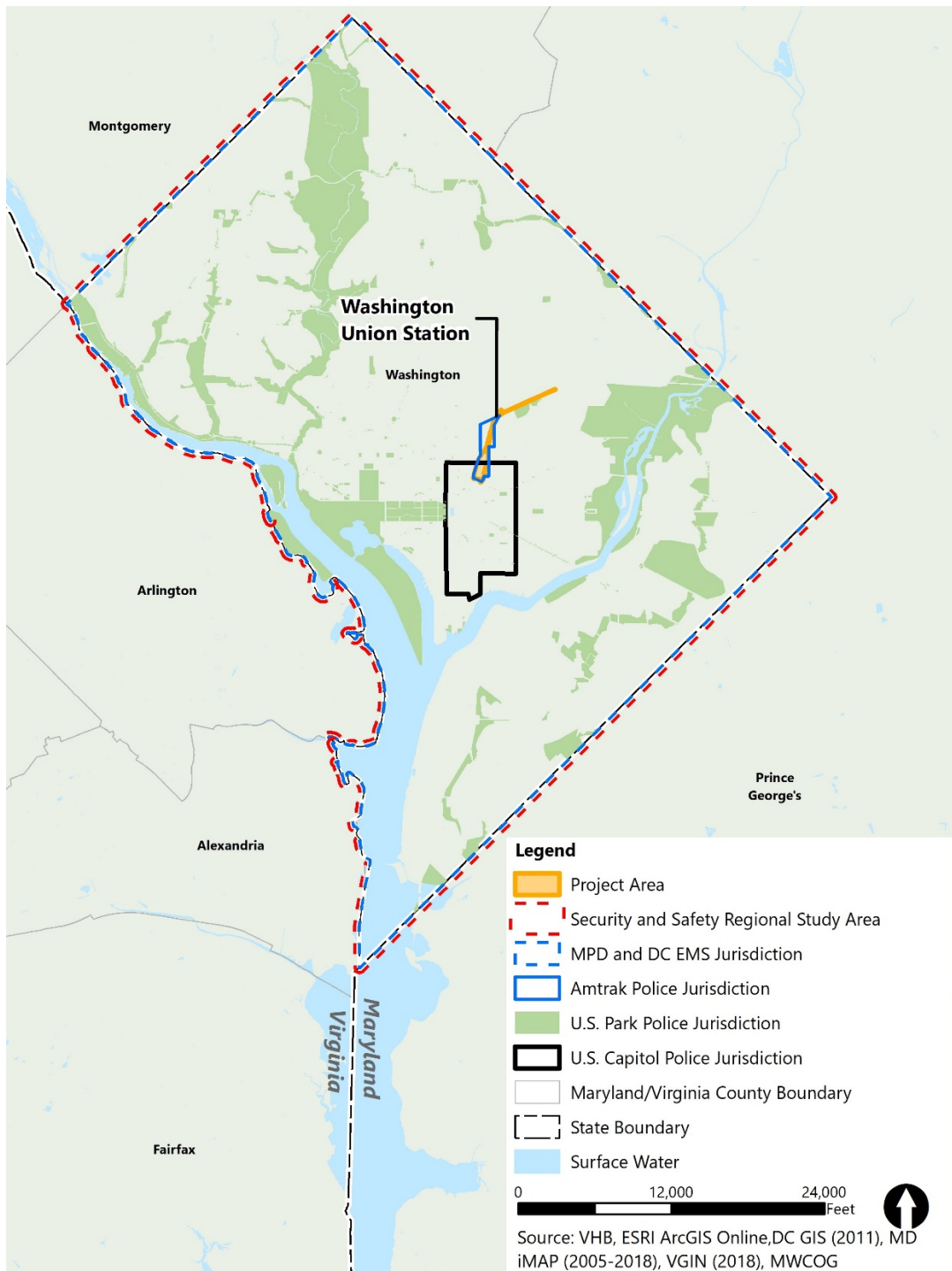
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[215] Department of Homeland Security, Office of the Inspector General. 2010. *TSA's Preparedness for Mass Transit and Passenger Rail Emergencies.* https://www.oig.dhs.gov/assets/Mgmt/OIG_10-68_Mar10.pdf. Accessed June 7, 2017.

[216] Amtrak is responsible for assessing and implementing safety and security measures for the NEC and its trains in the Study Area and commuter services, in collaboration with Amtrak, are responsible for assessing and implementing safety and security measures for their trains in the Study Area.

Figure 15-1. Public Safety and Security Local Study Area

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Figure 15-2. Public Safety and Security Regional Study Area

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15.4 Methodology

This assessment considered entrances, transit connections, retail and food areas, concourses, platforms, and support facilities.

The existing conditions for the Regional Study Area covers high-level safety and security planning issues. The following were identified and used to describe the existing conditions in the Local Study Area.

- The location of government facilities, hospitals, police stations, fire/EMS stations, and where public services are provided.

- Vehicular safety, railroad, pedestrian and bicycle safety, schools, high-risk facilities, and fall hazards.

- Present and future local pedestrian safety initiatives.

- Description of security and law enforcement services in the Study Area.

- District and regional policies concerning the provision of emergency services, law enforcement, emergency medical services, and emergency response planning.

- Stakeholder issues from personal contact with local agencies.

- Resources related to public safety, and security resources (such as, air quality, water quality, and solid waste and hazardous materials).

- Data on crime statistics in the Project Area and Local Study Area.

- Railroad line access points and the security concerns associated with rail yards within the Study Area.

15.5 Affected Environment

15.5.1 Public Safety

Railroad safety in the Project Area is overseen by the FRA and relevant Amtrak departments. Based on FRA safety data, since calendar year 2012, there have been 29 train crashes within the District on Amtrak tracks, of which 23 have been derailments.[217] In that same time period, there were three injuries and $1.18 million in reported damages.

WUS has multiple overlapping police and security forces that operate in WUS and Local Study Area. The largest force is the District's Metropolitan Police Department (MPD). WUS itself is within the boundaries of MPD Police Service Area (PSA) 103. Other PSA's that may be impacted by changes to the WUS area are PSA 104, PSA 501, PSA 502, and PSA 505. There is one substation nearby, the District 1 Substation at 500 E Street SE. There are two liaison units

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217 Due to a lack of granularity in the data, it is unknown how many of these crashes happened in the Project Area.

located nearby as well, the Asian Liaison Unit at 616 H Street NW, and the Gay and Lesbian Liaison Unit at 300 Indiana Avenue NW. These locations are not within the Local Study Area. MPD substations and police service area boundaries are shown in **Figure 15-3**.

In addition to MPD, there are other agencies with overlapping jurisdiction at or near WUS. Amtrak Police (APD) has jurisdiction and authority over the WUS area as defined by 49 CFR 207, 48 USC 28101 and 24305(e).[218] FRA has met with APD to discuss the existing safety and security procedures at WUS. The boundaries of APD jurisdiction are defined by First Street NE to the west, New York Avenue to the north, 3rd Street NE to the east north of L Street NE, and 2nd Street NE from L Street to F Street NE. Columbus Plaza and the area near Columbus Circle to the south of WUS is under the jurisdiction of U.S. Park Police. Amtrak Police regularly patrol WUS, have an office and information desk located in the Claytor Concourse, and are headquartered in the railyard area. Amtrak Police jurisdiction is displayed in **Figure 15-4**.

Metro Transit Police are responsible for the Metrorail platform and concourse, as well as the West Porch. United States Government Publishing Office (GPO) Police are responsible for the H Street and K Street bridges that connect into WUS over First Street NE. Federal Protective Service (FPS) is responsible for securing Federally-occupied buildings at the east and west sides of WUS (Securities and Exchange Commission and Postal Square Buildings). United States Capitol Police have responsibility over the Thurgood Marshall Federal Building and the parking lots and park land controlled by the Architect of the Capitol. The United States Park Police (USPP) has jurisdiction over Columbus Plaza, as well as other National Park land in the area. TSA conducts periodic bag and passenger screenings with uniformed and canine divisions inside WUS.

Contracted security forces (Allied Universal Security Services) are managed by APD to create order in the terminals and perform screening of freight deliveries at the east and west loading docks. In all, there are 32 Federal law enforcement agencies specified in the Police Coordination Amendment Act of 2001 that govern how overlapping federal agencies interact with MPD in the District.[219]
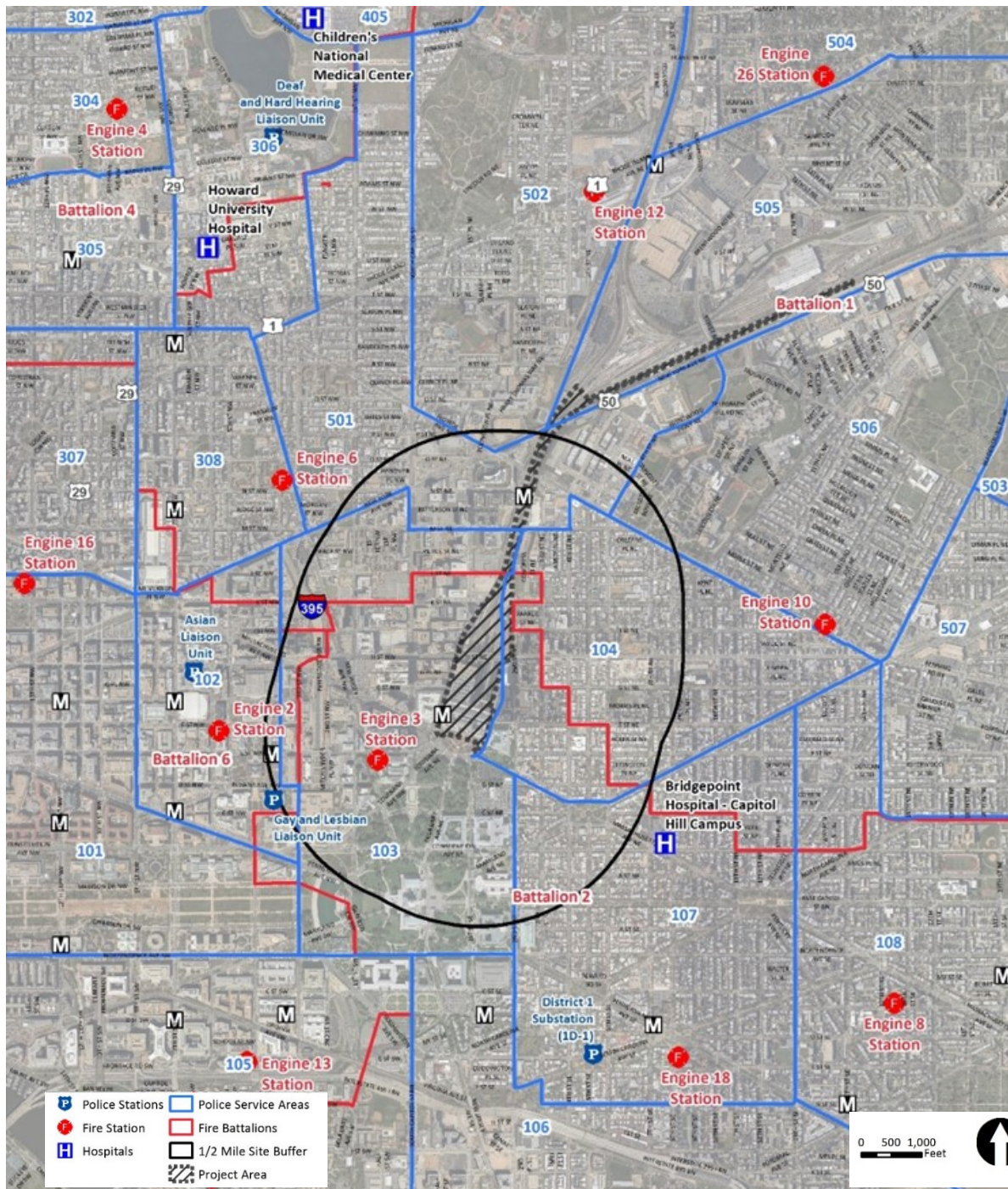
Immediate force volumes at WUS vary significantly by time of day and day of week but maintaining adequate staffing for emergency response across all the overlapping agencies is a priority for public safety and security.

