WASHINGTON
UNION STATION
STATION EXPANSION

Draft Environmental Impact Statement for Washington Union Station Expansion Project

Appendix C1 –
Methodology Report

U.S. Department of Transportation
Federal Railroad Administration

April 2018

This page intentionally left blank.

WASHINGTON
UNION STATION
STATION EXPANSION

Environmental Impact Statement Methodology Report

FINAL

U.S. Department of Transportation
Federal Railroad Administration

April 2018

Contents

List of Tables

List of Figures

Acronyms and Abbreviations

AAI	All Appropriate Inquiries
ACHP	Advisory Council on Historic Preservation
ACS	American Community Survey
ADA	Americans with Disabilities Act
ADT	Average Daily Traffic
AHERA	Asbestos Hazard Emergency Response Action
AIRFA	American Indian Religious Freedom Act
AOC	Architect of the Capitol
APE	Area of Potential Effect
ARPA	Archaeological Resources Protection Act
ASHRAE	American Society of Heating, Refrigerating, and Air Conditioning Engineers
ASTM	American Society for Testing Materials
BID	Business Improvement District
BMP	Best Management Practice
BTU	British Thermal Unit
CAA	Clean Air Act
CAAA	Clean Air Act Amendments of 1990
CCC	Community Communications Committee
CFA	Commission of Fine Arts
CFC	Chlorofluorocarbons
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CH4	Methane
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CWA	Clean Water Act
CZMA	Coastal Zone Management Act
dBA	A-weighted sound level / decibel notation

dBV	Vibration expressed as decibel
DC	District of Columbia
DC DPR	District Department of Parks and Recreation
DCHPO	DC Historic Preservation Officer
DCMR	District of Columbia Municipal Records
DCOP	District Office of Planning
DDOT	District Department of Transportation
DHS	Department of Homeland Security
DO-12	Director's Order 12
DOE	Determination of Eligibility
DOEE	Department of Energy and Environment
ECC	Energy Conservation Code
EISA	Energy Independence and Security Act
EIS	Environmental Impact Statement
EJ	Environmental Justice
EMS	Energy Management Systems
EO	Executive Order
EPA	Environmental Protection Agency
EPCRA	EPA Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act of 1973
EUI	Energy Use Intensity
FEIS	Final Environmental Impact Statement
FEMA	Federal Emergency Management Agency
FHWA	Federal Highway Administration
FR	Federal Register
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
GHG	Greenhouse gas
GIS	Geographic Information System
HAP	Hazardous Air Pollutants

HCM	Highway Capacity Manual
HHS	Department of Health and Human Services
HPP	Historic Preservation Plan
HVAC	Heating, Ventilation, and Air Conditioning
Hz	Hertz
In/s	Inches per second
IPAC	Information for Planning and Conservation
IPCC	Intergovernmental Panel on Climate Change
IRIS	Integrated Risk Information System
ITE	Institute of Transportation Engineers
kWh	Kilowatt hours
Ldn	Day-night average level
LEED	Leadership in Energy and Environmental Design
Leq	Energy-equivalent level
LID	Low-Impact Development
Lmax	Maximum A-weighted Level
LOS	Level of Service
LURM	Land Use Ridership Model
LUST	Leaking Underground Storage Tank
MARC	Maryland Area Regional Commuter
MBTA	Migratory Bird Treaty Act of 1918
MMBtus	Million British Thermal Units
MOVES2014	2014 Motor Vehicles Emission Simulator
MPD	Metropolitan Police Department
mph	Miles per Hour
MPO	Metropolitan Planning Organization
MSAT	Mobil Source Air Toxics
MSW	Municipal Solid Waste
MTA	Maryland Transit Authority
MWAQC	Metropolitan Washington Air Quality Committee

MWCOG	Metropolitan Washington Council of Governments
N_2O	Nitrous Oxide
NAAQS	National Ambient Air Quality Standards
NAC	Noise Abatement Criteria
NAGPRA	Native American Graves Protection and Repatriation Act
NATA	National Air Toxics Assessment
NCPC	National Capital Planning Commission
NEPA	National Environmental Policy Act
NCHRP	National Cooperative Highway Research Program
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NHPA	National Historic Preservation Act
NOAA	National Oceanic and Atmospheric Administration
NoMa	North of Massachusetts Avenue
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRCS	National Resource Conservation Service
NRHP	National Register of Historic Places
NWS	National Weather Service
O_3	Ozone
OSHA	Occupational Safety and Health Administration
Pb	Lead
PCB	Polychlorinated Biphenyl
$PM_{2.5}$	Particulate matter sized 2.5 micrometers or less
PM_{10}	Particulate Matter sized 10 micrometers or less
PPE	Personal Protective Equipment
PPV	Peak-particle Velocity
PSCDC	Public Service Commission of the District of Columbia

RCRA	Resource Conservation and Recovery Act
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users
SDWA	Safe Drinking Water Act
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office
SIP	State Implementation Plan
SLR	Sea Level Rise
SO_2	Sulfur Dioxide
SWRv	Stormwater Retention Volume
TDM	Transportation Demand Management
The District	Washington, DC
THPO	Tribal Historic Preservation Officer
The Project	Washington Union Station Expansion Project
TIP	Tribal Implementation Plan
TMDL	Total Maximum Daily Load
TNC	Transportation Networking Companies
TNM	Traffic Noise Model
TSCA	Toxic Substances Control Act
TVRA	Threat, Vulnerability, and Risk Assessment
UCR	Uniform Crime Reporting
U.S.	United States
USDOT	United States Department of Transportation
USC	United States Code
USGS	United States Geologic Survey
USN	Union Station North
USPG	Union Station Parking Garage
USRC	Union Station Redevelopment Corporation
USFWS	United States Fish and Wildlife Service
VCP	Voluntary Cleanup Program
VdB	Vibration Level

VRE	Virginia Railway Express
WIOA	DC Workforce Investment Council, Workforce Innovation and Opportunity Act
WMATA	Washington Metropolitan Area Transit Authority
WUS	Washington Union Station

1 Overview

1.1 Introduction

This report describes the proposed methodology for assessing existing conditions and environmental impacts associated with the Washington Union Station (WUS) Expansion Project (the Project).

The methodology for describing the existing conditions and the Project's environmental impacts is flexible to accommodate the scoping, technical analysis, agency coordination, and comment periods. This flexibility also allows for incorporation of input from regulators and cooperating agencies, and for new and emerging information as it becomes available. For each resource, this report describes:

- An overview and definition of the resource category;
- The regulatory context, including related Federal regulations and agency consultations;
- The limits of the Study Area(s) for each resource category;
- The information/data to be collected for the Environmental Impact Statement (EIS);
- The models or analytical techniques that will be used to identify potential direct, indirect, and cumulative impacts; and
- The method for evaluating impacts in the EIS.

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
- Safety and Security
- Public Health and Elderly and Persons with Disabilities
- Environmental Justice
- Cumulative Impacts
- Section 4(f) Determination

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' 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 WUS 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)

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

The EIS will describe the existing conditions of the Project Area (**Figure 1-1**), including key physical, biological, cultural, social, and economic resources. Environmental consequences of the Proposed Action and its alternatives (including the No-Action Alternative) will also be evaluated. The environmental resources included in the EIS analysis are based on the Federal Railroad Administration (FRA) Procedures for Considering Environmental Impacts review of pertinent Federal and state regulations, and scoping comments.

1.2 Regulatory Context

The National Environmental Policy Act of 1969 (NEPA) (42 USC 4321-4355) and the Council on Environmental Quality (CEQ) implementing regulations for NEPA (40 CFR 1500-1508) set the procedures through which Federal agencies must evaluate the potential effects of major Federal actions on the human and natural environment. The CEQ implementing regulations outline what Federal agencies must do to achieve the goals of the act. To comply with NEPA and CEQ regulations, the EIS will evaluate the potential effects of the proposed Project.

FRA is the lead Federal agency for the WUS Expansion Project EIS. The FRA *Procedures for Considering Environmental Impacts*[1] define the FRA's policies and procedures for reviewing projects in compliance with NEPA.

1.3 Study Areas

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.

1 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.

Figure 1-1. WUS Project Area

1.4 General – Analysis Years

The EIS will analyze a No-Action and the Action Alternatives. The EIS will analyze impacts in the peak construction year and the planning year. The peak construction year is assumed to be 2030 and the planning year is assumed to be 2040. The determination regarding the years assigned to these milestones will be determined when detailed phasing strategies are confirmed during the alternatives refinement phase of the Project. The EIS may also examine an opening year if FRA finds that the peak construction year and planning year are projected to be greater than 10 years apart. The EIS analyses will use 2017 as the baseline year used to describe the Affected Environment.

1.5 General – 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, because of a proposed Federal action. The EIS will use 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 in the methodology description for each resource.

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

- **Regulation Review** – Identifying Federal, state, and local regulations relevant to the scope and focus of the assessment of existing conditions. Pertinent 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.

1.6 General – Evaluation Impacts

The impact analysis will evaluate post-construction (operational) and construction impacts for each resource. The analysis will also consider direct, indirect, and cumulative impacts for each resource. The CEQ (40 CFR 1500-1508) provides the following definitions:

- ***Direct effects*** are caused by the action and occur at the same time and place.
- ***Indirect effects*** are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems.

- ***Cumulative impact*** is the full impact on the environment which results from the compilation of incremental impact of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency (Federal or non-Federal) or person undertakes such actions.
- The duration, significance, and outcome of potential effects related to the Project will vary based on the environmental consequences of constructing and operating the Project. For each resource, the analysis will consider the duration and significance of the effects, and whether effects are beneficial or adverse, as defined below:
- Duration: Short-term effects are those that may occur only during a specific phase of the Project; such as during construction activities. Long-term effects are those that would occur over a longer duration, such as the lifetime of Project operations.
- Significance: Minor effects are those that may be perceptible but are of very low intensity and may be too small to measure. Moderate effects are those that are more perceptible and typically are more amenable to quantification or measurement. Major effects are those that, in their context and due to their intensity, have the potential to meet the thresholds for significance set forth in the Council on Environmental Quality (CEQ) regulations (40 CFR 1508.27).
- Significance requires consideration of both context and intensity. Depending on the nature of the topic, relevant contexts include society as a whole (human, national), the affected region, the affected interests, and the locality. Intensity refers to the severity of impact and includes consideration of beneficial and adverse impacts, and a wide range of criteria. Among these criteria are public health and safety, unique characteristics of the geographic locale, the level of public controversy, whether the action threatens to violate other laws, and other considerations.
- Beneficial or Adverse: A beneficial effect may cause positive outcomes to the natural or human environment. In turn, an adverse effect may cause unfavorable or undesirable outcomes to the natural or human environment.

1.6.1 Evaluation of Mitigation Measures

Depending on the impact assessment results for each resource area, the need for mitigation will be evaluated and preliminary mitigation recommendations may be provided. Mitigation measures will be identified and discussed for any unavoidable impacts association with the Project.

1.7 Alternatives and Key Assumptions

The EIS will evaluate the environmental effects of each of the Project alternatives, including the No Action Alternative. A summary of the alternatives addressed in the EIS and the assumptions used in the alternatives analyses follow below.

1.7.1 No Action Alternative

The CEQ NEPA Regulations (40 CFR 1502.14) and FRA NEPA Procedures (Federal Register [FR] 64:28545, May 26, 1999) require that the EIS evaluate the No-Action Alternative. For this Project, the No-Action Alternative is the state in which the proposed WUS Expansion Project is not constructed. The No-Action Alternative includes those actions within the Project Area that are planned and predictable in the planning year of 2040. The Project Area, shown in **Figure 1-1**, includes WUS and portions of the Amtrak yard where construction would occur for the Proposed Project.[2] Generally, the No-Action Alternative includes the following projects:

- Short-term station improvement and restoration projects conducted by the Union Station Redevelopment Corporation (USRC) and its retail leaseholder and parking garage operator;
- Station, storage facility, and track improvements conducted by Amtrak for maintaining a state of good repair and condition;
- Virginia Railway Express (VRE) plans for expanding their storage capacity near New York Avenue;
- Local transportation projects including the H Street Bridge replacement and the District Streetcar extension;
- NEC FUTURE; and
- The private air-rights development project.[3]

The No-Action Alternative also includes increased traffic on roadways adjacent to the Project Area due to predictable growth in population and traffic based on forecasts from the local Metropolitan Planning Organization and the Metropolitan Washington Council of Governments (MWCOG). The predictable growth in population and traffic in the No-Action Alternative will be estimated using MWCOG travel demand data for the transportation analysis zones nearby to WUS.

In the EIS, the No-Action Alternative will be compared to the existing 2017 conditions.

1.7.2 Action Alternatives

Action Alternatives are versions of the Project under consideration in the EIS. Each of the Action Alternatives will incorporate the program elements described in *Section 1.1*, Introduction, and will be assessed based on the environmental impacts for each resource, and the ability of each alternative to meet the Project's Purpose and Need. Each Action Alternative will be compared to 2017 existing conditions and the No-Action Alternative.

---

2 Reasonably foreseeable projects within the larger Study Area are identified and evaluated in the Cumulative Impacts section of the DEIS.

3 The specific projects assumed for the No-Action will be described in greater detail in the No-Action description in the DEIS.

2 Natural Ecological Systems

2.1 Overview and Definition

The Project Area is fully developed and there are no natural ecological systems within the Study Area. Resources that are not present in the local Study Area will be stated up front in the chapter, and no impact assessment will occur. The land use cover map prepared for the Environmental Impact Statement (EIS) will document the absence of natural ecological systems. The methodology outlined below will define the potential natural ecological systems within the vicinity of Washington Union Station (WUS) and provide a methodology for evaluating impacts, should any resources be present.

2.2 Regulatory Context

The following regulations and guidance provide the regulatory context for this analysis:

- Endangered Species Act of 1973 (ESA) (16 USC 1531) and implementing regulations (50 CFR 402);
- Bald and Golden Eagle Protection Act (16 USC 668);
- Migratory Bird Treaty Act of 1918 (MBTA) (16 USC 703-711) and implementing regulations (50 CFR 10);
- Guidance for Presidential Memorandum on Environmentally and Economically Beneficial Landscape Practices on Federally Landscaped Grounds (60 FR 40837);
- Executive Order 11990, *Protection of Wetlands* (42 FR 26961);
- 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);
- Executive Order (EO) 11988, *Floodplain Management* (42 FR 26951);
- EO 13807*, Establishing Discipline and Accountability in the Environmental Review and Permitting Process for Infrastructure*; and
- Coastal Zone Management Act (CZMA) (16 USC 1451-1464).

2.3 Study Area

This section defines the local and regional study areas for the ecological systems analysis.

2.3.1 Local

The local Study Area includes the Project Area, which spans from the historic entrance to K Street NE above the tracks, and the area within 150 feet of the Project Area. This Study Area includes all areas in which natural resources could be directly or indirectly affected by construction or operation of the Project.

2.3.2 Regional

The regional Study Area includes the central area of Washington, DC (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 to include the Potomac and Anacostia Rivers.

2.4 Affected Environment

This section will identify existing wetlands, threatened and endangered species, flood hazards and floodplain management areas, and any areas included in the Coastal Zone, if present, within the local and regional Study Areas as applicable.

2.4.1 Data Sources

Data sources include information available from the Department of Energy and Environment (DOEE), National Park Service (NPS), U.S. Fish and Wildlife Service (USFWS), and field observations.

2.4.2 Methodology

This section will draw from these data sources to describe any natural resources within the local Study Area and, if relevant, natural resources within the District.