As a multimodal hub, road safety is another important consideration of the overall safety environment at WUS. Federal Motor Carrier Safety Administration (FMCSA) inspections occur regularly at the bus facility.

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[218] 49 CFR 207, 48 USC 28101 and 24305e. Accessed from https://www.gpo.gov/fdsys/pkg/USCODE-2011-title49/html/USCODE-2011-title49-subtitleV-partE-chap281-sec28101.htm. Accessed on March 20, 2018.

[219] Covered Federal Law Enforcement Agencies. Accessed from https://mpdc.dc.gov/page/covered-federal-law-enforcement-agencies. Accessed on March 20, 2018.

Figure 15-3. Emergency Response Resources

Source: DC GIS open data library.

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Figure 15-4. Amtrak Police Jurisdiction

Source: Amtrak Police Department.

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15.5.2 Emergency Response

WUS and the Local Study Area are served by Fire Battalion 1 and Fire Battalion 2. The closest fire station to WUS is Engine 3 Station, located at 439 New Jersey Avenue NW. Other stations close to WUS are Engine 2, Engine 6, Engine 10, Engine 12, Engine 13, and Engine 18. Fire battalion boundaries and engine company locations are displayed in **Figure 15-3**. The exact protocols regarding fire response vary by incident type and size, and District Fire services also coordinate with other local municipalities through mutual aid agreements should additional resources be required.

Eight hospitals in the District provide emergency care. While none of those facilities fall within the Local Study Area boundary, five hospitals are located within 3.0 miles of WUS, with Howard University Hospital and Bridgepoint Hospital – Capitol Hill Campus being the closest to WUS. Emergency response services in the Regional Study Area are provided by the MPD and the DCFD. Howard University Hospital is located at 2041 Georgia Avenue NW and Bridgepoint Hospital – Capitol Hill Campus is located at 700 Constitution Avenue NE. Children's National Medical Center is slightly further away at 111 Michigan Avenue NW. Howard University Hospital has 300 beds and is a DC Level 1 Trauma Center,[220] one of only three Level 1 adult trauma centers in the District's Metropolitan area. Children's National Medical Center has 303 beds and is a referral center for pediatric and neonatal emergency services.[221] Bridgepoint Hospital Capitol Hill is a 177-bed facility specializing in both acute care and sub-acute and rehabilitation services.[222] Hospital locations are also noted in Figure 15.4-1.

15.5.3 Crime

Among the MPD's seven districts, the First District had the highest numbers of total reported crimes and property crimes in 2016. The First District represented the median for reported violent crimes among the seven MPD districts.[223]

The Local Study Area saw a 24-percent increase in reported crimes between January 1, 2016 and December 31, 2016, as compared to the same period in 2015.[224] This included a 43-percent increase in violent crime and a 21-percent increase in property crime.

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[220] Queen, Monica; Mann, Rachel. "Howard University Hospital Trauma Center Recertified by the American College of Surgeons" Accessed from https://web.archive.org/web/20160303214252/http://www.howard.edu/newsroom/releases/2013/20131121HowardUniversityHospitalTraumaCenterRecertifiedbytheAmericanCollegeofSurgeons.htm. Accessed on March 22, 2018.

[221] [Children's National Medical Center – About Us.] Accessed from https://childrensnational.org/about-us. Accessed on March 22, 2018.

[222] [Bridgepoint Hospital Capitol Hill.] Accessed from http://www.bridgepointhealthcare.com/overview-bridgepoint-hospital-capitol-hill/ Accessed on March 22, 2018.

[223] Metropolitan Police Department, Crimemap Application. Accessed from crimemap.dc.gov. Accessed on March 22, 2018.

[224] Metropolitan Police Department, Crimemap Application, accessed at crimemap.dc.gov. Accessed on March 22, 2018.

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MPD has several ongoing practices and initiatives intended to reduce crime – particularly violent crime – and improve relations and increase cooperation between the police force and community members. Among these are the piloting and subsequent introduction of a full-scale body-worn camera program. MPD also uses a citywide closed-circuit television (CCTV) system, with 144 neighborhood-based cameras across all seven MPD districts, to more efficiently direct and deploy resources. MPD has installed CCTV cameras at six locations in the Study Area.

MPD places an emphasis on community policing and beat patrols. The department has multiple initiatives intended to counter traditional summer crime trends by putting more officers on the street during summer months.

According to MPD crime statistics, the highest incidences of violent crime in the Study Area in calendar year 2016 occurred in the unit block of Massachusetts Avenue NE, in the unit block of Massachusetts Avenue NW, and near the intersection of First Street NE and L Street NE. The highest incidences of property crime in the Study Area occurred at these three locations, as well as near the intersection of New Jersey Avenue NW and F Street NW and the intersection of 3rd Street NE and G Street NE.[225]

Within the one-half mile Study Area of WUS, there were a total of 3,553 criminal incidents reported from January 1, 2016 to February 28, 2018 through the District's open data initiative **Table 15-1**.[226] These incidents are related to the FBI's Uniform Crime Report (UCR)[227] Part 1 violent crimes of homicide, robbery, sexual assault, assault with a dangerous weapon; and Part 1 property crimes of motor vehicle theft, burglary, theft from auto, and theft – other. Those incidents are described in **Figure 15-5**.

Table 15-1. Criminal Incidents by Police Service Area (2016-2017)

| Police Service Area	Assault with Dangerous Weapon	Homicide	Sexual Assault	Burglary	Motor Vehicle Theft	Robbery	Theft from Auto	Theft from Other	Total
102	1	-	-	1	-	-	2	-	4
103	72	4	15	13	92	84	387	572	1,239
104	22	-	9	67	65	64	511	706	1,444
107	1	1	1	7	4	2	68	46	130
501	29	1	4	24	37	50	220	346	711
506	2	-	7	1	-	2	2	11	25
Total	127	6	36	113	198	202	1,190	1,681	3,553

Source: DC GIS Open Data

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[225] Metropolitan Police Department, Crimemap Application. crimemap.dc.gov. Accessed on March 15, 2018.

[226] Criminal Incidents. http://opendata.dc.gov/datasets?q=crime. Retrieved March 15, 2018

[227] FBI Part 1 Uniform Crime Report. https://ucr.fbi.gov/ Retrieved March 15, 2018.

Figure 15-5. Criminal Incidents Near WUS (January 2016 – February 2018)
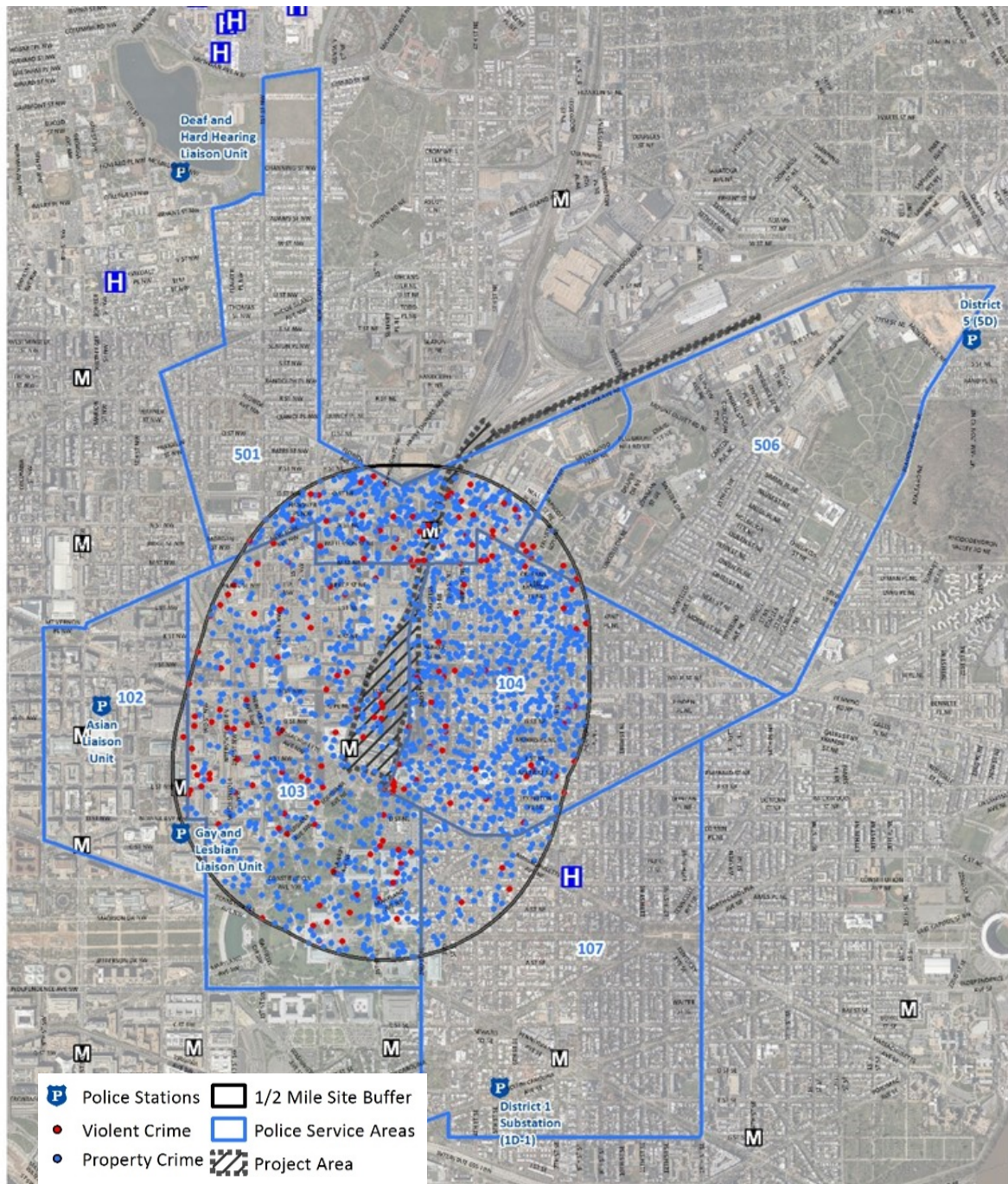
Source: DC GIS open data.

15.5.4 Schools

There are several schools, both public and private, in the Local Study Area. Gonzaga College High School is located west of WUS on North Capitol Street. The Capitol Hill Montessori

Police Service Areas 103, 104, and 501 contained majority of the incidents. PSA 103 had more than 47-percent of the violent incidents, to include 4 homicides, 72 aggravated assaults, and 84 robberies. PSA 104 experienced more than 42-percent of the property crime.

School is located at G and 3rd Streets NE. Stuart-Hobson Middle School is located on E Street NE between 4th and 5th Streets. Ludlow-Taylor Elementary School is located at 7th and G Streets NE, while J.O. Wilson Elementary School is located at 7th and K Streets NE. Two Rivers Public Charter School is located at Florida Avenue NE and 4th Street NE. Model School for the Deaf is located on the campus of Gallaudet University, on Brentwood Parkway NE. McKinley Technology High School is located at T Street NE and 2nd Street NE. These schools are shown in **Figure 15-6.**

15.6 Security

Security at WUS is overseen by Amtrak Police. USRC provides security guards to offer additional security in WUS. Within the concourses, WUS is publicly accessible and there are no security measures to restrict entry. Canines and active surveillance are used to provide security. Canines and patrols are also used on the platforms and on trains. The platform area is restricted to ticketed passengers and to railroad personnel. Major entrances to the track are controlled by electronic or manned security locations at 3rd Street NE and from the Ivy City Yard. The H Street Bridge and New York Avenue Bridge offer an opportunity for intrusion of people or materials onto the trucks from above. In both cases, however, fencing and walls limit such intrusion.

The parking and bus garage does not screen vehicles, passengers, and luggage. Bus service in the facility includes both scheduled intercity and tour operations, as well as charter services. For revenue generation purposes, USPG accepts the long-term storage of buses, RVs, and box trucks within the facility.

Loading facilities for WUS are located on First Street NE and in a loading dock on H Street shared with the adjacent Station Place development. No screening facilities are provided at the loading dock, though security personnel protect the area.

As the Nation's Capital and home to numerous critical functions of the Federal government, the District features a robust security apparatus across a variety of agencies, including MPD, USCP, USPP, and the U.S. Secret Service, among others. The District government includes a Homeland Security and Emergency Management Agency (HSEMA) which coordinates preparedness and response in the event of an emergency. The District and the Federal government have developed multiple contingency plans targeted at securing critical infrastructure and ensuring the safety of citizens should an emergency situation arise.

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Figure 15-6. Schools Near WUS

Source: DC GIS open data

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HSEMA, with input and guidance from the DC Emergency Preparedness Council, has created a District Preparedness System that defines operational and tactical processes for use in preparing for, responding to, and recovering from a disaster or other emergency event. The District Response Plan, developed by HSEMA to facilitate coordinated planning and unified response in times of crisis, identifies Amtrak, Maryland Transit Administration (MTA), and VRE as stakeholder organizations and agencies tasked with support roles during an emergency. According to the District Response Plan, each of these stakeholders will "provide emergency transit support and coordination during an emergency." During a rail failure, the impacted stakeholder organization or agency will coordinate with DDOT to establish transfer points and arrange transportation assets for the subsequent movement of its users.[228]

Given Amtrak, MTA, and VRE are tasked with providing transit support in the event of an emergency, WUS would serve as a primary hub of multimodal activity depending on the level of disruption to transit during the emergency event.
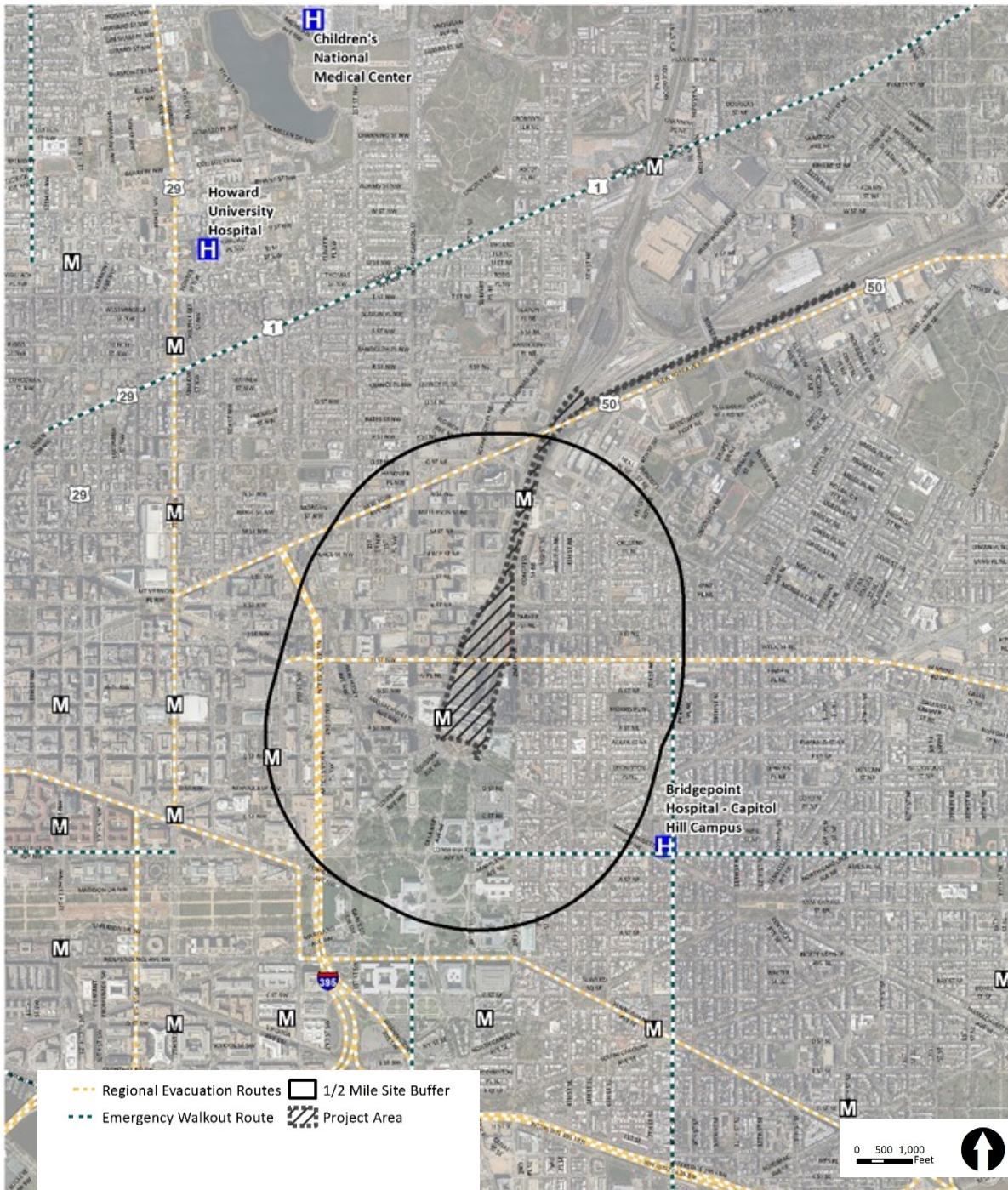
DDOT has designated 19 corridors radiating from downtown Washington as emergency event/evacuation routes. Each evacuation route extends into Maryland and Virginia and provides direct connections to the Capital Beltway (I-495). Within the Local Study Area, New York Avenue, H Street NE, and I-395 are designated evacuation routes for vehicular egress from the city. During an emergency situation, traffic signals on these routes will either be re-programmed to maximize green time for the main line or operated on flashing yellow mode, and uniformed police officers will be stationed at selected intersections to help manage traffic operations.

In addition to vehicular evacuation routes, there are pedestrian evacuation routes that extend through the study area and are identified by destination corridor. For the College Park Corridor, the pedestrian evacuation route is along Rhode Island Avenue to the Northeast. For the Largo Corridor and the Arlington Corridor, the pedestrian evacuation route is along Constitution Avenue. For the Oxon Hill Corridor, the evacuation route is along South Capitol Street. Both vehicular and pedestrian evacuation route are displayed in **Figure 15-7**.

The U.S. Senate Office Buildings, the Supreme Court Building, portions of the U.S. Capitol, and numerous other federal government office buildings are located in the Local Study Area. These buildings house functions and personnel that require some of the most stringent security measures of any locations in the country.

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[228]   DC Homeland Security and Emergency Management Agency, *District Response Plan,* September 2014. Accessed from https://hsema.dc.gov/page/document-library. Accessed on November 30, 2017.

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Figure 15-7. Vehicular and Pedestrian Evacuation Routes Near WUS