2.4.3 Existing Conditions

Wetlands and Other Waters of the U.S.

The local Study Area is fully developed, and there are no surface water bodies or wetlands within the local Study Area. The land use cover map prepared for the EIS will document the absence of surface water bodies and wetlands. The description of existing conditions will also describe Tiber Creek, based on published sources and information provided by DOEE. According to available data sources (U.S. Geological Survey [USGS] 1975), Tiber Creek was formerly a system of freshwater stream tributaries to the Potomac River. One branch flowed through the area currently occupied by WUS into the main stem of the creek, which was converted to a canal and, in the late 1800s all of Tiber Creek was placed in an underground culvert system and is referred to as an “underground sewer.”

Current research shows that this is currently a combined sewer for much of northeastern DC and also collects stormwater runoff. This underground conduit is not a jurisdictional Water of the United States under the Clean Water Act (CWA).

Threatened and Endangered Species

In response to a data request in October 2016 through the USFWS' Information for Planning and Conservation (IPAC) system, the USFWS provided a determination that no Federally-listed species occur in the local Study Area between WUS and K Street NE. A second IPAC data request will be filed at the time the impact analysis is performed for each of the alternatives. This will be to confirm that no listed species are within the local Study Area for track improvements. The second IPAC data request is necessary as the original IPAC determination only covered the station and rail yard south of K Street and did not include track work extending to the northeast.

Flood Hazards and Floodplain Management

The local Study Area is not within a mapped Federal Emergency Management Agency (FEMA) floodplain. The applicable FEMA map will be included in the EIS to document the absence of this resource.

Coastal Zone Management

The local and regional Study Areas are not within the mapped Coastal Zone.

Wildlife

Field observations will be used to identify any potential wildlife or wildlife habitat within the local Study Area. Preliminary field studies performed in August 2016 demonstrate that there are no natural habitats within the local Study Area. Several passerine birds common in urban environments, such as house sparrows, may inhabit the local Study Area, and have been observed roosting in street-side ornamental trees along East First Street as well as under the H Street Bridge.

2.5 Environmental Consequences

The natural ecological systems impact analysis will evaluate the Project's direct and indirect impacts on wetlands and other waters of the U.S. and wildlife if the Affected Environment research demonstrates that any resources are present.

2.5.1 General Methodology

The impacts of the Project will be discussed using both quantitative and qualitative methods, and where feasible and applicable, will be identified in association with particular actions proposed by an alternative. Impacts will be identified for each alternative, including any beneficial impacts. Impacts are (direct) the loss of natural habitats or (indirect) the alteration of natural habitats in a way that would affect their functions and attributes.

2.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to the existing conditions developed in the Affected Environment analysis.

3 Water Resources and Water Quality

3.1 Overview and Definition

This section will focus on three water resource categories: stormwater (impacts to surface water and groundwater quality), water supply, and wastewater. Natural surface water resources are also addressed in Chapter 2, *Natural Ecological Systems*. This section will include information on:

- Existing surface and groundwater resources;
- Existing connections at Washington Union Station (WUS) to DC Water stormwater, water supply, and wastewater infrastructure;
- Existing potable water usage and wastewater generation;
- Regulatory requirements and permits;
- Impacts to the quality and quantity of surface water and groundwater;
- Projected potable water usage and wastewater generation;
- Impacts to DC Water infrastructure, including stormwater, water supply, and wastewater; and
- Proposed measures to mitigate for any short-term (construction-phase) or long-term (operational) impacts to water quality or infrastructure level-of-service.

3.2 Regulatory Context

Federal and DC regulations and guidelines that the analysis will consider include:

- U.S. Clean Water Act (CWA)/Water Quality Act of 1987, (33 USC 1251-1376) 401 and 402;
- Federal Water Pollution Control Act (CWA) of 1972 (33 USC 1251-1376) as amended by the CWA (1977) and the Water Quality Act (1987);
- U.S. Safe Drinking Water Act of 1974 (SDWA) (42 USC 300f);
- U.S. Ground Water Rule (71 FR 65574);
- U.S. Environmental Protection Agency (EPA) National Pollutant Discharge Elimination System (NPDES) Construction General Permit;
- Energy Independence and Security Act of 2007;

- Executive Order 13693, *Planning for Federal Sustainability in the Next Decade*;
- Executive Order 13508, *Chesapeake Bay Protection and Restoration*;
- DC Water Pollution Control Act of 1984, as amended (DC Law 5-188);
- DC Storm Water Permit Compliance Amendment Act of 2000 (DC Law 13-311);
- DC Municipal Regulations, Title 21 Water and Sanitation;
- District Department of Transportation (DDOT) *Green Infrastructure Standards*;[4]
- Department of Energy and Environment (DOEE) *Stormwater Management Guidebook*;[5]
- *DC Water Green Infrastructure Utility Protection Guidelines*;[6] and
- *DC Water Project Design Manual Volume 3 Infrastructure Design*.[7]

3.3 Study Area

The Study Area will extend 500 feet from the Project Area to encompass adjacent connections to DC Water stormwater, water supply, and wastewater infrastructure. While the assessment will focus on the Project Area and connected infrastructure, it will also characterize and evaluate potential impacts on water resources and infrastructure outside the Study Area, including receiving waterbodies, water sources, and wastewater treatment facilities. The Study Area will be determined based on the data sources listed below, therefore the EIS will include a more exact description and depiction of the Study Area.

3.4 Affected Environment

Using the data sources below, this section will characterize the current condition of the resource in the Study Area. This section will summarize the existing water resources information for the Project.

3.4.1 Data Sources

The analysis will draw on the following reports and data:

- DC NPDES Permit Number DC0000221 - Authorization to Discharge under the NPDES Municipal Separate Storm Sewer System Permit, Effective October 7, 2011;

4 District Department of Transportation (DDOT). 2014. Green Infrastructure Standards.
5 District Office of Energy and Environment (DOEE). July 2013. Stormwater Management Guidebook. https://doee.dc.gov/swguidebook. Accessed June 6, 2017.
6 DC Water. July 2013. Green Infrastructure Utility Protection Guidelines.
7 DC Water and Sewer Authority. 2001. Project Design Manual Volume 3, Infrastructure Design. https://www.dcwater.com/sites/default/files/Project%20Design%20Manual%20Volume%203%20Infrastructure%20Design.pdf. Accessed June 6, 2017.

- DC DOEE Water Quality Assessment 2016 Integrated Report to EPA, 305(b) and 303(d) Clean Water Act;
- Total Maximum Daily Load (TMDL) documents for Potomac River, Anacostia River, Chesapeake Bay, and tributaries;
- Geographic Information System (GIS) maps from USGS, Natural Resource Conservation Service (NRCS), DC GIS, and other sources;
- Reports from past geotechnical investigations in the Project Area and vicinity, if available;
- Topographic survey of Project Area;
- As-built plans of WUS stormwater, water, and wastewater infrastructure, including connections to DC Water infrastructure;
- DC Water record plans of stormwater, water, and wastewater infrastructure;
- Existing WUS permits related to water resources;
- WUS records for current water usage;
- Occupancy data for estimating current wastewater generation; and
- Reports and/or qualitative assessments from DC Water regarding existing infrastructure capacity and deficiencies.

3.4.2 Methodology

Drawing from these data sources and in coordination with DC Water and DOEE, a comprehensive description and mapping of existing water resources will be developed. The Affected Environment water resources description will include:

- Stormwater, water supply, and wastewater infrastructure at WUS and connection points to DC Water infrastructure;
- Drainage area delineations in ArcGIS for the Project Area, with detailed information on area, impervious cover, hydrologic soil group, and water table for each drainage area;
- Receiving waterbodies for stormwater and/or combined-sewer overflows, as applicable;
- Water quality impairments and TMDL requirements for receiving waterbodies;
- Current potable water usage at WUS and description of water source; and
- Current wastewater generation at WUS and description of the wastewater treatment facility.

3.5 Environmental Consequences

The water resources impact analysis will evaluate the Project's impacts to water resources and DC Water infrastructure during construction and operation of the Project.

3.5.1 General Methodology

This methodology will characterize impacts to surface water and groundwater quality, and to DC Water stormwater, water supply, and wastewater infrastructure. The relative impacts of each alternative, including the No-Action Alternative, will be compared based on the following information and indicators:

- Total area of land disturbance;
- Proposed stormwater collection, treatment, and conveyance systems;
- Proposed mitigation strategies such as Best Management Practices (BMPs) for short-term (construction) and long-term impacts, including Low-Impact Development (LID) measures;
- Stormwater and water quality-related permit requirements;
- Drainage area delineations in ArcGIS for the Project Area, with detailed information on area, impervious cover, hydrologic soil group, water table, and stormwater hotspots for each drainage area;
- Spreadsheet calculation of regulated Stormwater Retention Volume (SWRv) per the DOEE Stormwater Management Guidebook;
- Receiving waterbodies for stormwater and/or combined-sewer overflows, as applicable;
- Water quality impairments and TMDL requirements for receiving waterbodies, and a qualitative assessment of the alternative's compliance with those requirements and potential impact on receiving waterbodies;
- Projected potable water demand at WUS, description of the water source, and qualitative assessment based on consultation with DC Water on the capacity of the water supply infrastructure to meet that demand;
- Proposed water conservation measures to be incorporated into the Project;
- Projected wastewater generation at WUS, description of the wastewater treatment facility, and qualitative assessment based on consultation with DC Water on the capacity of DC Water wastewater infrastructure to convey and treat those flows, and potential effects on infrastructure level-of-service; and
- Proposed wastewater mitigation measures to reduce wastewater flows to DC Water infrastructure and/or to offset negative impacts on infrastructure level-of-service.

3.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to existing conditions.

3.5.3 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to existing conditions and the No-Action Alternative in each milestone year.

3.5.4 Methodology for Evaluating Construction Impacts

Temporary, construction period impacts to surface water and groundwater quality, and to DC Water stormwater, water supply, and wastewater infrastructure, will be assessed for each alternative. The evaluation will qualitatively assess potential impacts resulting from construction phasing, staging location, and techniques including:

- Location of construction staging and stockpile areas;
- Likely construction phasing scenarios;
- Proposed construction-phase spill prevention and waste-management practices; and
- Proposed construction-phase erosion and sediment control BMPs.

3.5.5 Methodology for Evaluating Mitigation Measures

Based on the results of the impact assessment, the need for mitigation will be evaluated and preliminary recommendations will be provided. Unavoidable impacts to water resources and measures to minimize or mitigate for adverse changes in stormwater, water quality, groundwater, potable water demand, or wastewater generation will be identified. The following mitigation measures will be recommended and evaluated:

- Construction-phase mitigation measures based on available best practices to include: erosion and sedimentation controls, and prevention of surface water and groundwater contamination.
- Post-construction mitigation measures will include source-control measures to minimize the generation of pollutants and runoff, and stormwater treatment facilities to manage runoff from the Project.
- Mitigation for potential impacts to stormwater, water supply, and wastewater infrastructure will be identified through collaboration with DC Water, and may include water conservation, water reuse, and infrastructure modifications.

Recommended mitigation measures will be in accordance with U.S. EPA's 2017 NPDES Construction General Permit, *DDOE Stormwater Management Guidebook, DDOT Green Infrastructure Standards, DC Water Green Infrastructure Utility Protection Guidelines,* and *DC Water Project Design Manual Volume 3 Infrastructure Design*.

4 Solid Waste Disposal and Hazardous Materials

4.1 Overview and Definition

Solid waste is the broader regulatory term that encompasses Resource Conservation and Recovery Act (RCRA) hazardous waste. The term solid waste does not imply the waste is non-hazardous. The RCRA states that "**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."[8] Solid waste also includes construction debris and excavated soils.

The term **hazardous materials** will collectively be used to describe hazardous substances, as defined by the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); hazardous wastes, as defined by the RCRA; asbestos; and petroleum products. 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 CFR 1910.1200. **Hazardous waste** specifically pertains to a solid waste that is a known, RCRA- listed hazardous waste or that meets the RCRA-defined characteristics of a hazardous waste. **Non-hazardous waste** is solid waste not defined as a hazardous waste under RCRA.

As it relates to the Project, the Federal Railroad Administration's (FRA) *Procedures for Considering Environmental Impacts*,[9] 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, it states, "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."

---

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

9 U.S. Department of Transportation, Federal Railroad Administration (FRA). 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.

At a Federal level, non-hazardous industrial solid waste and municipal solid waste (MSW) are managed under the Solid Waste Program (RCRA Subtitle D), which sets criteria for municipal solid waste landfills and other solid waste facilities, and prohibits the open dumping of solid waste.[10]

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. Therefore, it will be necessary to identify the potential impacts the Project will have on solid waste and hazardous materials resources, as well as the potential to encounter these materials during construction

Transportation projects that include the excavation, and/or structure demolition or modification will have the potential to encounter hazardous materials. 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.

4.2 Regulatory Context

The Federal and local regulations governing solid waste disposal include:

- RCRA Solid Waste Regulations, 40 CFR 239-282;
- Government of the District of Columbia Department of Environment and Energy (DOEE) Control of Asbestos, Title 20 DCMR 800;
- Asbestos Notification Form, DOEE10, Air Quality Division;[11]
- District of Columbia Hazardous Waste Regulations, 20 DCMR Chapters 40 through 54;
- The U.S. Environmental Protection Agency (EPA) National Emission Standards for Hazardous Air Pollutants (NESHAP) Regulations, 40 CFR 61;
- Green Construction Code, Sections 406 and 503 of Title 12K of the District of Columbia Municipal Regulations (12K DCMR 406, 503);
- Toxic Substances Control Act (TSCA) Polychlorinated Biphenyl (PCB) regulations, 40 CFR 761;

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

[11] Government of the District of Columbia, Department of Energy and Environment, Air Quality Division. Notification of Demolition and Renovation. https://doee.dc.gov/sites/default/files/dc/sites/ddoe/publication/attachments/Form%20-%20Asbestos%20Project%20Notification%20V3.pdf. Accessed July 20, 2017.

- TSCA, 15 USC 2601-2692 including the Asbestos Hazard Emergency Response Action (AHERA);
- OSHA Lead in Construction Standard, 29 CFR 1926.62;
- OSHA Standards for Hazardous Materials, 29 CFR 1910 and 1926;
- OSHA Hazard Communication, 29 CFR 1910.1200.;
- CERCLA of 1980 as amended, 42 USC 9601 et seq.;
- RCRA and Superfund Amendments and Reauthorization Action, 42 U.S.C. 6901 et seq.;
- DOEE Control of Asbestos, Title 20 DCMR 800; and
- District of Columbia Illegal Dumping Enforcement Amendment Act of 1994, DC Law 10 117, DC Official Code 8-901 (et. seq.).

The 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 interstate and intrastate carriers. Hazardous materials in rail cars can only be shipped by persons registered by the USDOT and the hazardous material must be properly classed, described, packaged, marked, labeled, and in condition for shipment. In addition, under RCRA and Washington, DC (the District) statutes, DC 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 DC Law 2-64, DC Code 8-1301 through 8-1322. The DC Voluntary Cleanup Program (VCP) provides a framework for conducting the cleanup of any brownfield or site contaminated by hazardous substances that is not listed in the EPA's National Priority List during property development in the event that the property owner, developer, or other entity seeking coverage did not cause or contribute to the contamination.

4.3 Study Area

This section defines the local and regional study areas for the solid waste disposal and hazardous materials analysis.

4.3.1 Local Study Area

The local Study Area for hazardous waste will be the same as the Project Area.

4.3.2 Regional Study Area

It is considered unlikely that solid waste present at a regional level would require handling and/or storage within the Project Area. 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 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

The disposal of solid wastes will require regional level transportation and the environment of the regional communities where these landfills and/or incinerators are located shall be generally assessed for potential of impact. At a minimum, regional landfills will be identified by their location and accepted waste types. Therefore, the regional Study Area will be comprised of the surrounding states where major licensed solid waste receiving facilities are most likely to be present including Maryland, Pennsylvania, Virginia, and Delaware.

4.4 Affected Environment

This section will identify the existing solid waste and hazardous materials currently generated from Washington Union Station (WUS) and associated Amtrak facilities and existing hazardous materials potentially present in soils or groundwater.

4.4.1 Data Sources

Existing sources and quantities of solid waste being generated at WUS will be identified using existing data provided by the property owner(s), tenants, and/or managers, which may be compiled in reports and databases. Information will be requested regarding the existing WUS solid waste disposal practices, including volume, sources, disposal facilities and locations, recycling programs, and existing permits. Data sources include:

- A database search report purchased from a third-party data collection service and then reviewed by the Project team to identify documented and potential sources of contamination, such as hazardous waste sites, within the Study Area. As noted above, the records search will include databases that are generally consistent with American Society for Testing Materials (ASTM) 1527-13 Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process. Additional data sources may be called upon as necessary to supplement the database search.
- Municipal and historical files used to help confirm ownership history and past usage of sites identified through the database search, including:

- Tax records;
- Aerial photographs;
- Topographic maps;
- City Directories;
- Health Department records;
- Fire Department/EMS records;
- Sanborn Fire Insurance Maps; and
- DOEE records for any leaking underground storage tanks (LUSTs) and Voluntary Cleanup Program (VCP) properties within the Project Area.

4.4.2 Methodology

This section will draw from these data sources to build a profile of the existing solid waste disposal practices and establish a baseline for existing solid waste generation and disposal for the Study Area. The profile will include the types of solid waste, the sources of solid waste, the volume of solid waste generated, and types of disposal facilities and their respective locations, to the extent this information is made available.

This section will also establish existing conditions for hazardous materials impacts (such as those from documented spills/releases) located within the Project Area. The following steps will be taken:

- Review existing data and prior environmental reports available for the Project Area and alternatives, as applicable.
- Obtain copies of hazardous materials-related permits issued to the facility from the regulatory departments and facility managers, if available.
- Based on the findings of the database search and site reconnaissance, rank environmental concerns identified by potential level of risk to environmental media within the Project Area (high, moderate, or low).
- Should a property[12] need to be acquired to facilitate the Project, a full ASTM Phase I Environmental Site Assessment will be conducted in accordance with ASTM 1527-13 for these properties prior to property acquisition.
- Identify 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

[12] This excludes private and Federal air-rights property, which is not associated with hazardous materials impacts, since this type of property does not contain subsurface environmental media.

outline the property safety protocols around hazardous materials such as proper handling, personal protective equipment, and more.

4.4.3 Environmental Consequences

The solid waste disposal and hazardous materials impact analysis will evaluate the Project's direct and indirect impacts to existing environmental contamination within the Project area and the Project's management and disposal of solid waste and hazardous materials during operation (post-construction) and during construction.

4.4.4 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared against existing conditions. Existing conditions are the baseline amount of solid waste generated by the facility under normal operating conditions. The existing conditions may include solid waste generation, handling, and/or storage. Generally, existing contaminated sites within the Study Area would continue to be addressed in accordance with the regulatory framework. Potentially contaminated sites not previously identified would not be assessed or mitigated without the implementation of the Project.

The No-Action Alternative will include any anticipated changes in solid waste generation, handling, and/or storage associated with those actions included under the No-Action condition including the proposed private air-rights development. The No-Action Alternative will also include potential changes to the profile of solid waste present within the Project Area and require an evaluation in respect to the generation, handling, and/or storage of solid waste and the potential risk of hazardous materials release.

4.4.5 Methodology for Evaluating the Action Alternatives

The Action Alternatives have the potential to impact the existing generation, handling, and/or storage of solid waste and hazardous materials. Each Action Alternative will be compared to existing conditions and the No-Action Alternative. In accordance with FRA's Environmental Procedures, the alternatives will be assessed with respect to District and local standards for solid waste (including hazardous materials) disposal. Each Action Alternative will be compared to the hazardous materials concerns identified as existing conditions and also compared to the No-Action Alternative.

4.4.6 Methodology for Evaluating Construction Impacts

Solid waste and hazardous materials generated as a result of construction activities will be assessed based on the approximate locations, types, and quantities (if possible) to determine the potential environmental impacts to the region. Construction impacts will be presented in aggregate. As needed, to supplement this evaluation it may be necessary to perform a basic hazardous building materials assessment for any building or structure that will be renovated or demolished as part of the Project to supplement the estimation of solid waste. Hazardous building materials are typically conducted by a firm possessing the appropriate licenses (asbestos inspector, lead inspector, etc.) in general compliance with AHERA, OSHA, and/or ASTM standards.

Solid waste impacts during the construction phase will be evaluated as follows:

- Identify site occupants and/or site workers that are more susceptible to the adverse effects of exposure to toxic chemicals, pesticides, and other pollutants (in other words, sensitive receptors due to age or pre-existing health conditions). Identify the location of sensitive receptors within close-proximity to potential construction activities. Examples of sensitive receptors include schools, hospitals, daycare facilities, elderly housing, convalescent facilities, and residents.
- Characterize types of solid waste and hazardous materials likely to be used during construction.
- If possible and depending on facility access, perform a hazardous materials building assessment for any building or structure that will be renovated or demolished as part of the Project. This includes the collection and analysis of samples. It also includes an inventory of the types, conditions, and quantities of potentially regulated wastes such as fluorescent light tubes, mercury switches, and emergency light batteries, among others. Additional wastes such as PCBs, lead paint, light ballasts, chlorofluorocarbons (CFCs), refrigerants associated with heating, ventilation, and air conditioning (HVAC) systems, exit signs, flammable materials, and more that may be encountered during the building assessment should be documented and assessed for proper disposal.
- Note documented hazardous waste sites that have the potential to be encountered during construction and the types of contaminants likely to be encountered in the various media.
- Identify best practices for properly addressing any spills of oil and/or hazardous materials that may occur during construction.

The solid waste disposal and hazardous materials impacts will be discussed using both quantitative and qualitative methods, and where feasible and applicable, will be identified with a particular component (or action) of the Project.

Solid waste disposal impacts will be identified for each alternative as follows:

- Identify the general categories of hazardous materials and waste, as well as associated sources that will be designated for disposal or recycling during demolition, renovation, or construction. Provide the results of the assessment, inventories, and analysis.
- Identify potential hazardous waste facilities for waste disposal/recycling within the region that typically handle these types of solid waste. Attention will be paid to the facility capacity, distance to the project, and transportation routes. Transportation routes will be specifically addressed in the Transportation section of the EIS.
- Identify hazardous materials permits and relevant solid waste regulations pertinent to solid waste management, mitigation, and diversion during the Project. As noted previously, solid waste includes RCRA hazardous waste.

Hazardous materials impacts will be identified for each alternative as follows:

- Assess each alternative for new sources of hazardous materials that would be introduced, such as potential contaminants associated with the construction or operation of the alternative and hazardous materials stored or used at or along the Project Area (rail greasers, traction power stations, etc.).
- Summarize how the regulated conditions, if identified, may affect construction techniques (for example, dewatering or foundation types), potential site infrastructure (such as, groundwater and stormwater management), construction workers' personal protective equipment (PPE) (based on site workers increased exposures), or necessary permits.
- Assess the need for additional investigation or mitigation, such as subsurface assessments or remedial plans dependent upon each alternative.

4.4.7 Methodology for Evaluating Mitigation Measures

Pending the results of the solid waste and hazardous materials assessment, the need for solid waste and/or hazardous materials mitigation will be evaluated and preliminary mitigation recommendations will be provided to reflect all applicable regulations. If contaminated soils or groundwater, or hazardous vapors, are anticipated to be encountered during construction of the Project, appropriate site remediation techniques or other measures to prevent exposure will be proposed. For instance, preparation of a Health and Safety Plan will be recommended to protect construction workers and the public from potential exposure.

To supplement, whenever possible, additional best practices to properly manage solid wastes (including hazardous waste and universal wastes) generated during construction will be implemented to mitigate impacts to nearby properties, residents, site occupants, and on-site workers. These mitigation strategies may include personal protective equipment, administrative controls, special handling procedures, dust and particulate control, and management and disposal of contaminated soil and groundwater in compliance with Federal and local regulations. When disposed of outside DC, state hazardous waste regulations will be adhered to in order to prevent release during transport and proper disposal in a landfill or incinerator permitted to receive or treat the waste. All mitigation measures will be developed to prevent construction delays and to provide adequate protection to workers and any nearby sensitive receptors.

5 Transportation

5.1 Overview and Definition

This section defines the resource category of transportation and introduces the methodology for assessing impacts. Impacts will be assessed across a variety of transportation modes, not just vehicular traffic. Railroad (including Amtrak, Virginia Railway Express ([VRE]), and Maryland Area Regional Commuter [MARC] Train), long-distance bus (intercity and tour/charter), private vehicle, ride-for-hire, bicycle, transit (Metrorail, Streetcar, commuter bus, DC Circulator, and Metrobus), and pedestrian impacts will be assessed.

5.2 Regulatory Context

The Federal Railroad Administration's (FRA) *Procedures for Considering Environmental Impacts*[13] 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. Applicable and relevant District statutes, regulations, and guidance include:

- National Capital Planning Commission (NCPC). *The Comprehensive Plan of the National Capital: Federal Elements, Transportation Element.*;[14]
- District Department of Transportation (DDOT) Design and Engineering Manual;[15]
- DDOT Pedestrian Safety and Work Zone Standards – Covered and Open Walkways;[16]

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

14 National Capital Planning Commission. 2016. "Transportation." Federal Elements of the Comprehensive Plan for the National Capital. https://www.ncpc.gov/docs/06_CP_2016_Transportation_Element_2.29.16.pdf. Accessed December 21, 2017.

15 District Department of Transportation. 2017. Design and Engineering Manual. https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/2017-06-30_DDOT_DEM.pdf. Accessed December 22, 2017.

16 District Department of Transportation. 2007. Pedestrian Safety and Work Zone Standards – Covered and Open Walkways. 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 June 6, 2017.

- DDOT Public Realm Manual;[17]
- DDOT DC Temporary Traffic Control Manual;[18] and
- District Department of Transportation Comprehensive Transportation Review Guidelines.[19]

The *Comprehensive Plan for the Nation's Capital: Federal Elements, Transportation Element* identifies policies to set parking specific ratios for Federal office buildings and "to encourage a gradual shift from SOV [single-occupancy vehicle] commuting to transit, walking, biking, carpooling/vanpooling, vehicle-sharing, and teleworking." (Transportation Element, pg 5). The parking policies described in the element focus on Federal employee commuting. As the Project does not envision Federal office use, the parking ratio goals outlined by NCPC do not appear to apply to the Project's parking program. However, the transportation analysis will document the provision of parking relative both to the overall demand for vehicle-based access to WUS and to the overall passenger activity at WUS."

5.3 Study Areas

The study areas for the transportation analysis are described below. The local Study Area will be refined in concert with DDOT.

5.3.1 Local

The local Study Area for transportation includes the Project Area, the immediately adjacent roadway network and key intersections near WUS. These key intersections will be identified based on traffic conditions and in coordination with DDOT.

5.3.2 Regional

The regional study area for transportation is the area of the jurisdictions that are members of the MWCOG—the local Metropolitan Planning Organization (MPO)—in Maryland, the District of Columbia, and Virginia. This regional study area is being selected because Washington Union Station (WUS) is a Project of regional significance that has an impact on transportation movements in different modes across the MWCOG area. It is at the geography of MWCOG that the Constrained Long-Range Plan and regional modeling efforts are conducted.

---

17 District Department of Transportation. 2011. Public Realm Manual. https://ddot.dc.gov/sites/default/files/dc/sites/ddot/publication/attachments/ddot_public_realm_design_manual_2011.pdf. Accessed June 6, 2017.

18 District Department of Transportation. 2006. DC Temporary Traffic Control Manual – Guidelines and Standards. https://comp.ddot.dc.gov/Documents/Temporary%20Traffic%20Control%20Manual.pdf. Accessed June 6, 2017.

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

5.4 Affected Environment

The multimodal transportation analysis will address the various modes of access to and from WUS (see *Section 5.1*) and how those modes affect the surrounding road network, sidewalks, bike system, and transit system.

5.4.1 Data Sources

- 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 (USPG), LLC;
  - Monthly passenger counts from USPG, LLC;
  - 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, LLC;
  - 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.[20]
- Bicycle
  - DDOT bicycle counts;

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

- 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
- 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 (MPD) 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.

5.4.2 Methodology

The current conditions analysis will summarize the existing conditions and issues related to overcapacity, level of service, or other relevant factors depending on the service, across all modes. Existing conditions will be documented from the data sources listed in *Section 5.4.1* for the range of transportation modes identified to provide a broad description of the transportation conditions as they exist. The most recent data available will be used for each data source and projected forward to 2017, if necessary. For traffic analysis, existing data sources listed above will be used to estimate existing Level of Service conditions at nearby intersections. Delay, volume-to-capacity ratio, and queue length will be considered. The model used to assess Environmental Consequences (see *Section 5.5*) will be calibrated to describe the existing conditions, as well.

5.4.3 Traffic Analysis Methodology

As part of the existing conditions analysis, traffic counts are conducted that include roadway classification, daily traffic information, bicycle and pedestrian volumes, and turning movements. Data are collected in the AM and PM peak hours from 6:00 AM to 9:00 AM and 4:00 PM to 7:00 PM.

An intersection capacity analysis is performed for the existing conditions at the intersections contained within the Study Area during the morning and afternoon peak hours. Synchro, Version 8.0 is 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 levels of service (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 are based on: the peak hour traffic volumes outlined previously; the lane use and traffic controls outlined previously; and 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.