Source: DC GIS open data

15.6.1 Traffic Restrictions[229]

Traffic restrictions are in place for several routes around WUS. These restrictions are both for traffic safety as well as limiting potential for explosive ordnance delivered by large vehicles. Development of WUS will require increased heavy vehicle traffic, and bus traffic may shift depending on the alternative.
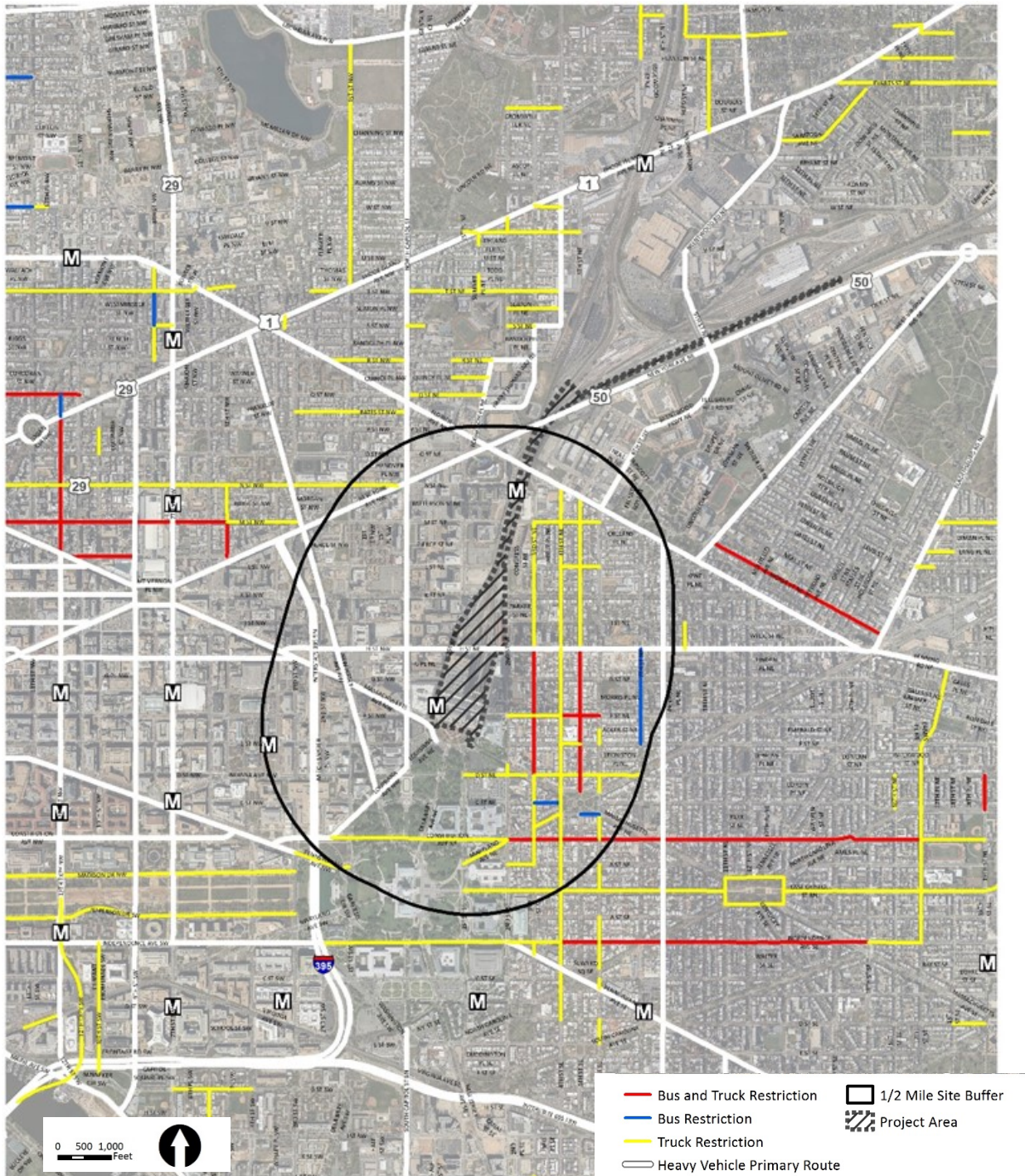
There are specific heavy vehicle routes that have been defined by the District. These routes are classified as Primary Routes with no heavy vehicle restrictions, Bus Restricted Routes, Truck Restricted Routes, and Bus and Truck Restricted Routes. These route designations are depicted in **Figure 15-8**.

New York Avenue, Florida Avenue, New Jersey Avenue, Massachusetts Avenue NW, N Capitol Street, and H Street are all Primary Routes within the half-mile radius of WUS. There are truck restricted streets in the study area along D Street NE, Constitution Avenue, F Street NE, and sections of 3rd, 4th, and 5th Streets NE. Buses and trucks are restricted along 3rd Street and 5th Street NE between H Street and D Street, and on F Street NE between 4th Street and 6th Street NE.

Directional restrictions may also restrict some heavy vehicles from accessing different elements near WUS. Adjacent to WUS are one-way segments along First Street NE, G Place NE, and Parker Street NE, southbound, eastbound, and westbound respectively.

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[229] Truck and Bus Routes. Accessed from http://opendata.dc.gov/datasets/truck-and-bus-through-route. Accessed on March 10, 2018.

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Figure 15-8. Heavy Vehicle Route Restrictions Near WUS

Source: DC GIS open data

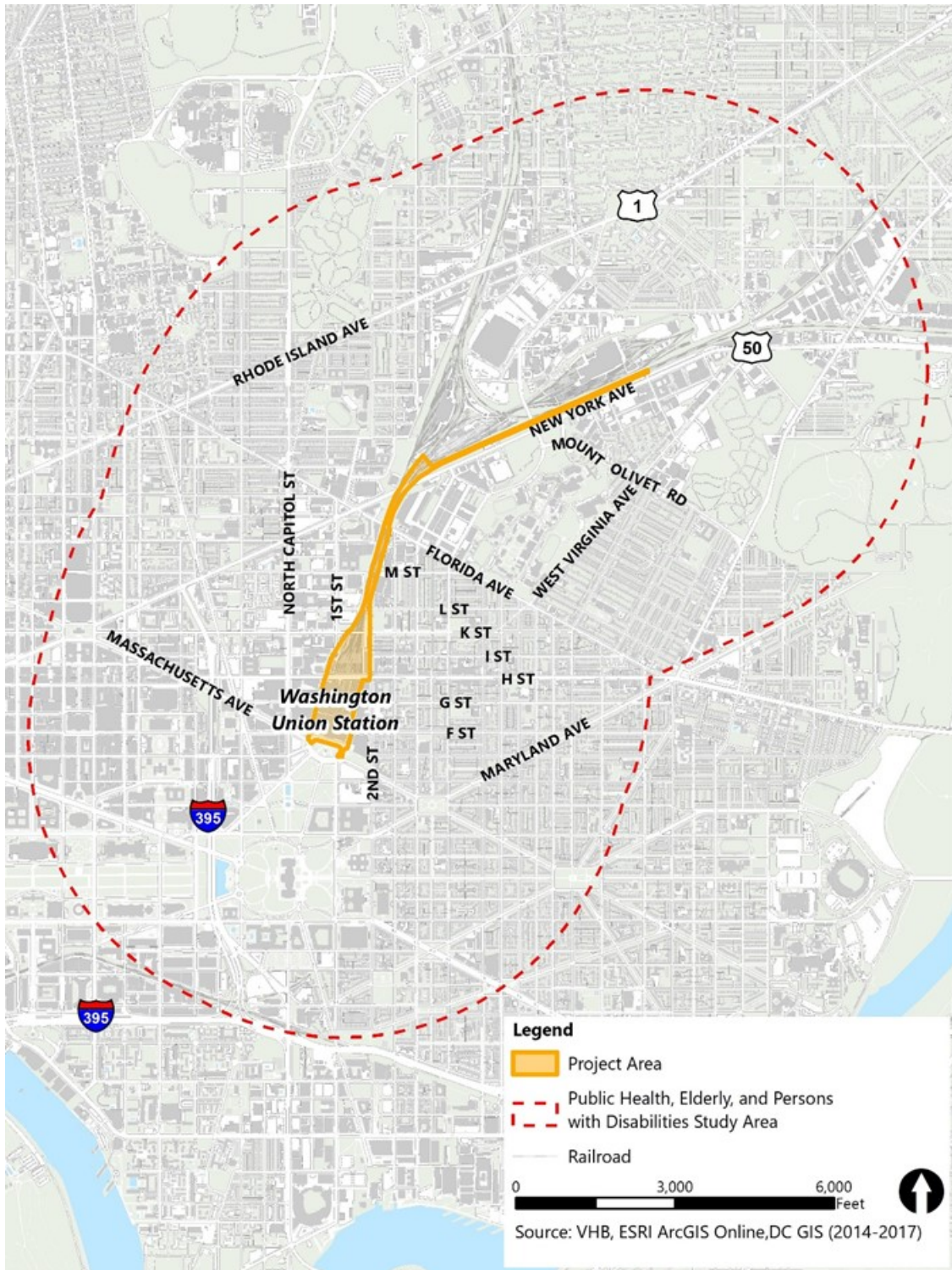# 16 Public Health, Elderly, and Persons with Disabilities

16.1 Overview

This section describes the Affected Environment as it relates to the issues of public health, the elderly, and persons with disabilities. The Affected Environment includes existing conditions at WUS itself, as well as in the Local and Regional Study Area.

16.2 Study Area

The Project Area includes the Station, track, and platform areas being modified by the Project. The Project Area includes spaces used by passengers, visitors, workers, train activities, loading of goods, and retail uses. It includes the portions of the First Street Tunnel where tracks will be modified and locations where the Project interfaces with public streets.

The Local Study Area (**Figure 16-1**) for public health, elderly, and persons with disabilities mirrors related chapters such as *Section 3, Water Quality*, *Section 4, Solid Waste Disposal and Hazardous Materials, Section 6, Air Quality, Section 10, Noise and Vibration, and* Section *15, Public Safety and Security*; accordingly, the extent of the Local Study Area is one mile around the Project Area. Impacts related to elderly and disabled persons on a regional level are considered unlikely due to the scope of this project. Potential impacts affecting these topic areas and populations are expected to be localized. Therefore, a regional review is considered not applicable.

Figure 16-1. Public Health, Elderly, and Persons with Disabilities Local Study Area

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16.3 Regulatory Context and Guidance

There are substantial regulations for public health. The U.S. Environmental Protection Agency (EPA) is principally responsible for issues of public health caused by environmental factors, while the U.S. Department of Health and Human Services (HHS) is the lead public health agency. Different Executive Orders (EOs) outline the Federal government's interest in accounting for public health issues in Federal actions. For example, EO 13045, *Protection of Children from Environmental Health Risks and Safety Risks*, states that agencies must "make it a high priority to identify and assess environmental health risks and safety risks that may disproportionately affect children; and … shall ensure that its policies, programs, activities, and standards address disproportionate risks to children that result from environmental health risks or safety risks."[230] And, as noted above, FRA's regulations require consideration of impacts to the elderly and those with disabilities. At the local level, public health issues are considered by the District Departments of Health (DOH) and Energy and the Environment (DOEE).

Federal policies, regulations, and guidance that may pertain to public health include:

- Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations;

- EO 13045, Protection of Children from Environmental Health Risks and Safety Risks;

- EPA Memorandum, Promoting the Use of Health Impact Assessment to Address Human Health in Reviews Conducted Pursuant to the National Environmental Policy Act and Section 309 of the Clean Air Act;[231]

- National Ambient Air Quality Standards (NAAQS) (40 Code of Federal Regulations [CFR] Part 50);

- Safe Drinking Water Act (SDWA) (42 United States Code [USC] 300 f);

- Clean Water Act (CWA) (33 USC 1251);

- Occupational Safety and Health Administration (OSHA) Lead in Construction Standard (29 CFR 1926.62);

- EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Regulations (40 CFR 61); and

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[230] U.S. Environmental Protection Agency. 1997. *Summary of Executive Order 13045 - Protection of Children from Environmental Health Risks and Safety Risks*. https://www.epa.gov/laws-regulations/summary-executive-order-13045-protection-children-environmental-health-risks-and. Accessed June 2, 2017.

[231] U.S. Environmental Protection Agency. 2015. *Promoting the Use of Health Impact Assessment to Address Human Health in Reviews Conducted Pursuant to the National Environmental Policy Act and Section 309 of the Clean Air Act*. https://www.epa.gov/sites/production/files/2016-03/documents/hia_memo_from_bromm.pdf

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- 40 CFR 312, Standards and Practices for All Appropriate Inquiries (AAI) under CERCLA (42 USC 9601).

Federal policies, regulations, and guidance that may pertain to the elderly and persons with disabilities include:

- Americans with Disabilities Act regulations;[232]

- Transportation Services for Individuals with Disabilities (49 CFR Part 37); and

- FTA Americans with Disabilities Act Guidance (FTA Circular 4710.1).