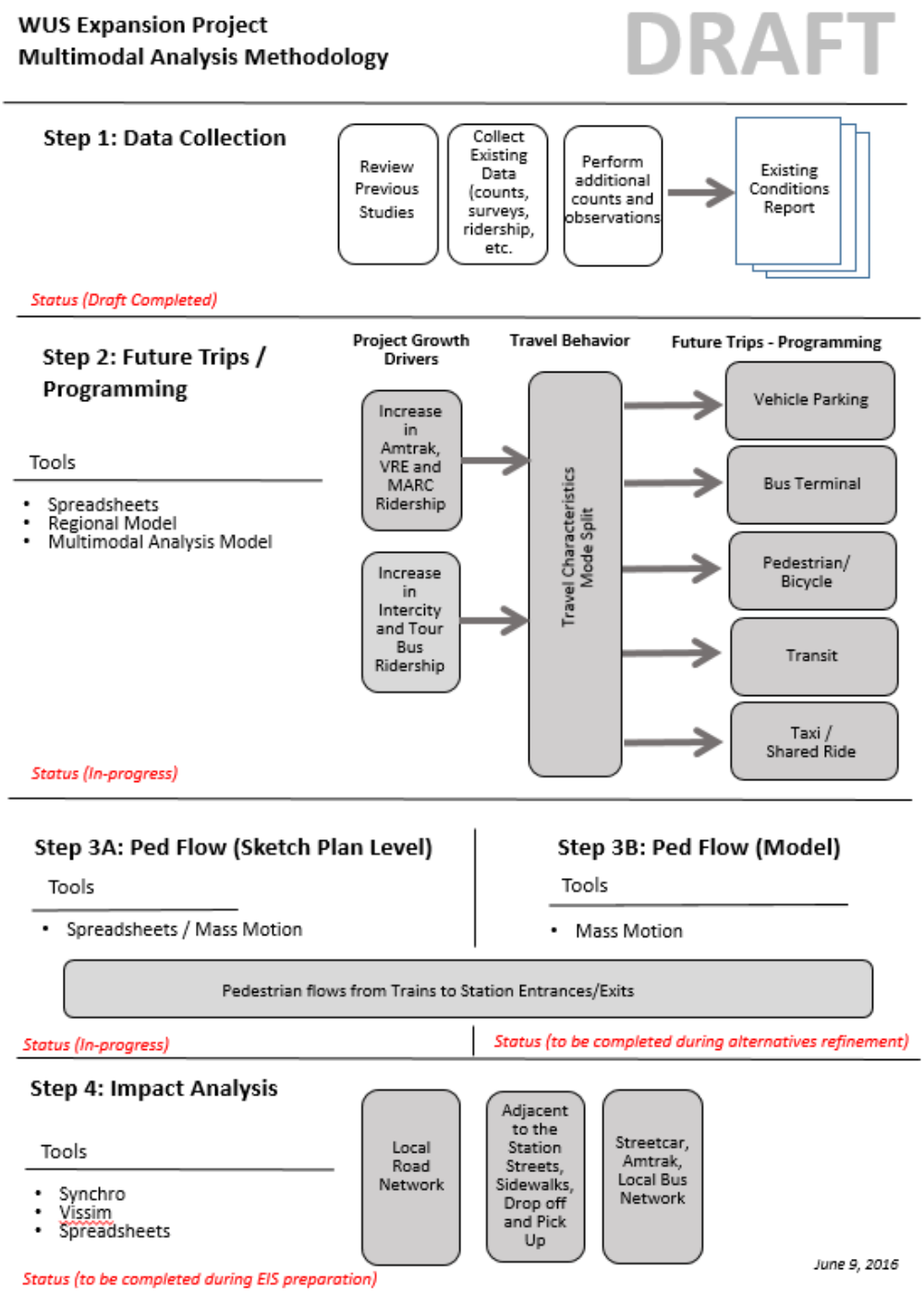
5.5 Environmental Consequences

The multimodal transportation analysis will address access to WUS via all modes of transportation and how those modes will affect the surrounding road network, sidewalks, bike system, and transit system. The analysis includes the effects of the Project on the adjacent road network due to changes in the volume or patterns of vehicular trips (cars, for-hire vehicles [taxis and TNCs], buses, delivery trucks).

5.5.1 General Methodology

The transportation analysis will use present and future transportation trip generation information to estimate future transportation volumes and the impacts of the Project on the range of transportation modes outlined above. Information will be collected from a mixture of agency sources (see *Section 5.4.1*) and site visits. The quality of the information may vary across agencies and the limitations of certain data sources will be noted in the analysis. The process is described in **Figure 5-1**. The analysis years will be the mid-point of construction (2030) and the planning year of 2040.

Figure 5-1. Multimodal Analysis Methodology



Key inputs will include:

- Projected ridership, service frequency, and schedule data (provided by Amtrak, DDOT, MARC, Washington Metropolitan Area Transit Authority [WMATA], VRE);
- Private and Federal air-rights development assumed program, including hotel, office, residential, and retail uses;
- Projected local transit ridership;
- Projected pedestrian and bicycle activity;
- Projected intercity bus ridership;
- Background growth (local area growth);
- Station retail and hotel uses; and
- Growth from other planned developments (residential, office).

With the existing condition data, projected future ridership and development data, and estimated mode splits,[21] projections for each mode will be developed across all alternatives and time horizons through a detailed "multimodal model." These projections will include daily, weekly, and AM/PM peak hour rail and transit ridership, traffic, and bicycle and pedestrian information.

Data sources will include:

- Northeast Corridor (NEC) FUTURE *Tier 1 EIS* – Amtrak, MARC, and VRE ridership;[22]
- Amtrak Terminal Infrastructure Study and Operations Plan;
- VRE *2040 System Plan*;[23]
- MARC Train *2040 Growth and Investment Plan*;[24]
- NEC FUTURE *Tier 1 Final Environmental Impact Statement (FEIS)* – Intercity bus projections;
- MWCOG *Regional Bus Staging, Layover, and Parking Location Study*;[25]

21 Mode splits are the percentage of trips that are taken via a certain mode. If twenty percent of station users take transit, their "transit mode split" is twenty percent.

22 Federal Railroad Administration. 2017. NEC FUTURE Tier I Final Environmental Impact Statement. http://www.necfuture.com/tier1_eis/feis/. Accessed June 6, 2017.

23 Virginia Railway Express. 2014. System Plan 2040. http://www.vre.org/vre/assets/File/2040%20Sys%20Plan%20VRE%20finaltech%20memo%20combined.pdf. Accessed June 6, 2017.

24 Maryland Transit Administration. 2013. MARC Growth and Improvement Plan Update: 2013 to 2050. https://mta.maryland.gov/sites/default/files/mgip_update_2013-09-13.pdf. Accessed June 6, 2017.

25 Metropolitan Washington Council of Governments. 2015. Regional Bus Staging, Layover, and Parking Location Study.

- Destination DC visitor statistics;[26]
- WMATA Land Use Ridership Model (LURM);
- MWCOG Cooperative Forecast – WMATA ridership;
- Submissions from the private developer to FRA;
- DDOT DC Circulator ridership;
- DDOT Streetcar Ridership Projections;
- MWCOG 2040 Cooperative Forecast - local Transportation Activity Zone data; and
- DC land use sources including the DC Office of Planning, the DC Zoning Commission, the DC Board of Zoning Appeals, the District Department of Consumer and Regulatory Affairs, the North of Massachusetts Avenue (NoMa) Business Improvement District, the Mount Vernon Triangle Business Improvement District, the Capitol Hill Business Improvement District, and local Advisory Neighborhood Commissions.

The multimodal model that is developed has been constructed specifically for the context of WUS. However, its trip generation and origin-destination outputs are constructed using industry standards, including the Institute of Transportation Engineers (ITE) trip generational manual. The model will be similar to a standard trip generation model for a development project, with added complexity as a result of the different transportation and land use trip generators on the Project site. The model, and assumptions that underpin the model, will be reviewed by modeling experts, FRA, and DDOT for its accuracy and validity. Data from Amtrak, FRA WMATA, MARC, VRE, and DDOT will be used to inform the model. The model will be calibrated for existing conditions to confirm the accuracy of the model and then used to assess all alternatives, including the No-Action Alternative. The information from the WUS-specific multimodal model will be used to provide inputs for more detailed analysis of the transportation network and the pedestrian flow within the station. This more detailed analysis will be conducted using Synchro, VISSIM, and MassMotion, as described below.

Synchro analysis, which estimates the performance of intersections from changes in vehicle volumes, will be performed using Synchro 8.0 for the No-Action Alternative and the Action Alternatives at key intersections throughout the Local Study Area. This tool was chosen to provide a macroscopic overview of traffic conditions across a large number of intersections.

VISSIM analysis, which estimates intersection performance in greater detail than Synchro, will be performed for the Preferred Alternative for the areas immediately adjacent to WUS. This analysis will provide a microscopic assessment in detail of where WUS most directly interacts with the street network. The future year condition in VISSIM will be calibrated against the existing conditions, where traffic, pedestrian, and bicycle counts are all conducted and signal timing information is available, to confirm accuracy of analysis.

[26] Destination DC. "Washington, DC Visitor Research." https://washington.org/press/DC-information/washington-dc-visitor-research. Accessed July 24, 2017.

A pedestrian flow analysis, using MassMotion software, will be performed for the internal flow of the station itself. This analysis will test the ability of the station concourse and exits to appropriately handle the specific pedestrian flows within WUS and the overall volume of pedestrians in, and exiting, WUS.

These models along with other spreadsheet based tools will be used to analyze the impacts based on projected volumes. Long-term programming needs for each of the multimodal functions at WUS will be developed based on existing conditions data and future trip projections.

Following the development of program requirements, more detailed modeling will be developed to further analyze the impacts to all modes due to the increase in ridership at WUS. This modeling will serve as the basis for impact analysis that will include traffic, pedestrian, and bicycle facilities in the surrounding area. It is worth noting that the impact analysis will examine pedestrian flow to the Metrorail station fare gates and increased passenger volumes at the Union Station WMATA Station, but that the EIS and this analysis will not assess the impact of WUS Expansion on the broader Metrorail system.

The Pedestrian Flow analysis will be conducted using the MassMotion Model to simulate the flow of people within the station. **Figure 5-1** shows that there are two steps in this process: Sketch Plan and Model. Pedestrian analysis is initially focused on confirming the peak level of morning pedestrian flows to confirm concourse concepts provide adequate capacity. The modeling analysis provides an understanding of the overall volumes and passenger travel direction to exit the station. The terminal, platforms, concourses, and vertical circulation will be considered in this analysis. The following section describes the multimodal model.

Multimodal Model

The model will be used to develop multimodal transportation demands and impacts from both station and adjacent land uses and from rail transit services within and in close proximity to WUS. The model refers to both land use and transit activity at WUS that generate trips.

The model will use a set of mode splits to estimate how trips are distributed from the transit and land use generators into the broader transportation network. The transit mode splits will be sourced from Amtrak, VRE, MARC, and WMATA ridership surveys. The land use mode splits will derive from American Community Survey Census data and data from other development in downtown DC These mode splits will be reviewed by DDOT.

Land Use Generators

The model will consider transportation demands associated with the following land use changes:

- WUS – expansion of retail, office, hotel, and Amtrak “back of house” space at WUS property;
- Federal mixed-use air-rights development over WUS consisting of retail, office, hotel, and residential uses;
- Adjacent planned land uses; and

- Potential local study area development build-out.

The methodology for land use trip generation is outlined in **Figure 5-2**. As shown, the model will consider land uses discretely, adjust for internal trip making (trips between land uses) as appropriate, and assign trips among modes.

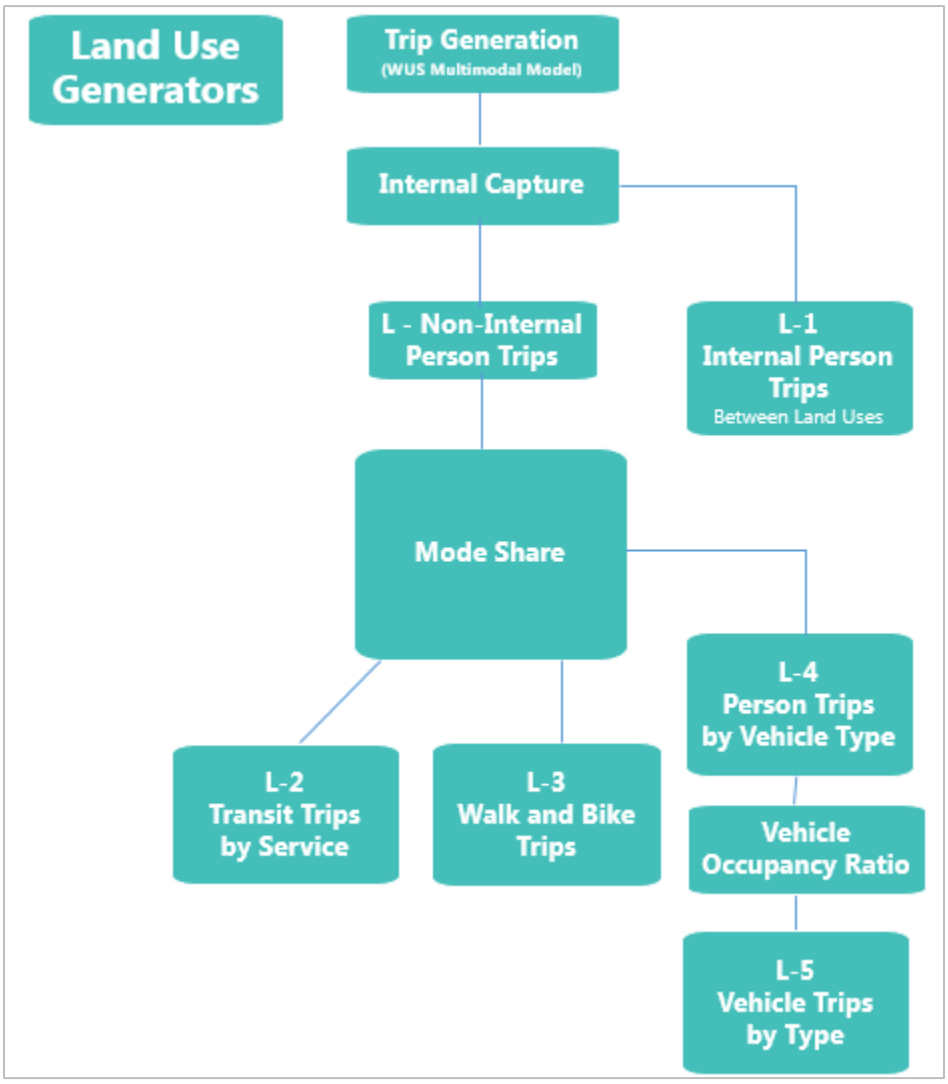
Potential land use changes will be drawn from known projects currently "in the pipeline",[27] and potential projects identified by government agencies and Business Improvement Districts, and the MWCOG regional land-use forecasts which estimate future population and employment for the study area.

Traffic volumes contained in the MWCOG regional model will be examined to develop an average annual growth rate for study area roadways to represent the background growth. These will be compared with historic Average Daily Traffic (ADT) rates for the study area to ensure reasonableness. This methodology for calculating growth rates considers all future projects and developments in the MWCOG model, and allows for distinct growth rates by direction and time of day. For those intersections immediately impacted by future volumes (such as driveways serving proposed developments), trip generation for those developments will be examined, where possible, to determine driveway volumes and balanced into the grown roadway network volumes. These development volumes and the MWCOG model rates will be taken into account while projecting future traffic forecasts. WUS-related trips will be distributed through the street network based on Amtrak and MWCOG data about the local origins and destinations of WUS users, and in conformity with current and future travel patterns in the region. This distribution will be reviewed by DDOT.

The internal capture rate for land use generators will be evaluated based on ITE guidance and professional judgment. Because of the density of uses within WUS and with a future Federal air-rights development, a small but clear internal capture is expected.

[27] The projects included in the pipeline have been identified by a DC government agency and/or local Business Improvement District (BID) as a project that is in the "development pipeline." These are projects under construction or development that can be reasonably expected due to their levels of planning and public approvals. Sources include: The Deputy Mayor for Planning and Economic Development, the Department of Community and Regulatory Affairs, the District of Columbia Housing Authority, the District of Columbia Office of Planning, the District of Columbia Board of Zoning Appeals, the District of Columbia Zoning Commission, Advisory Neighborhood Commission 6E, Mount Vernon Triangle Community Improvement District, NoMa Business Improvement District, and Capitol Hill Business Improvement District.

Figure 5-2. Land Use Trip Generation



Transit Generators

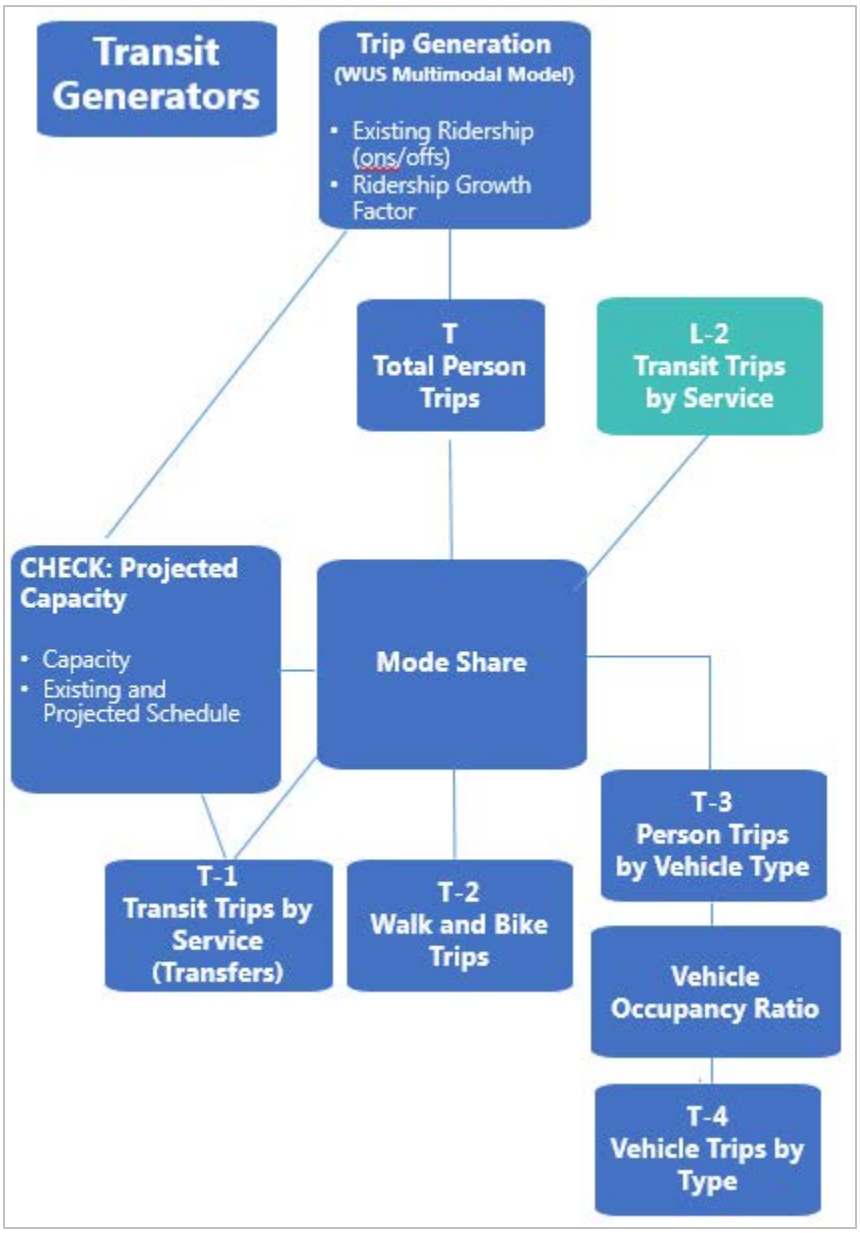
The model will consider demands associated with transit modes serving the WUS area. Transit trip generation projections will be developed for services in italics as part of the process outlined in **Figure 5-3**:

- *Amtrak (Acela, Long Distance, Regional)*
- *MARC*
- *VRE*
- *Metrorail*
- *Intercity Bus (Greyhound Megabus, BoltBus, Best Bus, Washington Deluxe)*
- Bikeshare, including dockless operations[28]
- Commuter Bus (Maryland Transit Authority [MTA], Loudoun County Transit [LCT], PRTC OmniRide)
- Local Bus (Metrobus, DC Circulator)
- Local Shuttles
- Streetcar
- Tours/Charter Bus

The methodology for transit trip generation is outlined in **Figure 5-3**. The model will consider existing ridership levels and projected growth by service and remove transit trips generated by land uses within and proximate to WUS. The model will also check the transit trip generation against targeted capacity and occupancy levels of the mode. These capacity levels will be confirmed with the service operators. For modes where transit-specific trip generation is not performed (such as, local transit), passenger volumes will be drawn directly from the land-use-based trip generation and the other transportation generators.

[28] Local stations to be considered are North Capitol Street & F Street, NW, Columbus Circle/Union Station, North Capitol Street and G Pl, NE, 2nd & G Street, NE, and 2nd Street and Massachusetts Avenue, NE.

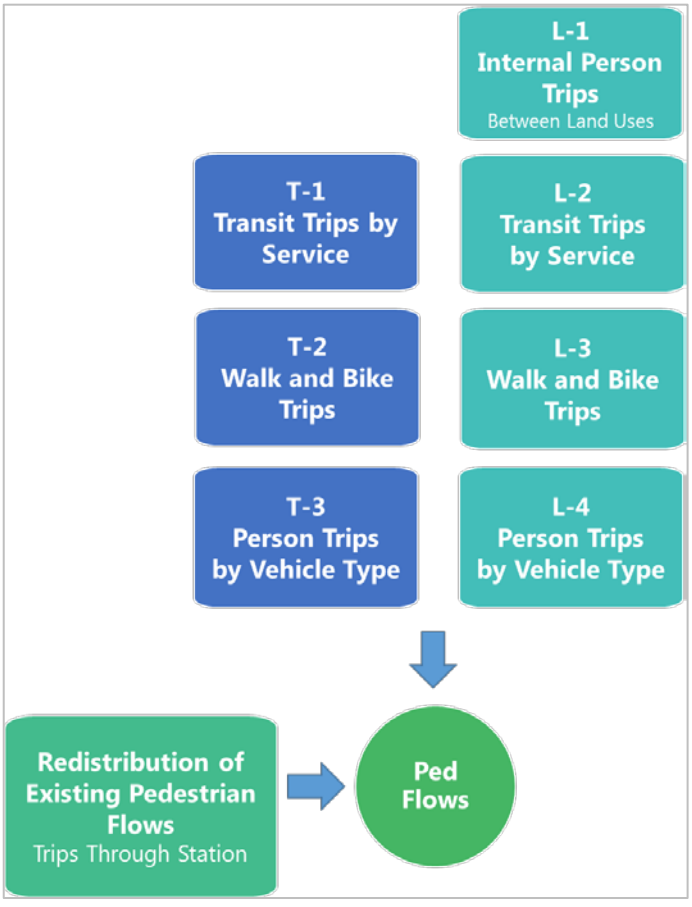
Figure 5-3. Transit Trip Generation



Pedestrian Flows

The model will aggregate pedestrian flows from land use and transit generators to develop a pedestrian origin-destination matrix (**Figure 5-4**). This matrix will also consider a potential for redistributing existing pedestrian flows currently traveling around WUS, which may be routed through WUS in the future due to improved permeability. The resulting pedestrian flows will support analysis of the WUS internal pedestrian facilities (platforms, elevators, concourses, stairs, doors, etc.), and of pedestrian facilities immediately adjacent to WUS (sidewalks, queuing areas, etc.) and within the local study area. As noted previously, the pedestrian volumes generated will feed into the pedestrian analysis in **Figure 5-1**.

Figure 5-4. Pedestrian Flows



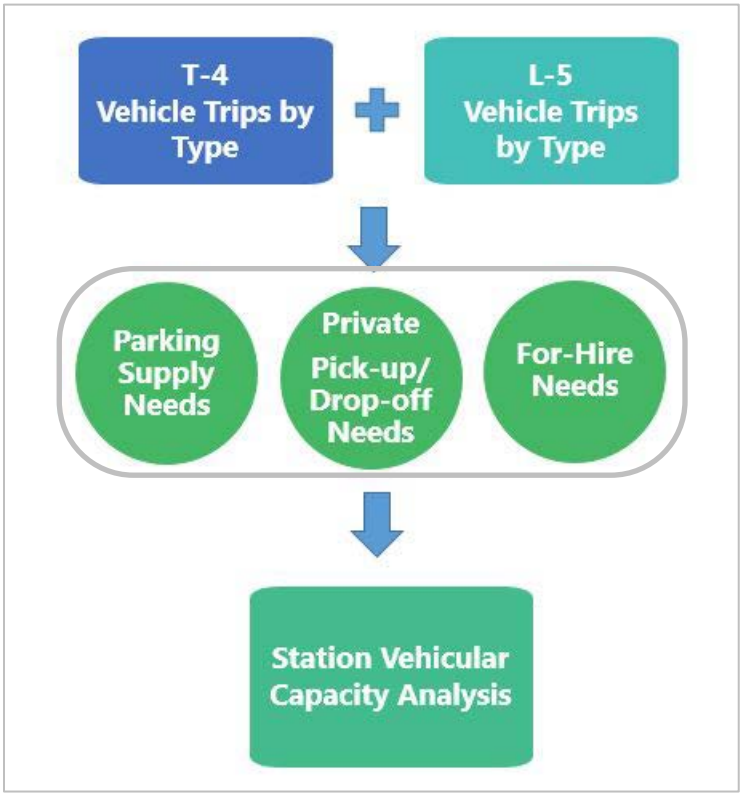
Vehicle Flows

The model will estimate vehicle demands generated by land use and transit. These demands will inform the VISSIM Model and Synchro Model. Vehicle trips will be distributed in coordination with the VISSIM and Synchro model development and analysis. These models will also be further informed by redistribution and/or growth of transit services utilizing the local study area roadway network.

The Synchro and VISSIM analyses will consider the different vehicular flows to and from WUS. These flows include parking demand, for-hire demand, and private pick-up and drop-off demand. The Synchro and VISSIM analyses will also incorporate intercity/tour/sightseeing bus movements to the extent that each of these is within the models' study area.

The impact analysis will provide an opportunity to further test the ability of the alternatives to handle the anticipated site volumes and inform mitigation activities. Issues of queueing and delay immediately around WUS will be considered, as will potential impacts in the broader transportation network. This analysis approach is visualized in **Figure 5-5** below. The approach can be described simply in the following way: Once the number of TRIPS associated with WUS is understood, that is translated into the curb and parking NEEDS associated with those TRIPS. The combination of the two are then analyzed to understand the functioning of the station directly adjacent to the station, in addition to our broader analysis work.

Figure 5-5. Vehicle Flows



5.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to existing conditions. The No-Action Alternative includes some Projects and growth that will change the local transportation network, including extensions of the H Street Streetcar, the H Street Bridge replacement, growth in railroad ridership and service, private air-rights development, and background growth. These Projects and this growth will be documented in the No-Action Alternative section. The changes to transportation from the No-Action Alternative in the study area will be assessed for mode specific impacts including:

- Amtrak and commuter railroads;
- Vehicular parking;
- Ride-for-hire circulation;
- Pedestrian and bicycle activity;
- WMATA Metrorail;
- WMATA Metrobus, DC Circulator, and other local bus; and

- Intercity and tour/charter bus.

Potential benefits to the transportation network in terms of enhanced multimodal connectivity, station access, safety, and impacts to the rail network will also be analyzed. At the same time, the potential for poor conditions and operational constraints placed on WUS infrastructure if NEC FUTURE volumes are to be realized and the WUS Expansion Project does not occur will be assessed.

5.5.3 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to existing conditions and the No-Action Alternative in each analysis year. In accordance with FRA Environmental Procedures, the EIS will assess the impacts of each alternative on local and regional transportation networks. These impacts may include indirect effects as a result of the Project. Indirect impacts include impacts on the transportation system as a result of development pattern changes that indirectly result from the Project. Where the potential for adverse impacts on transportation is identified, mitigation to avoid or minimize these impacts will be discussed. Mode-specific impacts will be assessed for the following modes in the following ways:

- Amtrak and VRE and MARC commuter railroads - Increases and decreases in, and ability to meet expected, service capacity levels and ridership will be assessed;
- Private vehicular traffic - Increases and decreases in traffic volumes on nearby streets, Level of Service impacts, and queuing impacts, at key intersections;
- Parking – Increases in demand for parking and parking-related traffic in the District;[29]
- Ride-for-hire circulation – Increases and decreases in traffic volumes on nearby streets, and ability to meet demands at the WUS curbside spaces;
- Pedestrian and bicycle activity – Increases and decreases in pedestrian and bicycle activity, ability to meet activity demands, and impacts on pedestrian and bicycle safety;
- WMATA Metrorail - Increases and decreases in passenger demand, impacts on passenger flow, capacity issues that may result from these increases;
- WMATA Metrobus, DC Circulator, and other local bus – Increases and decreases in passenger demand, impacts on access to transit buses; and
- Intercity and tour/charter bus – Increases and decreases in service capacity level and ridership, ability to meet future service capacity levels.
- Potential benefits to the transportation network in terms of enhanced multimodal connectivity, station access, safety, and impacts to the rail network will also be analyzed.

[29] The role of parking in the financial health of the Union Station Redevelopment Corporation will be explored in the Social and Economic assessment.

5.5.4 Methodology for Evaluating Construction Impacts

Each Action Alternative will be assessed for the construction period impacts on transportation networks. Construction-related traffic will be directly assessed. Potential lane closures and traffic pattern changes will be assessed. Impacts on existing and future transportation modes at WUS will be discussed, including vehicular parking, ride-for-hire circulation, pedestrian and bicycle activity, and intercity and tour/charter bus will be considered. Specific methodological steps include:

- Estimate truck trips during construction period based on construction methods and schedules determined during the Project's constructability analysis.
- Assess traffic closures and required detours during construction.
- Identify and assess truck traffic routes serving the construction site.
- Assess changes to multimodal transportation patterns because of the impacts of different phases of the construction on WUS functions, including:
  - Disruption to Amtrak and commuter railroad operations;
  - Sidewalk and bicycle facility closures and needs for safe accommodations for vulnerable users;
  - Alterations to for-hire vehicle and private vehicle pick-up and drop-off opportunities;
  - Impacts to continued operations to the WMATA Red Line; and
  - Impacts to bus (intercity, tour/charter, sightseeing, and transit) from construction activities.

5.5.5 Methodology for Evaluating Mitigation Measures

The mitigation will be based on the severity of the impacts on the multimodal transportation network. The severity of the impacts will be based on the degree to which the alternatives cause disruption and unsupportable increases in demands across modes, for both temporary construction impacts and future operations, as compared to the No-Action Alternative. For example, in the area of vehicular traffic, a change in Level of Service will be assessed for severity.

Mitigation will be considered for vehicular, pedestrian, bicycle, transit, and rail modes at WUS, as appropriate. Specific approaches to assessing mitigation are described below:

- Transportation measures that mitigate Project impacts while minimizing their own environmental impacts will be prioritized. The goal will be to avoid transportation mitigation activities that carry with them substantial impacts that must be addressed in their own right.
- Mitigation activities that promote non-vehicular transportation modes will be prioritized, including potential alteration to parking and vehicular pick-up and drop-off programs.
- Expansion of roadway capacity beyond the immediate vicinity of WUS that results in shifts to existing curbs will not be preferred, be considered because of the difficulty in correlating

WUS impacts with changes in traffic patterns in the broader city and due to the urban characteristics of downtown DC. Where opportunities for these changes present themselves, they will be considered.