District policies, regulations, and guidance that may pertain to public health include:

- DC Municipal Regulations, Title 22-B, Public Health and Medicine;[233] and

- The *District of Columbia Building Code*[234] includes a chapter (Chapter 11) on accessibility and notes that facilities should be designed and constructed with accessibility considerations for persons with physical disabilities.

16.4 Methodology

The assessment considered entrances, transit connections, retail and food areas, concourses, platforms, and support facilities. The assessment considered existing populations of users within the Project Area and the Local Study Area that may face impacts from public health factors related to the Project. The existing elderly and disabled population that use WUS are described.

The following actions were used to describe the existing conditions in the local Study Area. The existing conditions for the regional Study Area covered high-level public health planning issues.

- The location of hospitals and where public services were identified.

- District and regional policies concerning the provision of emergency medical services were documented.

- Stakeholder issues from personal contact with local agencies were documented.

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[232] U.S. Department of Justice. *The Americans with Disabilities Act of 1990 and Revised Regulations Implementing Titles II and III.* https://www.ada.gov/2010_regs.htm. Accessed July 27, 2017.

[233] District of Columbia. D.C. Municipal Regulations. Title 22-B Public Health and Medicine. http://www.dcregs.dc.gov/Gateway/TitleHome.aspx?TitleNumber=22-B. Accessed July 25, 2017.

[234] International Code Council and District of Columbia. 2014. *District of Columbia Building Code – Chapter 11, Accessibility.* https://codes.iccsafe.org/public/chapter/content/9182/. Accessed June 1, 2017.

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Public health data sources included the EPA Human Health Risk Assessment tools, databases, and guidelines;[235] EPA Emergency Planning and Community Right-to-Know Act (EPCRA) existing Tier I and Tier II reports and other requirements under that law;[236] HHS health data; accident statistics reports and railcar maintenance reports from Amtrak and FRA; and DOH data.

Data sources for the elderly and disabled included census in the Local Study Area. Data also included available information on existing accessibility and ADA compliance features (for example, ramps or elevators) and any known issues within the station and track facilities.

16.5 Affected Environment: Public Health

16.5.1 Public Health in the Project Area

The Project Area is located in the heart of Washington, D.C. and residents and workers may be exposed to urban air quality, as described in *Section 6, Air Quality*. Further discussion of environmental stressors on public health in the Project Area are described in *Section 3, Water Quality*, *Section 4, Solid Waste Disposal and Hazardous Materials, Section 10, Noise and Vibration,* and *Section 15, Public Safety and Security*. Diesel locomotives at WUS have the potential to affect public health due to emission of fine particulates. Today, MARC Brunswick and Camden Line trains, all VRE trains, and some Amtrak trains have diesel locomotives. The diesel locomotives are currently naturally ventilated. In addition, Station practices related to boarding and to safe distance from locomotives when locomotives are being switched, limit prolonged direct exposure to diesel emissions.

16.5.2 Public Health in the Local Study Area

The Study Area is subject to environmental stressors related to air quality issues, solid waste disposal and hazardous materials, noise and vibration, and water resources. As stated above, each of these environmental stressors in the Local Study Area is described in greater detail in the respective Chapters. Sensitive receptors within the Local Study Area relative to public health are shown in **Figure 16-2**. Hospitals and schools within one-half mile are provided in *Section 15, Public Safety and Security*, as are local policies concerning the provision of emergency medical services. The following are childcare facilities and related service providers that were identified to be within one-half mile of the Project Area through a

235 U.S. Environmental Protection Agency. *Human Health Risk Assessment.* https://www.epa.gov/risk/human-health-risk-assessment. Accessed June 2, 2017.

236 U.S. Environmental Protection Agency. *Emergency Planning and Community Right-to-Know Act.* https://www.epa.gov/epcra. Accessed July 27, 2017.

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desktop review of businesses using North American Industry Classification System codes,[237] DC Atlas Plus,[238] and Google Maps:[239]

- FERC Child Development Center, Inc. (888 First Street NE);

- The Harbor at Station Place (100 F Street NE);

- Thurgood Marshall Child Development Center (1 Columbus Circle Northeast);

- Bright Beginnings (128 M Street NW);

- Kiddie University (806 H Street NE);

- Kiddie University (728 F Street NE);

- Bre Bre's Child Development Home (639 Maryland Avenue NE); and

- Elonda's Day Care (816 6th Street NE).

Aging services such as nursing and assisted living facilities within one-half mile of the Project Area include:

- Hayes Senior Wellness Center (500 K Street NE);

- DC Office of Aging (500 K Street NE and 441 4th Street NW);

- Sibley Plaza (1140 N Capital Street NW); and

- Unique Residential Care Center (901 First Street NW).

16.5.3   Public Health in the Regional Study Area

The Regional Study Area, which comprises the entirety of the District, is largely a high-density mix of residential, office, retail, and light industrial, and features a wide variety of uses and activities consistent with an urban setting. The Regional Study Area is subject to similar stressors as in the Local Study Area.

16.6 Affected Environment: Elderly and Persons with Disabilities

16.6.1 Elderly and Persons with Disabilities in the Project Area

Similar to the public health issues discussed above, elderly persons are more susceptible to air quality and water quality than the population at-large, including the potential for exposure to fine particulates from diesel emissions at WUS; this can be the result of weakened immune response. Section 15.4.1, *Safety*, addresses emergency response services within the Project and Local Study Areas, for events requiring emergency medical services

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[237]   Community Analyst [Computer Software]. Business and Facilities Search. Accessed April 23, 2018.

[238]   District of Columbia. *DC Atlas Plus*.http://atlasplus.dcgis.dc.gov/ . Accessed April 23, 2018.

[239]   Google Maps [Computer Software]. https://www.google.com/maps. Accessed April 23, 2018.

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such as accidents and injuries, heart attacks, and adverse effects and complications of medical treatment (for example, medication reactions).

As a bustling transportation and retail hub, WUS has a diverse user base. Elevators and escalators provide circulation throughout the building. However, the Station received its last major renovation in the 1980s, and as a result, some Station elements may not meet the latest accessibility standards. Such limitations impair mobility for the elderly and persons with disabilities with respect to their ability to access the Station and its facilities, including transit services. In particular, the ramps that allow passengers access from the Station to the train level are difficult for Station users in wheelchairs and with limited mobility. Currently, Amtrak Red Cap service helps such users to reach their trains. Additional examples of existing accessibility deficiencies include:

- Lower Level tracks do not provide the needed high-level platforms for ADA compliance;

- Existing platforms do not meet ADA requirements for warning strips, safety zones, vertical circulation, or pedestrian circulation; and

- Existing platforms lack level boarding and have an excessive gap between the platform and train.

Congestion within corridors and along the platforms can also represent a hazard to those with impaired mobility by increasing the chance of bad falls. At WUS, platforms are narrow and have a single point of access/egress and conflicting uses by passengers and service staff increase congestion and reduce platform capacity.

16.6.2 Elderly and Persons with Disabilities in the Local Study Area

According to the Census, there are an estimated 1,350 individuals older than 65 within the Local Study Area, approximately 6.9 percent of the total population within this area (see **Figure 16-3**). **Figure 16-3** represents the absolute number and percentage of elderly persons within each Census tract in the Local Study Area. On both an absolute and percentage basis, the elderly populations are higher in residential neighborhoods northwest of WUS and west of North Capitol Street and east of WUS and east of 6th Street NE. Sensitive receptors related to elderly persons within the Local Study Area such as nursing homes and assisted living facilities are shown in **Figure 16-2**.

Due to its urban setting and the recent redevelopment and reconstruction of numerous parcels and roadways, the Local Study Area features a comprehensive sidewalk network that is in relatively good condition based on an observational review of structural integrity and levelness. Most intersections have high visibility crosswalks across the major approaches, with wheelchair ramps and detectable warning surfaces to aid visually impaired individuals. The majority of intersections in the Local Study Area have accessible pedestrian signal (APS) equipment, and those that do not currently have APS equipment are expected to be rebuilt or retrofitted in the next few years.

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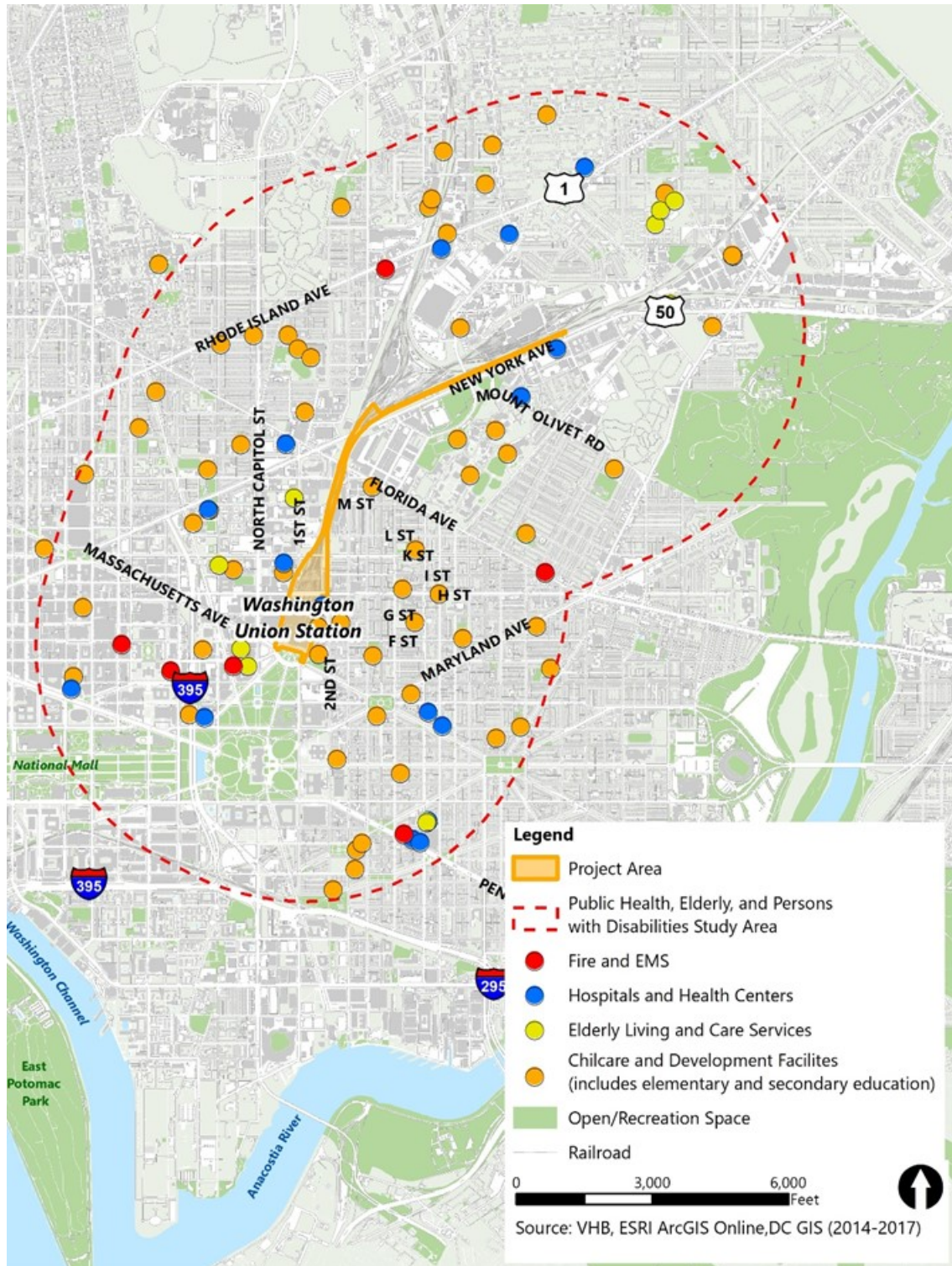**Figure 16-2. Public Health Sensitive Receptors in the Local Study Area**

Figure 16-3. Elderly Persons in the Local Study Area
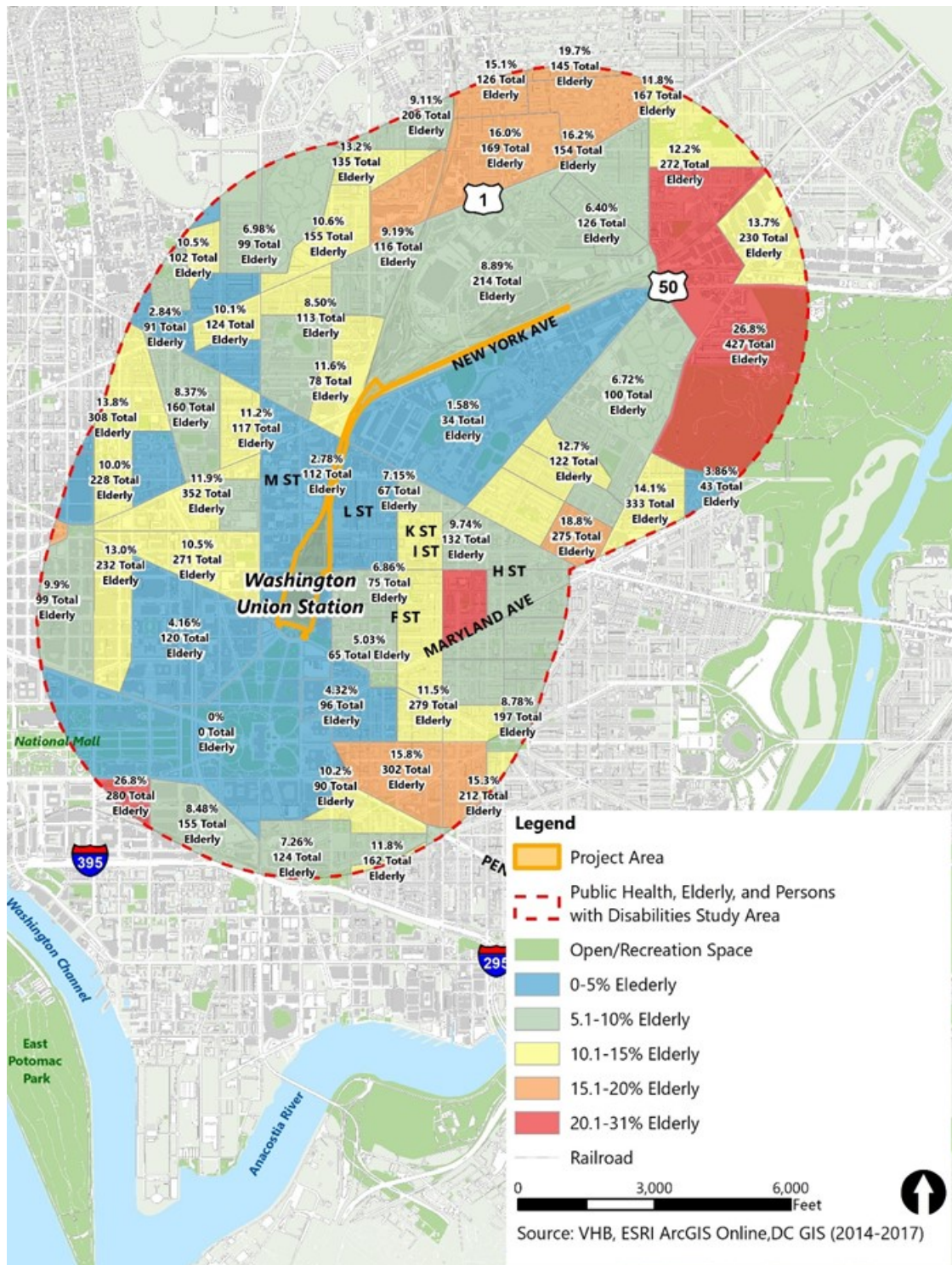
While the rapid redevelopment that has taken place in the Local Study Area in recent years has resulted in an increase in accessible infrastructure in many locations, that redevelopment is also accompanied by construction activities that can alter or shut down sidewalks, trails, and paths for extended periods of time, which may create obstacles for mobility for the elderly and disability populations.

17 Environmental Justice

17.1 Overview

The environmental justice (EJ) analysis considers the Washington Union Station (WUS) Expansion Project's (the Project) potential for disproportionately high and adverse effects to minority or low-income populations because of the project alternatives. This section describes the Affected Environment as it relates to EJ.

17.2 Regulatory Context and Guidance

Federal policies, regulations, and guidance that may pertain to public health include:

- Executive Order (EO) 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations;

- U.S. Civil Rights Act Title VI;

- Memorandum of Understanding on Environmental Justice and Executive Order 12898 (August 4, 2011);

- Council on Environmental Quality (CEQ), Environmental Justice: Guidance Under the National Environmental Policy Act;[240]

- U.S. Department of Transportation (U.S. DOT) Order 5610.2(a), Actions to Address Environmental Justice in Minority Populations and Low-Income Populations;

- U.S. DOT, Environmental Justice Strategy;[241]

- Promising Practices for EJ Methodologies in NEPA Reviews: Report of the Federal Interagency Working Group on Environmental Justice and NEPA Committee;[242]

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[240] Council on Environmental Quality. 1997. *Environmental Justice: Guidance Under the National Environmental Policy Act.* Accessed from https://www.epa.gov/sites/production/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf. Accessed on August 17, 2017.

[241] U.S. Department of Transportation. November 15, 2016. *Environmental Justice Strategy.* Accessed from https://www.transportation.gov/policy/transportation-policy/environmental-justice-strategy. Accessed on August 17, 2017.

[242] Federal Interagency Working Group on Environmental Justice & NEPA Committee. 2016. *Promising Practices for EJ Methodologies in NEPA Reviews: Report of the Federal Interagency Working Group on Environmental Justice and NEPA Committee.* Accessed from https://www.epa.gov/sites/production/files/2016-08/documents/nepa_promising_practices_document_2016.pdf. Accessed on August 17, 2017.

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- ■ Federal Transit Laws, 49 USC 53; and

- ■ FTA Circulars:

    - • FTA Circular 4703.1 Environmental Justice Policy Guidance for FTA Recipients; and

    - • FTA Circular 4702.1A Title VI and Title VI-Dependent Guidelines for FTA Recipients.

Because the FTA is a Cooperating Agency, the EJ analysis for the Project must be consistent with FTA guidance. As outlined in FTA Circular 4703.1, the USDOT is required to make EJ part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of programs, policies, and activities on minority populations and low-income populations. FTA Circular 4703.1 provides guidance for incorporating EJ principles into plans, projects, and activities receiving funding from FTA, including incorporation of EJ and non-discrimination principles into transportation planning and decision-making processes and project-specific environmental reviews.
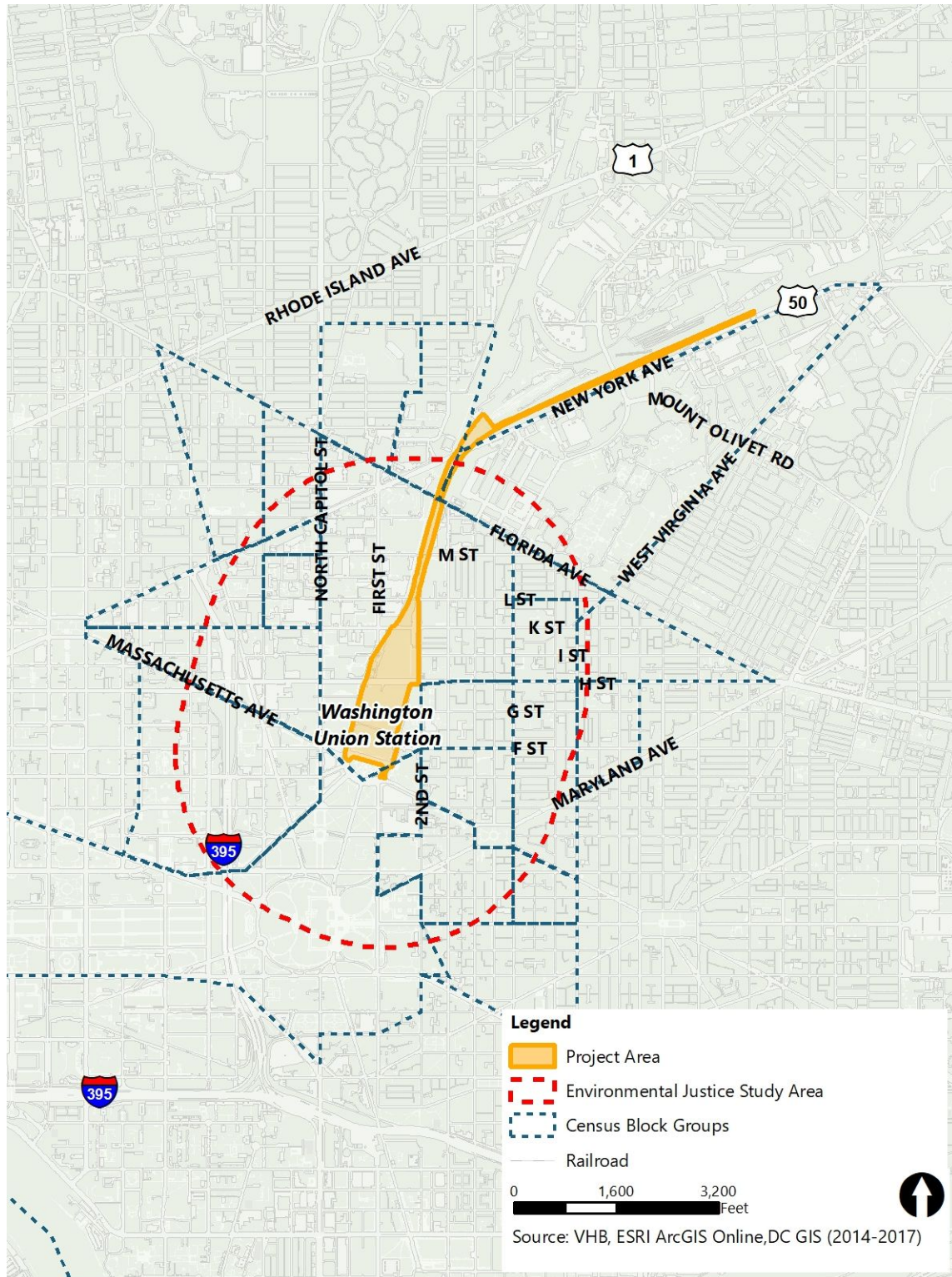
The FTA Circular 4703.1 also states that **minority populations** are any readily identifiable group or groups of minority persons who live in geographic proximity and, if circumstances warrant, geographically dispersed or transient persons, such as migrant workers or Native Americans, who will be similarly affected by the Project. Minority populations include persons who are American Indian or Alaskan Native, Asian American, Native Hawaiian or Other Pacific Islander, African American (not of Hispanic Origin), and Hispanic or Latino.