- Where demands on a particular non-vehicular mode exceed capacity, capacity improvements will be proposed, as will transportation demand management (TDM) approaches that reduce or adjust trips to other modes. Some capacity improvements will include vertical circulation capacity. The ability to shift trips to another mode (e.g., from WMATA Metrorail to Streetcar) will be considered. Approaches consistent with the Transportation Management Plan (TMP) and Transportation Demand Management recommendations of NCPC's *Comprehensive Plan for the Nation's Capital: Federal Elements, Transportation Element* will be considered, as applicable." (see pages 8 and 9 of the Transportation Element document)[30]
- Lower-cost mitigation measures that achieve goals in reducing trips and shifting trips to non-vehicular modes will be prioritized ahead of higher-cost measures.
- Potential increased access restrictions, to reduce neighborhood "cut-through" traffic, will be assessed against such policies' impacts on overall traffic flow.
- Strategies for reducing the noise and traffic impacts of trucks will be identified in alignment with the District truck route policies.
- The use of price signals, such as the cost for parking or the use of the bus facility, will be assessed in order to make more efficient use of those facilities.
- Additional bicycle and pedestrian connections needed to ensure safety and capacity will be identified.
- Any increases in transportation capacity will be assessed for their impacts on operational safety for all modes, include railroad operations.

[30] National Capital Planning Commission. 2016. "Transportation." Federal Elements of the Comprehensive Plan for the National Capital. https://www.ncpc.gov/docs/06_CP_2016_Transportation_Element_2.29.16.pdf. Accessed December 21, 2017.

6 Air Quality

6.1 Overview and Definition

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 introduces the methodology for determining existing conditions and assessing impacts. The air quality assessment quantifies and summarizes the National Ambient Air Quality Standards (NAAQS) criteria pollutants and hazardous air pollutants (HAP) emissions resulting from the construction and operation of the Project and the corresponding effect on ambient air. Air Pollution is a general term that refers to one or more substances determined to degrade the quality of the atmosphere. Six main air pollutants, collectively referred to as Criteria 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 sized 2.5 micrometers or less ($PM_{2.5}$); and;
- Lead (Pb).

6.2 Regulatory Context

The CAA and Conformity Rule are the primary legislation regulating air quality; both play a role in setting the Nation's air quality standards for pollutants and adopting emission control programs. The CAA authorizes the EPA to "protect public health by regulating emissions of harmful pollutants." The National Environmental Policy Act (NEPA) also requires the analysis of potential impacts in terms of the project's context, intensity, and duration. The Federal Railroad Administration's (FRA) *Procedures for Considering Environmental Impacts*[31] 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.

[31] 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.

Relevant Federal Laws and regulations include:

- CAA (42 USC 7401);
- Conformity Rule (40 CFR 51 & 93);
- NAAQS (40 CFR 50);
- FRA *Procedures for Considering Environmental Impacts* (64 FR 28545);
- Control of Hazardous Air Pollutants from Mobile Sources 2007 (72 FR 8427);[32] and
- Federal Highway Administration (FHWA) *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*.[33]
- CEQ, *Regulations for Implementing the Procedural Provision of the Nation Environmental Policy Act* (40 CFR 1500-1508)

The state regulations are presented in *Section 6.2.3*.

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 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 $PM_{2.5}$. SO_2 and Pb are generally not emitted in substantial quantities by on-road vehicles since regulations have limited the amount of sulfur and lead allowed in the composition of fuels for these vehicles. SO_2 pollution is still of concern for some non-road engines that burn high-sulfur fuel. The NAAQS are summarized in **Table 6-1**.

The EPA assesses an area's attainment of the NAAQS by classifying the area under four designations: 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. 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.

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

[33] Federal Highway Administration (FHWA). October 18, 2016. *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. Memorandum.

Table 6-1 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 (NO_2)	1-hour	100 ppb	-	98th percentile of 1-hour maximum concentrations, averaged over 3 years
	1-year[1]	53 ppb	53 ppb	Annual Mean
Ozone (O_3)	8-hour[2]	0.070 ppm	0.070 ppm	Annual 4th highest daily maximum 8-hour concentration, averaged over 3 years
Particulate Matter 2.5 ($PM_{2.5}$)	1-year	12 µg/m^3	15 µg/m^3	Annual mean, averaged over 3 years
	24-hour	35 µg/m^3	35 µg/m^3	98th percentile, averaged over 3 years
Particulate Matter 10 (PM_{10})	24-hour	150 µg/m^3	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)	1-hour[3]	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[4]	0.15 µg/m^3	0.15 µg/m^3	Not to be exceeded

Source: EPA 2016a

1 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.

2 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.

3 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.

4 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.

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

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 of Columbia as the area is in non-attainment for 8-hour ozone and is in a Maintenance area for CO 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 of the frequency or severity of any existing violation of the NAAQS; or
- Delay the attainment of the NAAQS.

EPA promulgated final General Conformity regulations at 40 CFR 93 Subpart B for all Federal activities except those covered under Transportation Conformity. FRA activities are not covered under Transportation Conformity as 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[34]; therefore, General Conformity regulations apply to the WUS Project. Federal conformity for projects being reviewed by the FRA is subject to "General Conformity." The EPA has established *de minimis* thresholds to help determine whether a General Conformity determination is required. These thresholds are presented in **Table 6-2**.

Table 6-2 General Conformity *De Minimis* Emission 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

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

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]	100	All Nonattainment and Maintenance
Lead (Pb)	25	All Nonattainment and Maintenance

Source: EPA 2016b

1 Direct emissions, SO_2, NO_x, (unless determined not to be a significant precursor), VOC or ammonia (if determined to be a significant precursor)

6.2.2 Mobile Source Air Toxics

Most air toxics originate from human-made sources, including on road mobile sources, non-road mobile sources such as 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.

The EPA assessed this expansive list in its rule on the *Control of Hazardous Air Pollutants from Mobile Sources*,[35] and identified a group of 93 compounds emitted from mobile sources that are part of EPA's Integrated Risk Information System (IRIS).[36] 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).[37] These are 1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter. While 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.

6.2.3 State and Regional Regulation

The District Department of Energy and Environment (DOEE) enforces DC's air quality regulations that are codified in the District of Columbia Municipal Records (DCMR) at Title 20, Chapters 1 through 15. The purpose of the regulations are to prevent or minimize emissions into the atmosphere 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.

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

36 U.S. Environmental Protection Agency. *Integrated Risk Information System*. https://www.epa.gov/iris. Accessed June 6, 2017.

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

District permitting of the major and minor emission sources is described in 20 DCMR Chapters 2 and 3. Permits are not required for fuel burning equipment that has a heat input capacity of 5 million British thermal units (MMBtus) per hour or less and operates on gaseous fuels or distillate oils.[38] 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.

The control of fugitive dust and particulate matter is regulated in 20 DCMR §605. 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 and per the regulation must be controlled for unpaved roads, unpaved parking lots, transport of dusty material, demolition, and other scenarios likely to involve fugitive dust emissions.

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.

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 and adoption of the General Conformity requirements in 20 DCMR §1501. Another potentially relevant air quality concern, the storage of petroleum products, is regulated in 20 DCMR Chapter 7.

6.3 Study Areas

The Study Area is the area in which all environmental investigations specific to air quality are conducted to determine the resource characteristics and potential impacts of the Project segment. The documentation of existing conditions in the Environmental Impact Statement (EIS) will include a definition of the study area regarding air quality, the attainment status for each pollutant in that area, District plans as well as agencies responsible for addressing air quality where necessary, and data on existing ambient air quality. The study area should be sufficient in size to account for:

- Project description, including linear and sited facilities, stations, operations, and ancillary improvements;

[38] 20 DCMR §200.12

- Regional context, including air quality attainment plans and Tribal Implementation Plan (TIP) status;
- EPA modeling guidance on typical screening distances;[39] and
- Local context, including hotspots and sensitive receptors.

6.3.1 Local

The local component will focus on the area around WUS where impacts of idling trains and trains entering and leaving WUS could be felt (air quality Study Area). Another element of the local component will examine nearby intersections that are affected by motor vehicle traffic entering and leaving the station. In addition, the Study Area will include sensitive receptors near the proposed stationary emission sources (heating, ventilation, and air conditioning [HVAC] equipment, construction equipment, etc.) associated with the Project.

6.3.2 Regional

The regional Study Area will be 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 WUS expansion, is the regional study encompasses the area of the jurisdictions that are members of the MWCOG—the local MPO—in Maryland, the District of Columbia, 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. It is at the geography of MWCOG that the Constrained Long-Range Plan and regional modeling efforts are conducted. This is consistent with the methodology used by EPA to regulate air attainment status for the area.

6.4 Affected Environment

This section will summarize the existing air quality information for the Project and the existing conditions in the Study Area.

6.4.1 Data Sources

The existing conditions analysis will be based on a review of available reports and data, EPA databases, applicable field investigations, modeling (where applicable), and professional judgment. The agency databases will be investigated for any past, or ongoing monitoring studies of air quality within the Study Area. A review of Federal and District policies and agency requirements will help determine if/when field investigations are necessary.

The following list of data sources will be used to determine the existing air quality conditions:

[39] U.S. Environmental Protection Agency. September 27, 2016. *Modeling Guidance and Support.* https://www3.epa.gov/scram001/guidanceindex.htm. Accessed June 6, 2017.

- Meteorological conditions from regional or Federal sources, such as, National Oceanic and Atmospheric Administration (NOAA) National Weather Service (NWS) data;
- Air quality monitoring reports and network plans from DOEE;
- EPA AirData Air Quality Monitoring Database;
- EPA Greenbook;
- Aerial maps and GIS maps (for land use identification and approximate distances to receptors); and
- Metropolitan Washington Air Quality Committee (MWAQC) through the MWCOG.

6.4.2 Methodology

The regional climate and metrological conditions in the Study Area will be determined based on publicly available data from NOAA and NWS. This information will include data on historical temperatures, precipitation, wind speeds, and distributions.

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

The current attainment status of the Study Area is confirmed based on the EPA Federal Register Notices. This information is also available from the EPA's Greenbook. The attainment status for the criteria pollutants regulated by the NAAQS will be confirmed for the District of Columbia. WUS is located in the District of Columbia which has been designation 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 will be determined as follows (and described in more detail in the General Methodology):

- ***Local Assessment*** will include 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 will be determined through coordination with FRA but has been assumed to be included for purposes of this methodology report.
- ***Regional Assessment/General Conformity*** will include VOC, NOx, CO, and $PM_{10}/PM_{2.5}$ emissions inventories that include the existing diesel locomotive, motor vehicles, and buses within the regional Study Area.

6.5 Environmental Consequences

The air quality impact analysis will evaluate the Project's direct and indirect impacts on air quality because of post-construction operations for both mobile sources (trains, vehicles, buses) and

stationary sources (ventilation systems), and for construction emissions. Transportation analysis (post-construction and construction-period) is a key input to Air Quality impact analyses.

6.5.1 General Methodology

The following methodologies will be used for analysis of operational air quality by source type. Temporary construction impacts are discussed in further detail in *Section 6.5.4*.

Mobile Source

A mobile source analysis will consider impacts from both roadway and rail emission sources.

Local Assessment. As discussed above, the need for a hotspot assessment will be determined through coordination with FRA but has been assumed to be included for purposes of this methodology report and is outlined below. To address the concerns related to the impacts of increased train operations on local air quality, the following subjects will be addressed:

- **CO Hot Spot Assessment.** The District of Columbia is in a Maintenance area with respect to the CO standards, and a detailed hotspot analysis is not a regulatory requirement through the NEPA process. However, to complete the localized impact assessment and for NEPA analysis purposes, a CO hotspot or intersection analysis will be conducted to address the concerns related to the impacts of WUS improvements for roadway and transit vehicles and parking garages. For the WUS area, the analysis will be limited to no more than three worst case intersections based on level of service analysis and geographic coverage. The analysis will follow EPA's *Guideline for Modeling Carbon Monoxide from Roadway Intersections* (EPA-454/R-92-005) and using the 2014 Motor Vehicles Emission Simulator (MOVES2014) in Project-Level Carbon Monoxide Analyses (EPA-420-B-15-028). MOVES2014a local input data will be obtained from DOEE or Metropolitan Washington Council of Governments (MWCOG).
- **$PM_{2.5}$ Hot Spot Assessment.** The District of Columbia is in a Maintenance area with respect to the $PM_{2.5}$ standards, and a detailed hotspot analysis is not a regulatory requirement through the NEPA process. However, to complete the localized impact assessment and for NEPA analysis purposes, a $PM_{2.5}$hotspot or intersection analysis will be conducted to evaluate emissions related to the diesel trains and motor vehicles in the air quality Study Area. For the WUS area, the analysis will be limited to no more than three worst case intersections based on level of service analysis and geographic coverage. The analysis will follow EPA's *Transportation Conformity Guidance for Quantitative Hot-spot Analysis in $PM_{2.5}$ and PM_{10} Nonattainment and Maintenance Areas* (EPA-420-B-15-084). MOVES2014a local input data will be obtained from DOEE or MWCOG.
- **Parking Garage Assessment.** A parking garage assessment will be conducted for each of the alternatives as the parking garages may be in different locations, as well as located both above and below ground. Sensitive receptors will be chosen based on EPA guidance and will be identified from field review, aerial imagery, and GIS data. Following the selection of sensitive receptors, EPA's CAL3QHC, CAL3QHCR, or AERMOD dispersion models will be used to calculate pollutant concentrations depending on the criteria pollutants being modeled

and the type of parking garage planned for the Project. The resulting concentrations will be compared against the NAAQS for compliance. Should the concentrations exceed the NAAQS, mitigation measures will be assessed to reduce the criteria pollutant(s) emissions to at or below the NAAQS.

Regional Assessment/General Conformity. Emissions inventories will be prepared for VOC, NOx, CO and $PM_{10}/PM_{2.5}$ for the air quality Study Area. The emissions inventories will include emissions from the diesel locomotives, and motor vehicles and buses on roadways in the air quality Study Area. The motor vehicle and bus emission factors will be calculated using EPA's MOVES2014a. Daily and annual emissions inventories will be prepared for each pollutant. Rail emissions will be developed based on EPA guidance *Emission Factors for Locomotives* (EPA-420-F-09-025). The regional pollutant burden analysis will be compared to *de minimis* criteria to show General Conformity with the State Implementation Plan. If the *de minimis* criteria is exceeded then mitigation strategies will be explored (see *Section 6.5.5*). Emissions will be compared in terms of trends over time, and emissions from the Action Alternatives will be compared with the No-Action Alternative. Inventories will be prepared for the existing conditions, the No-Action, and Action Alternatives in the Project's opening year and planning years (2035 and 2040, respectively). The opening and design years will continue to be refined through discussions with FRA.

MSAT Assessment. A qualitative assessment of MSATs will be prepared following FHWA's guidelines on air toxics, the *Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents*. The MSATs of concern will be identified and the trends of MSAT emissions for both the Build and No-Action Alternatives will be described. For the screening-level analysis, a review of the proposed Project's conceptual engineering plans, profiles and Project description will be used to identify new or modified air toxic emissions sources.

Stationary Source

The stationary source analysis will consider the effects the Project's stationary sources on existing receptors and of existing stationary sources on the Project. A qualitative analysis will be prepared to determine the potential for air quality impact associated with HVAC systems and Project-related combustion equipment. Should an impact be determined, the evaluation will consider possible mitigation measures that could be employed to reduce the violation.

6.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared against existing conditions. A qualitative assessment will be conducted for stationary sources in the area as the planned private air-rights development on the site of WUS has too many unknowns to determine the specific energy use and related emissions. A qualitative discussion will be provided that discusses the stationary source emissions as related to the proposed uses and projected square footage. Mobile source pollutant concentrations will be quantified through the hotspot analysis and emissions inventories through the traffic information available.