FTA Circular 4703.1 also defines that a **low-income person** is one whose median household income is at or below the Department of Health and Human Services (HHS) poverty guidelines. A low-income population is any readily identifiable group or groups of low-income persons who live in geographic proximity, and, if circumstances warrant, geographically dispersed or transient persons who will be similarly affected by a proposed USDOT, program, policy, or activity.

17.3 Study Area

The local Study Area for EJ analysis extends beyond the Project Area to account for effects that may be felt outside the area of direct impacts. Therefore, the Local Study Area for identification of EJ groups includes the Census block groups that are within one-half mile of the rail terminal (**Figure 17-1**). Each Census block group that is completely within or intersects the half-mile buffer is included in the Local Study Area. No Regional Study Area was defined.

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Figure 17-1. Environmental Justice Local Study Area

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17.4 Methodology

The data source for the identification of minority populations is the Year 2010 Census. Minority populations were quantified at the block level, which is the smallest geographic unit for which race and ethnicity data are available. The U.S. Census takes place every ten years and is intended to account for every resident in the U.S. The Census also collects information on home ownership, sex, age, race, and ethnicity.

The data source for the identification of low-income populations is the American Community Survey (ACS) five-year average data for 2011 – 2015. Low-income populations were quantified at the block group level, which is the smallest geographic unit for which low-income population data are available. The ACS is an ongoing survey that provides data on age, sex, race, family and relationships, income and benefits, health insurance, education, veteran status, disabilities, where people work and how they get there, where people live, and how much people pay for essentials. The purpose of the ACS is to provide an annual data set that enables communities, state governments, and Federal programs to plan investments and services. ACS provides periodic estimates that describe the average characteristics of population and housing over a period of data collection. The ACS is administered continually and, unlike the Census, is a random sampling of people from all counties and county-equivalents in the U.S.

Census and ACS data were used to identify minority and low-income groups in the Local Study Area using the definitions outlined in **Section 17.2**. Thresholds for the percentage of minority or low-income residents were established based on the percentages of minority and low-income residents in the City of Washington, DC, and the Local Study Area.

The area surrounding WUS has undergone rapid demographic change since the 2010 US Census data were collected. Therefore, additional data sources were used to confirm the location of minority and low-income populations. To identify distinct minority populations, the locations of places of worship within the Local Study Area were mapped using District GIS data, and those with predominantly African American congregations were identified via a web search. To identify distinct low-income populations, the locations of low-income housing units were mapped using District GIS data.

As noted in the definitions in **Section 17.2**, FTA Circular 4703.1 is also concerned with transient populations that might be affected by the Project. The WUS area is known to have a substantial homeless population. Census data does not officially count the homeless, although they do show up in the data, for instance when blocks without housing units are shown to have population. Newspaper articles about the homeless were also used to confirm their presence in the Local Study Area.

17.5 Affected Environment

This section presents an overview of demographic data (race/ethnicity and poverty status) for the Census blocks and block groups within the Local Study Area, to identify the presence of EJ populations.

17.5.1 Minority Populations

The minority population of the District is approximately 64-percent, and approximately 50-percent of the population in the local Study Area identify as minority. To be conservative, the CEQ guidance threshold of 50-percent was used as an indicator of minority population. For Census blocks where the minority population was below the threshold, the presence of places of worship with predominantly minority congregations was used to determine whether distinct EJ populations exist.

The Census blocks within the Local Study Area had a population of 20,090 in 2015. African Americans make up the largest minority group in the local Study Area, at approximately 39-percent. The lowest concentrations of minority populations occur in the southeastern portion of the Local Study Area, while the highest concentrations occur to the north and west. Sixty-six of the 130 Census blocks in the Local Study Area have minority populations over 50-percent (**Figure 17-2**). These Census blocks comprise portions of the Mount Vernon Square, North Capitol Street, NoMA, Truxton Circle, Eckington, and Near Northeast neighborhoods.

Within the Census blocks that do not have minority populations over 50-percent, there are five places of worship with predominantly African American congregations, indicating the presence of a distinct minority population. Of these five congregations, one is in the Capitol Hill neighborhood, two are in Stanton Park, and two are in Mount Vernon Square. Places of worship with predominantly African American congregations are listed in **Table 17-1** and shown in **Figure 17-2.**

There are three blocks immediately adjacent to the Project Area that had a minority population over 50-percent in the 2010 Census. Of these blocks, one (0062021008) is a parking lot and one (0106002034) includes WUS itself as well as some office buildings. While these results point to the presence of a minority population at the time of the Census in 2010, it is likely that these individuals were transient (homeless) and these blocks may not currently have a minority population present.

Based on this analysis, distinct minority EJ populations exist in the local Study Area, although the majority do not live in blocks immediately adjacent to the Project Area.

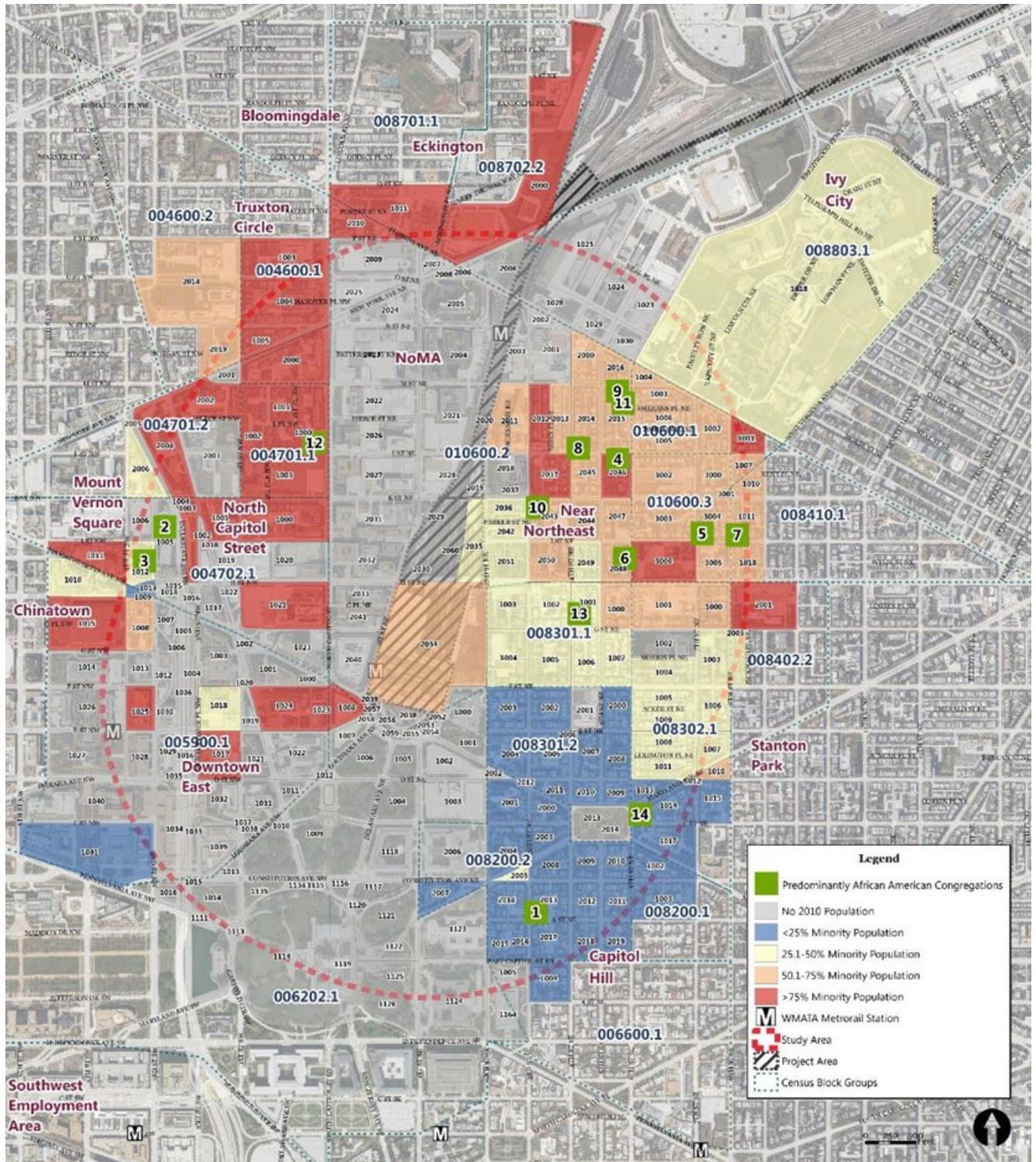**Table 17-1. Places of Worship with Predominantly African American Congregations**

ID	Congregation	Address	Neighborhood
1	Faith Tabernacle United Holy Church	300 A Street NE	Capitol Hill
2	Mount Carmel Baptist	901 3rd Street NW	Mount Vernon Square
3	Second Baptist	816 3rd Street NW	Mount Vernon Square
4	Enon Baptist	505 L Street NE	Near Northeast
5	Pilgrim Baptist	700 I Street NE	Near Northeast
6	Calvary Episcopal Church	820 6th Street NE	Near Northeast
7	Crusaders Baptist	800 I Street NE	Near Northeast
8	Greater Pleasant Grove Baptist	1101 4th Street NE	Near Northeast
9	Upon This Rock Tabernacle	513 M Street NE	Near Northeast
10	Community Holiness	305 K Street NE	Near Northeast
11	Mount Olive Baptist	1140 6th Street NE	Near Northeast
12	Mount Airy Baptist	1100 North Capitol Street NW	NoMa
13	Northeast Holy Trinity Church	709 4th Street NE	Stanton Park
14	Imani Temple	609 Maryland Avenue NE	Stanton Park

17.5.2 Low-Income Populations

This section describes the location of low-income populations in the Local Study Area, as well as the presence of homeless persons. As described in FTA Circular 4703.1, transient populations such as the homeless should be included in the EJ analysis.