6.5.3 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to the No-Action Alternative in each milestone year. Evaluation of impacts will include both qualitative and quantitative methods for both direct and indirect impacts. In accordance with FRA Environmental Procedures, the EIS will assess the air quality impacts of each alternative on local and regional transportation networks to determine the consistency of the alternatives with Federal and state plans for the attainment and maintenance of air quality standards.

As presented in the General Methodology each of the Action Alternatives will be assessed for following the local emissions, regional emissions/general conformity, MSAT, and stationary sources.

Temporary construction impacts are discussed in further detail in *Section 6.5.4*.

The analysis will consider impact avoidance and minimization features that are incorporated into the Project alternatives analysis and account for implementation of design features or best management practices (BMPs). The assessment will present each alternative's air quality pollutants impacts as measured against the NAAQS and General Conformity thresholds, as applicable. The analysis will evaluate how the Project conforms to the SIP and the 1990 CAAA. Complying with the SIP and CAAA would be accomplished by demonstrating compliance with EPA's General Conformity Rule. Following, the analysis will consider project actions for each alternative that improve or otherwise benefit air quality in the evaluation of impacts.

An analysis of the estimated potential emissions (described in *Section 6.5*) of the Action Alternative will be compared to the *de minimis* emissions Levels of **Table 6-2**. If annual direct emissions are less than the *de minimis* thresholds, then the Project complies with General Conformity. The applicability of General Conformity only considers the pollutants in nonattainment and maintenance areas for the District of Columbia.

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 nor 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 this Project, MSAT analysis will be based on interim guidance released by FHWA.

6.5.4 Methodology for Evaluating Construction Impacts

The assessment will conduct a two-step analysis for local construction impacts. Construction impacts are first considered at a qualitative level, describing planned phasing and construction activities. If the planned duration exceeds five years, a second step is conducted that involves quantitative modeling of potential emissions.

Construction by definition is temporary and transitory. A qualitative analysis of the construction air quality impacts from the Project will consider the duration and intensity of the anticipated construction activities. The analysis will include best practice mitigation measures to minimize pollutant emissions during the construction period.

Because the construction duration is anticipated to exceed five years, a quantitative air quality analysis is preferred. The analysis of the potential impacts from on-site and off-site activities at the construction site will include estimating emissions generated by diesel-powered construction equipment, dust-generating activities, and additional vehicles and, if necessary, evaluation of emission control measures that may be necessary to mitigate potential air quality impacts. Fugitive dust will be considered in accordance with 20 DCMR §605.

The quantitative construction air quality analysis will include the evaluation of on-site and off-site construction vehicles (worker cars and construction trucks), stationary construction equipment, and fugitive source activities. The analysis will consider phasing schedules, location, and activities occurring during the mid-point year of construction (2030). The analysis will identify nearby sensitive land uses with the greatest potential for construction-phase air quality impacts. Emission factors for the sources will be determined using a combination of EPA's Non-Road, MOVES2014a and AP-42 models, where appropriate. Dispersion modeling will be conducted using the latest version of EPA's AERMOD model to determine pollutant concentrations.

Pollutant levels will be estimated at each analysis site for future No-Action and Build (construction) conditions. The aggregate (on-site and off-site) modeling results of the Project's construction impacts at each analysis site will be compared to the NAAQS for each applicable pollutant and a compliance determination made.

6.5.5 Methodology for Evaluating Mitigation Measures

Should exceedances of the NAAQS be predicted, possible mitigation measures that could be undertaken to reduce these values will be identified.

For exceedances related to local air quality impacts for motor vehicles, potential signal timing optimization measures will be modeled and recommended to reduce concentrations below the NAAQS. Varying red times, cycle lengths, capacity improvements, and queue parameters will be considered until the NAAQS are met through iterations in the dispersion model.

For stationary source emissions, the required emission factor reductions for the equipment would be specified through dispersion modeling. Potential measures to reduce emissions such as equipment relocation, cleaner equipment, selective catalytic reduction, or particulate matter scrubbers would be recommended.

A list of best management practices related to construction air quality will be provided to ensure that pollutant emissions are minimized through industry standard measures.

7 Greenhouse Gas Emissions and Resilience

7.1 Overview and Definition

This section identifies regulatory requirements for assessing post-construction and construction-period greenhouse gas (GHG) emissions and climate change impacts. The outline of the anticipated environmental consequences related to GHG emissions and climate change follows the applicable regulatory criteria.

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.

The District has experienced ways that climate change is impacting the area, with record-breaking heat waves and snowstorms, flooding caused by rising sea levels, and heavy rains. This section reviews the Project in terms of future climate conditions, as well as projected changes in temperature, precipitation, and sea level rise (SLR). It also reviews how the Project will prepare for potential increases in flooding and heat.

7.2 Regulatory Context

7.2.1 Federal Regulations

- EO 13677, *Climate Resilient International Development*;
- EO 13693, *Planning for Federal Sustainability in the Next Decade*;
- U.S. Environmental Protection Agency (EPA) *Greenhouse Gas Endangerment Finding*;[40] and

[40] 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)*. 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.

- EPA and U.S. Department of Transportation (USDOT) *Greenhouse Gas Emissions and Corporate Average Fuel Economy Standards*.[41,42]

7.2.2 State and Regional Regulations and Plans

DC has developed multiple plans to reach GHG reduction goals and sustainability objectives such as *The Sustainable DC Plan*[43] and the *Climate Ready DC Plan*.[44]

7.3 Study Areas

Climate change is a global phenomenon and existing conditions for discussion of impacts related to GHG emissions are characterized using a regional Study Area for the mobile sources. For the stationary sources, a more local Study Area will be required. The effects of climate change on the Project (for example, extreme heat days, more frequent and intense heavy rain events) will be considered locally.

7.3.1 Local

Greenhouse Gas. The local Study Area includes Washington Union Station (WUS) and its immediate property (the Project Area). The greenhouse gas emissions related to the operations and maintenance of WUS will be estimated for the local Study Area. 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 from a mobile source perspective. For this reason, the Environmental Impact Statement (EIS) will not consider a local study area for GHG emissions for mobile sources.

Resilience. The local Study Area for climate change impacts include the Project Area and the surrounding area within one-half mile. Climate change impacts, such as extreme storm events, could affect not only WUS but immediately adjacent infrastructure.

7.3.2 Regional

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 regional Study Area for GHGs for mobile sources only on a regional scale,

41 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).* https://www.gpo.gov/fdsys/pkg/FR-2010-05-07/pdf/2010-8159.pdf. Accessed June 8, 2017.

42 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).* https://www.gpo.gov/fdsys/pkg/FR-2012-10-15/pdf/2012-21972.pdf. Accessed June 8, 2017.

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

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

not local. For the WUS expansion, the regional Study Area will be defined as expansion, is the regional study encompasses the area of the jurisdictions that are members of the Metropolitan Washington Council of Governments (MWCOG) in Maryland, the District of Columbia, and Virginia.

7.4 Affected Environment

This section will summarize the existing GHG emissions and climate change information for the Study Areas and regional trends. The affected environment will be defined based on evaluation of regional trends. Existing climate change impacts will be considered on a regional scale. In addition, the analysis will quantify the GHG emissions related to the operations and maintenance of the existing WUS.

This section will summarize the existing climatic conditions in the Study Area. The affected environment will be defined based on evaluation of regional trends in the topic. The affected environment discussion also provides context for the evaluation of potential climate change effects on the Project. Existing climate change impacts will be presented and will provide the baseline for assessing future climate change impacts on the Project.

7.4.1 Data Sources

The discussion of global, national, and regional trends in GHG emissions and climate change relies on the following primary sources, and others as appropriate:

- International Energy Agency analyses and projections of global energy use.
- Intergovernmental Panel on Climate Change (IPCC), *5th Assessment Report*[45] and other reports. Current global assessment of climate change including scientific information on causes of climate change, GHG emissions, and projections of impacts.
- National Oceanic and Atmospheric Administration (NOAA) and Oak Ridge National Laboratory, *Recent Greenhouse Gas Concentrations*.[46]
- U.S. Energy Information Administration, *Annual Energy Outlook*.[47] Assessment of GHG emissions and projects based on energy sectors.

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

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

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

- U.S. Global Change Research Program, U.S. National Climate Assessment.[48] Assessment of climate change and potential impacts in the United States, including potential climate change impacts by region.
- EPA, U.S. Greenhouse Gas Inventory.[49] Assessment of GHG emissions in the United States and trends by GHGs and economic sector.
- District Department of Energy and Environment (DOEE), District of Columbia Greenhouse Gas Inventory.[50]
- DOEE Climate Ready DC Plan.
- DOEE *Climate Projections & Scenario Development, Climate Change Adaptation Plan for the District of Columbia*.[51]

7.4.2 Methodology

Global, national, and regional trends in GHG emissions and climatic changes are 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 will be presented for the Project Study Areas. Current GHG emissions within the affected environment will be defined and will serve to establish a baseline to which the Action Alternatives' estimated GHG emissions can be compared.

The affected environment discussion also provides context for the evaluation of potential climate change effects on the Project. Existing climate change impacts will be presented and discussed and will provide the baseline for assessing future climate change impacts on the Project.

7.4.3 Environmental Consequences

The GHG impact analysis will evaluate the Project's direct and indirect impacts on regional air quality because of post-construction operations for both mobile sources (trains, vehicles, buses) and stationary sources (ventilation systems), and for construction emissions. Transportation analysis (post-construction and construction-period) and energy consumption is a key input to the GHG impact analyses. A discussion that focuses on the potential climate change effects that could occur

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

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

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

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

within the general region where the Proposed Action will be constructed and operated will be provided.

7.4.4 General Methodology

The following is a description of methodologies for analysis for direct and indirect sources.

Mobile Source

The Project Team will meet with the Federal Railroad Administration (FRA) prior to performing the GHG analysis to confirm modeling assumptions and methodology.

The mobile source analysis will consider impacts from both roadway and rail emission sources for direct and indirect effects on a regional level. Annual GHG emissions will be evaluated at a mesoscale level and will include emissions from diesel locomotives, motor vehicles and buses on roadways in the air quality Study Area. The motor vehicle and bus emission factors will be calculated using EPA's MOVES2014a. Annual emissions inventories will be prepared for each pollutant. Rail emissions will be developed based on EPA guidance *Emission Factors for Locomotives* (EPA-420-F-09-025).

Stationary Source

A stationary source analysis will consider the direct and indirect effects of the Project's stationary sources on GHG emissions. Direct effects are determined by examining emissions originating on site (such as natural gas and fuel oil consumption) while indirect effects consider emissions emitted off-site due to on-site consumption (such as electricity usage). A quantitative analysis will be prepared to determine the potential for air quality impact from the Project's emissions associated with the heating, ventilation and air conditioning (HVAC) systems and other GHG emitting sources. The methodology for GHG assessment follows the methodology in Chapter 8, *Energy Resources,* and will convert energy use into the corresponding GHG emissions.

Resilience

The future climate change conditions will be established and assessed qualitatively through review of relevant documentation. Documents to review include the *Climate Ready DC Plan, IPCC 5th Assessment Report, U.S. National Climate Assessment,* and DOEE *Climate Projections & Scenario Development.*

7.4.5 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to existing conditions. A quantitative assessment will be conducted for stationary sources within the local Study Area based on projected energy use and corresponding GHG emissions related to the private air-rights development, a private development project independent of the WUS Expansion Project. In additional, mobile source No-Action GHG emissions for the regional Study Area will be quantified through the mesoscale analysis.

The No-Action Alternative resilience to climate change will be compared to existing conditions. Climate change impacts will be assessed qualitatively and will rely on available climate data.

7.4.6 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to the No-Action Alternative in the planning year (2040). The GHG analysis will quantify the direct and indirect GHG emissions associated with the Project's energy use (stationary sources) and transportation-related emissions (mobile sources). GHG emissions will be assessed for the Action Alternatives to allow for a comparison of potential GHG impacts. Climate change impacts will be assessed qualitatively for each alternative and will rely on available climate data.

Consistent with the energy assessment, since the planned commercial residential development in the private and Federal air-rights over WUS will likely change with each Action Alternative, the estimated change in energy use and corresponding greenhouse emissions will be factored into each Action Alternative versus the energy use and GHG emission estimates for the No-Action Alternative.

Each Action Alternative will be compared to the No-Action Alternative in the planning year (2040). The resilience to climate change analysis will assess each element (such as sea level rise and storm surge, temperature, and precipitation) of each Action Alternative and will rely on available climate data.

7.4.7 Methodology for Evaluating Construction Impacts

Construction by definition is temporary and transitory. A qualitative analysis of the construction GHG impacts from the Project will consider the duration and intensity of the anticipated construction activities. The analysis will include best practice mitigation measures to minimize pollutant emissions during the construction period.

Each Action Alternative will be compared based on the proposed design and its associated construction requirement to assess the variations in construction energy use and corresponding GHG emissions.

7.4.8 Methodology for Evaluating Mitigation Measures

The analysis will consider mitigation measures to reduce the impact of GHGs and climate change from the Action Alternatives. GHG mitigation measures will be evaluated within the context of any regulatory requirements to implement energy efficiency, energy reduction measures, or GHG emissions reduction measures in new buildings or renovated buildings. In situations where regulations call for mitigation of energy use through a technical or construction practice, the EIS will address the mitigation need and discuss resulting greenhouse emissions. Mitigation measures will also consider measures to enhance resiliency if the impact analysis shows that climate change effects may impact the proposed Project.

Mitigation strategies to reduce GHG emissions may include:

- Identification of core and shell features to reduce energy usage;
- Implementation of energy management systems;
- Creation of a tenant manual for energy savings-related fit out;
- Identification of site energy savings; and
- Transportation demand management strategies.

8 Energy Resources

8.1 Overview and Definition

Energy use is directly connected to local public health (as discussed in Chapter 6, *Air Quality*), GHG emissions, and climate change (as discussed in Chapter 7, *GHG Emissions and Resilience*). Electricity used on site at WUS will predominantly be generated using fossil fuels which emit GHGs and air pollutants. Since climate change is an inherently global phenomenon, energy use encompasses regional, national, and global resources which experience the effects of rising GHG emissions. This section will focus on the changes in energy use associated with the alternatives considered in the EIS and the resulting environmental impacts to both the local and regional area where the Project will be constructed and operated.

8.2 Regulatory Context

The Federal and state regulations that the energy resources analysis will consider include:

Federal

- Sections of 42 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).
- Executive Order 13693, *Planning for Federal Sustainability in the Next Decade* sets goals for GHG emissions reductions and reporting, energy conservation and renewable energy, green building performance, fleet performance, climate change resiliency, and sustainable acquisition.

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.

State/Regional

- 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 EEC is intended to provide flexibility to permit the use of innovative approaches and techniques to achieve this objective.[52]

- The Green Building Act of 2006 phased in green building in DC and requires commercial buildings to be Leadership in Energy and Environmental Design (LEED) Silver. Since 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.[53]
- The Clean Affordable Energy Act of 2008 established a Sustainable Energy Trust Fund and a Sustainable Energy Utility to be operated under contract to the DOEE. The Sustainable Energy Utility administers sustainable energy programs in the District to:
  - Reduce per-capita energy consumption;
  - Reduce energy demand growth among the 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.[54]

8.3 Study Areas

This section defines local and regional study areas for energy use from stationary equipment and mobile sources (for example, construction vehicles, maintenance vehicles, transportation vehicles, passenger vehicles, and passenger rail) both during construction and post-construction operations.