Low-income populations were identified using HHS poverty guidelines. Because the guidelines are nationwide and median incomes are higher in the DC region than nationally, the percentage of households below 150-percent of the HHS poverty guidelines was also identified for each block group. Using this more conservative measure, approximately 22-percent of the population in the Local Study Area can be identified as low-income, while approximately 27-percent of District residents are considered low-income. A threshold of 27-percent was used to identify low-income EJ populations within a block group. For block groups where the low-income population was below the threshold, the presence of affordable housing was used to determine whether distinct EJ populations exist.

Figure 17-2. Minority Populations in the Local Study Area

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As shown in **Table 17-2** and **Figure 17-3**, the low-income population varies across the Local Study Area. The concentration of low-income residents varies from a low 1.5-percent to a high of approximately 67-percent. Seven of the 21 block groups in the Study Area have a percentage of low-income residents higher than 27-percent (**Table 17-2**).

Table 17-2. Low Income Population in the Local Study Area

Block Group	Below Poverty Line	Below 150% of Poverty Line
004600.1	**26.6%**	**31.0%**
004600.2	6.9%	10.3%
004701.1	**7.0%**	**52.7%**
004701.2	**32.4%**	**47.8%**
004702.1	15.1%	23.7%
005900.1	13.9%	16.7%
006202.1	0.0%	0.0%
006600.1	2.6%	4.7%
008200.1	0.0%	2.5%
008200.2	10.3%	12.7%
008301.1	1.6%	1.6%
008301.2	5.9%	6.4%
008302.1	6.5%	11.8%
008402.2	**20.5%**	**29.6%**
008410.1	8.5%	10.6%
008701.1	7.7%	15.2%
008702.2	24.0%	26.3%
008803.1	**51.8%**	**67.4%**
010600.1	**27.5%**	**37.9%**
010600.2	11.4%	13.5%
010600.3	**20.5%**	**27.1%**

Note: Entries in bold indicate block groups with low-income populations over 27 percent.

Figure 17-3 also shows the location of low-income housing. The number of units by development are listed in **Table 17-3**. Some of this housing is in communities managed by the District Housing Authority (identified as public housing) and an increasing amount is in private developments that reserve units for low-income residents. Some of these developments are exclusively low-income, while others provide housing for a mix of incomes, with a designated number of units reserved for residents meeting certain income limits. Many of the mixed-income developments are in the Near Northeast neighborhood along H Street NE, within block groups that have a low-income population below the threshold.

The neighborhoods to the northwest and northeast of WUS are rapidly redeveloping, with much of the redevelopment as multi-family residential buildings. The District also has an inclusionary zoning program that requires 8 to 10 percent of the residential floor area of

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residential projects be set aside for affordable rental or for-sale units. This requirement applies to new projects of 10 or more units, and to rehabilitation projects that are expanding an existing building by 50-percent or more and adding 10 or more units. Therefore, the distribution of low-income populations may change in the future.

In addition to low-income residents, there is a substantial homeless population in and at WUS. This transient population appears in Census counts that show population on blocks without housing units. News reports and field visits have reported the presence of encampments on First Street NE and under the K Street NE underpass. There are also homeless encampments in the L Street NE underpass. [243] There are also several organizations within the Local Study Area that provide social services to the homeless. These organizations are shown in **Figure 17-3** and listed in **Table 17-4.**

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[243] In January 2020, the District enacted and implemented a policy to permanently remove all homeless encampments from the K Street NE underpass. The removal policy did not apply to L Street encampments. Heim, Joe and Moyer, Justin Wm., "No Room on the Street: D.C. Orders Homeless out of Underpass in Fast-Developing Neighborhood," Washington Post, January 10, 2020. Accessed from https://www.washingtonpost.com/local/no-room-on-the-street-dc-orders-homeless-out-of-underpass-in-fast-developing-neighborhood/2020/01/10/1704d604-319c-11ea-9313-6cba89b1b9fb_story.html. Accessed on April 24, 2020.

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Figure 17-3. Low Income Population and Social Services in the Local Study Area

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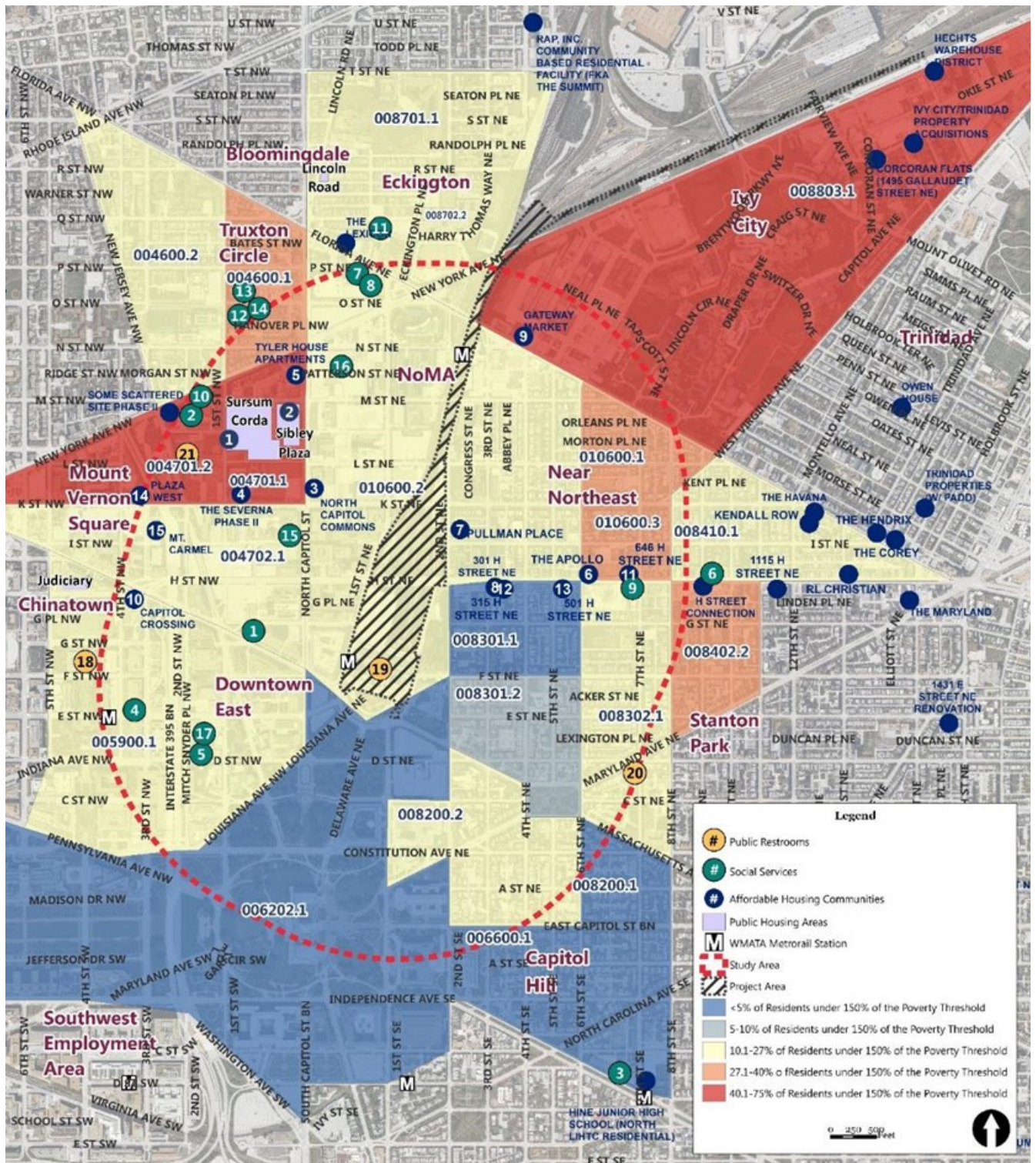
Table 17-3. Affordable Housing Units in the Local Study Area

ID	Name	Address	Affordable Units	Neighborhood
		Public Housing		
1	Sursum Corda	97 K Street NW	28	North Capitol Street
2	Sibley Plaza	1140 North Capitol Street NW	246	North Capitol Street
		Completed Units		
3	North Capitol Commons	1005 North Capitol Street NE	123	NoMa
4	The Severna Phase II (Severna on K)	43 K Street NW	133	North Capitol Street
5	Tyler House Apartments	1200 North Capitol Street NW	284	North Capitol Street
6	The Apollo	600 H Street NE	35	Near Northeast
7	Pullman Place	911 2nd Street NE	3	Near Northeast
8	301 H Street NE	301 H Street NE	3	Near Northeast
9	Gateway Market (The Edison)	340 Florida Avenue NE	38	Union Market
		Units Under Construction		
10	Capitol Crossing	300 Massachusetts Avenue NW	50	Downtown East
11	646 H St NE	646 H Street NE	2	Near Northeast
12	315 H St NE	315 H Street NE	8	Near Northeast
13	501 H St NE	501 H Street NE	3	Near Northeast
14	Plaza West	307 K Street NW	223	Mount Vernon Square
		Planned Units		
15	Mt. Carmel	901 3rd Street NW	66	Mount Vernon Square

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Table 17-4. Homeless Resources in the Local Study Area

ID	Organization	Program	Address
Social Services			
1	Central Union Mission	Ministry Resource Center & Shelter	65 Massachusetts Ave NW
2	Bright Beginnings	Early Child Care Program	128 M Street NW
3	Community Connections	The Center for Families and Children	650 Pennsylvania Ave SE
4	Community Family Life Services	Emergency Services Program	305 E Street NW
5	Community for Creative Non-Violence	The Mitch Snyder Center for Arts and Education	425 2nd Street NW
6	HIPS	Drop-In Center	906 H Street NE
7	Department of Behavioral Health	Assessment and Referral Center (ARC)	75 P Street NE
8	Department of Human Services	Family Services Administration	64 New York Ave NE
9	Department of Human Services	H Street Service Center	645 H Street NE
10	Samaritan Ministry of Greater Washington	The Next Step Program (Perry School Center)	128 M Street NW
11	Pathways to Housing	Administrative Office & Health Clinic	101 Q Street NE, Suite G
12	So Others Might Eat (S.O.M.E.)	Isaiah House Day Program	75 Hanover Place NW
13	S.O.M.E.	Dining, Shower, and Clothing Programs	71 O Street NW
14	S.O.M.E.	Medical & Behavioral Health Clinic	60 O Street NW
15	The Father McKenna Center	Day Shelter Program	900 North Capitol Street NW
16	Unity Health	Walker Jones Health Center (Ward 6)	40 Patterson Street NE
17	Jobs Have Priority	Employment Assistance Center	425 2nd Street NW
Facilities with Public Restrooms			
18	National Building Museum	Public Restrooms	401 F Street NW
19	Union Station	Public Restrooms	50 Massachusetts Ave NE
20	DC Public Library	Northeast Library	330 7th Street NE
21	DC Public Library	Northwest One Library	155 L Street NW