8.3.1 Local Study Area

The local Study Area includes WUS and its immediate property (the Project Area). Energy use within the local Study Area includes the energy required and used by operations and maintenance activities. Operations-related energy includes station energy use for lighting, heating, cooling, and cooking, and energy use for all transportation modes, including maintenance vehicles, high occupancy vehicles, passenger vehicles, and ride-for-hire[55] services. Construction-related energy includes energy use for all construction equipment, vehicles, and activities. The energy sources used

---

52 Washington DC Department of Consumer and Regulatory Affairs. Undated. *Green Building – 2013 DC Energy Conservation Code*. https://dcra.dc.gov/page/green-building-2013-dc-energy-conservation-code. Accessed June 2, 2017.

53 North Carolina Clean Energy Technology Center, Database of State Incentives for Renewables & Efficiency. October 27, 2014. *District of Columbia Green Building Requirement.* http://programs.dsireusa.org/system/program/detail/2485. Accessed on June 2, 2017.

54 DC Sustainable Energy Utility. Undated. About the DCSEU. https://www.dcseu.com/about-dcseu. Accessed on June 2, 2017.

55 Ride-for-hire includes transportation networking companies like Uber and Lyft and traditional taxicabs.

in the local Study Area will be electricity and fuels such as natural gas, fuel oil, gasoline, and diesel fuel.

8.3.2 Regional Study Area

The regional Study Area will include the city of Washington, DC and Federal and commercial buildings within this area with comparable sizes and energy use profiles as WUS. Closer analysis of such buildings can reveal potential energy efficiency opportunities for the Project.

8.4 Affected Environment

The affected environment includes the energy used at the existing WUS, all tenants within WUS, and the vehicles associated with the station including transit vehicles and buses, private and ride-for-hire vehicles, high occupancy vehicles, and maintenance vehicles. Current energy use within the affected environment will be assessed using the data sources defined below and will serve to establish a baseline to which the Action Alternatives' estimated energy use can be compared. Measures of the GHG emissions associated with WUS and its immediate area will be discussed in Chapter 7, *Greenhouse Gas Emissions and Resilience*.

8.4.1 Data Sources

Critical data sources for energy use will include the following:

- Primary:
  - Based on the business activity in the building (retail, food service, public space), the square footage of each area, and the time of year, a weighted energy use intensity (EUI) factor acquired from US EPA's EnergyStar program will be applied to estimate energy use in the Local Study Area.
- Secondary (if all appropriate parties are willing and able to provide these materials):
  - Annual electricity bills for all electricity suppliers to WUS including all associated accounts and electric meter numbers, rate tiers, and kilowatt hours (kWh) of electricity use.
  - Annual fuel bills from all fuel suppliers for all fuel uses at WUS including vehicles, backup generators, heating and cooling equipment, water heating, and any other applicable equipment. Bill items should include fuels and measures of fuel use in British Thermal Units (BTUs) or similar metrics.
  - Any available data compiled from onsite energy management systems.
  - Historical data compiled from any energy or energy efficiency audits conducted in the recent past.

8.5 Environmental Consequences

The energy use analysis will assess the energy use profiles of the Action Alternatives which will serve as the basis for the Project's direct and indirect impacts on GHG emissions and air quality. GHG and various air pollutants are emitted during extraction and refining/processing of fossil fuels, electricity generation, and combustion of fossil fuels in vehicles and equipment including gasoline, diesel, natural gas, and propane. These fuels are used in construction and post-construction activities that will take place at WUS. The construction and post-construction environmental impacts will consider both stationary source and mobile source energy use.

8.5.1 General Methodology

The methodology presented below will be further refined based upon consultations with the DOEE, the Public Service Commission of the District of Columbia (PSCDC), and the DDOT.

- Assess energy conservation by category, focusing on construction and operations. Capital cost estimates for the Action Alternatives will be used to estimate construction energy consumption by applying a published energy cost factor (for example, from data in *Energy and Transportation Systems*, Caltrans 1983). The energy will be expressed in some common measure such as BTUs.
  - The operations-related energy is station energy use for lighting, heating, cooling, and cooking and energy use for all transportation modes, including maintenance vehicles, high occupancy vehicles, and passenger vehicles. Vehicle miles traveled (VMTs) from motor vehicles will be converted to BTUs using published fuel efficiencies by vehicle type.
  - The construction-related energy includes energy use for all construction equipment, vehicles, and activities. Energy use for the Action Alternatives will be estimated by applying an EUI factor to the Action Alternative designs or by following allowable energy use as published in American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) 90.1 2010.
- Use energy modeling software to quantify projected energy use. This will include a listing of modeling inputs (for example, R-values, U-values, efficiencies, lighting power density, etc.) for items such as equipment, walls, ceilings, windows, lighting, HVAC units, etc., for the Action Alternatives.

8.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative includes a planned private air-rights development. Energy use for this development will be estimated using the square footage of the building, the programmed use of the buildings, and EUI factors optimized to capture the buildings' design and uses.

8.5.3 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to existing conditions (2017) and the No-Action Alternative in the planning year (2040). Based on the methodologies above, each Action Alternative will have slightly different measures of energy use, and energy mix profiles that can be quantified. Since the planned commercial residential development in the private and Federal air-rights over WUS will likely change with each Action Alternative, the estimated change in energy use will be factored into each Action Alternative versus the energy use estimates for the No-Action Alternative.

8.5.4 Methodology for Evaluating Construction Impacts

Each Action Alternative will be compared based on the proposed design and its associated construction requirements in the construction analysis year to assess the construction energy use.

8.5.5 Methodology for Evaluating Mitigation Measures

Energy use mitigation measures will be evaluated within the context of any regulatory requirements to implement energy efficiency, energy reduction measures, or GHG emissions reduction measures in new buildings or renovated buildings. In situations where regulations call for mitigation of energy use through a technical or construction practice, the EIS will address the mitigation need.

One potential mitigation measure would be to prepare a Tenant Manual. The retail space in WUS is leased by the USRC to a single entity, which leases the individual spaces to tenants. A draft Tenant Manual could be prepared for that single entity and any future entities that may control the new retail space created by the Project, designed to influence them to fit-out and operate their spaces with sustainable and energy efficient designs and operating practices to reduce overall energy demand and associated GHG emissions. Amtrak and/or the USDOT should identify potential strategies that could be adopted to ensure that the GHG reduction goals modeled as part of the EIS are met. These strategies may include, but may not be limited to: identifying core and shell features that allow tenant choices in energy-related fit-out (for example, chilled water distribution capabilities, individual electric metering, the energy management systems (EMS), and other building features); and requiring or encouraging tenants to adopt appropriate sustainable design, energy efficiency, water use, and water pollution control commitments to the extent feasible as part of their respective lease agreements. The Draft Tenant Manual could be included in the environmental review documents as a technical appendix.

9 Land Use, Land Planning, and Property

9.1 Overview and Definition

The land use impact assessment will consider the effects of the Project upon existing and proposed land uses and consistency with local zoning and local planning. Potential effects could result from an increase in land use associated with the expansion of the existing transportation use of Washington Union Station (WUS) and the potential impacts to property including development of existing private air-rights.

9.2 Regulatory Context

The following Federal and Washington, DC (the District) regulations and guidance provide the regulatory context for this analysis:

- Uniform Act (Uniform Relocation Assistance and Real Property Acquisition Properties Act) regulations;[56]
- National Capital Planning Act of 1952.[57] The National Capital Planning Commission (NCPC), chartered by this Act, has review of Federal projects in the nation's capital, and authority over transfers of jurisdiction between Federal agencies and between the Federal and District governments;
- NCPC, *The Comprehensive Plan for the National Capital: Federal Elements, Urban Design Element*;[58] and
- District of Columbia Zoning Regulations 2016.[59]

9.3 Study Areas

This section defines the local and regional study areas for the land use impact analysis.

---

56 U.S. Department of Transportation, Federal Highway Administration. 2005. *Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally-Assisted Programs* (49 CFR 24). https://www.gpo.gov/fdsys/pkg/FR-2005-01-04/pdf/05-6.pdf. Accessed July 20, 2017.

57 National Capital Planning Act of 1952. Public Law 82-592. https://www.gpo.gov/fdsys/pkg/STATUTE-66/pdf/STATUTE-66-Pg781.pdf. Accessed December 12, 2017.

58 National Capital Planning Commission. 2016. *Comprehensive Plan for the National Capitol – Federal Elements*. https://www.ncpc.gov/compplan/. Accessed June 5, 2017.

59 District of Columbia. 2016. DC Municipal Regulations, Title 11 – *Zoning Regulations of 2016.* http://www.dcregs.dc.gov/Search/DCMRSearchByTitle.aspx. Accessed June 6, 2017.

9.3.1 Local 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 WUS area (from the historic entrance to K Street NE above the tracks), the local Study Area will be the Project Area, as well as the zoning districts within one-half mile of the Project Area. North of K Street, where the Project consists solely of track modifications, the local Study Area will be the track area, as well as the zoning districts within one-quarter mile of the Project Area.

9.3.2 Regional Study Area

In the Washington, DC area, planning and zoning decisions are largely the domain of the local government, as opposed to regional planning entities. However, the NCPC has review and approval authority for Federal projects and the transfer of jurisdiction between the Federal agencies and between the Federal and District Governments, and develops the Federal Elements of the Comprehensive Plan for the National Capital. The regional Study Area for the land use impacts of the Project will include the nearby neighborhoods of the H Street Corridor, Capitol Hill, the National Mall, NoMa, and Mount Vernon Triangle.

9.4 Affected Environment

This section will identify existing land uses, property ownership, and local zoning and master plans within the local Study Area. For the regional Study Area, a higher-level analysis of the land uses and master plans will be provided.

9.4.1 Data Sources

Existing land use conditions and local zoning and master plans in the area will be identified using data from the DC Office of Planning. Master plan information from the NCPC will also be consulted. Property ownership will be determined using data from the DC Office of Zoning and the Office of Tax and Revenue. Information on zoning districts will be based on the DC Office of Zoning and the DC Municipal Regulations.

The development pipeline, the near-term development projects in the Study Area, will be identified using information from the 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 Appeals, 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 will also rely on District and local development plans and policies:

- *Comprehensive Plan for the National Capital – District Elements*;[60]

[60] District of Columbia. 2006. *Comprehensive Plan*. https://planning.dc.gov/page/comprehensive-plan. Accessed June 5, 2017. Amended in 2011.

- Other local plans consisting of the *H Street NE Strategic Development Plan*,[61] the *Mount Vernon Triangle Action Agenda*,[62] the *NoMa Vision Plan and Development Strategy*,[63] and the *Northwest One Redevelopment Plan*.[64]

9.4.2 Methodology

Using the information provided from the above data sources, a land use profile will be created for the local and regional Study Areas. The local Study Area profile will document the nature of land use and land ownership in the Study Area. The regional Study Area profile will generally describe the land uses. This section will also describe applicable District and local development plans and policies.

9.5 Environmental Consequences

The land use impact analysis will evaluate the Project's direct and indirect impacts caused by the change in land use resulting from the WUS Expansion Project, and consistency with local plans and policies.

9.5.1 General Methodology

- Characterize changes to land use within the Study Area caused by the alternatives.
- Identify changes to properties (existing or proposed) resulting from the alternatives.
- Evaluate consistency with NCPC and DC plans and policies.
- Identify potential changes in property ownership or transfers of jurisdiction.
- Identify potential indirect effects on land use surrounding Study Area. Expected indirect impacts are increases or decreases in redevelopment as a result of market impacts of the WUS Expansion Project. These impacts will be assessed qualitatively based on analysis of local development capacity and land uses changes that followed from similar multimodal station expansions.

---

61 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.

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

63 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.

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

9.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to existing conditions. The direct and indirect changes in land use associated with the No-Action Alternative within the local Study Area will be documented based on changes to properties resulting from the No-Action Alternative.

9.5.3 Methodology for Evaluating the Action Alternatives

The direct and indirect land use impacts of each Action Alternative will be compared to existing conditions and the No-Action Alternative in each analysis year. In accordance with FRA Environmental Procedures, the EIS will qualitatively assess the impacts of each alternative on local land use, land use controls, and comprehensive regional planning, by comparing the alternatives to existing and No-Action land use planning and ownership information.

The EIS will quantitatively assess the direct impacts on development by documenting the square footage developed or otherwise affected within the local and regional Study Areas. Consistency with local zoning, plans and policies will be assessed. Impacts within the Project Area to the private and Federal air-rights development will be assessed qualitatively by measuring changes to land use and quantitatively by measuring development acreage that is available or used by the Project. These impacts may include indirect effects resulting from the Project such as induced development, changes in development patterns, or increased rates of development/redevelopment. The indirect effects will be qualitatively described, except where informed by quantitative outputs from the modeling conducted for the Social and Economic analysis.

9.5.4 Methodology for Evaluating Construction Impacts

Land use impacts from construction will be evaluated based on whether any construction activities at WUS cause modifications or delays to existing or planned land uses in the Study Area. Any acquisition or extended use of property to facilitate construction activities will be identified.

9.5.5 Methodology for Evaluating Mitigation Measures

Where the potential for adverse impacts on land use conditions or inconsistency with local land use planning is identified, mitigation to avoid or minimize these impacts will be discussed. The need for mitigation will be evaluated based on the severity of the impacts and preliminary mitigation recommendations will be provided. Potential mitigation of land use, development, and zoning impacts will be developed in accordance with Federal guidelines and evaluated based on their effectiveness in mitigating the impacts of the alternatives. The need for land use mitigation is most compelling in situations where the impacts to land use directly or indirectly would:

- Physically divide an established community;
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted for the purposes of avoiding or mitigating an environmental effect;
- Result in displacement of businesses and residences; and

- Result in a physical change in the environment that would be substantially incompatible with existing land uses.

Potential mitigation measures will be assessed for their ability to:

- Bring the alternatives closer into conformity with applicable land use plan, policy, or regulation of an agency with jurisdiction over the Project adopted for the purposes of avoiding or mitigating an environmental effect to the extent possible;
- Prevent displacement of business and residences; and
- Bring the alternatives into greater compatibility with existing land uses to the extent possible.

10 Noise and Vibration

10.1 Overview and Definition

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 such as eliminating jointed rail can reduce noise and vibration and be a beneficial effect. Noise and vibration-sensitive uses typically include places where people sleep such as residences, hotels, and hospitals, and institutions with daytime and evening use such as schools, libraries, museums, and parks. The proposed Project would introduce new sources and modify existing sources of noise and vibration during the construction period and future operational conditions which could result in potential impacts.

This section defines noise, vibration, and ground-borne noise resources and summarizes the regulatory context of the assessment. This chapter presents the impact assessment methodology including the process to define the noise and vibration Study Areas, identify sensitive locations, characterize existing noise and vibration conditions, predict future conditions, assess potential impacts, and evaluate the need for and prepare the preliminary design of potential mitigation.

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 others, 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 useful to characterize the range of levels that may exist over a certain amount of time. This is commonly done by using sound level metrics such as the hourly energy-equivalent level (Leq) or the day-night average level (Ldn). Further information on these metrics are presented in the noise criteria section.

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. Vibration levels are expressed in decibel notation as "VdB" to differentiate them from sound decibels. Humans generally react to vibration in a low frequency range between approximately 4 and 80 hertz (Hz).

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. Similar to airborne noise, ground-borne noise is expressed in A-weighted sound level decibels. 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.

Metrics. Because sound levels fluctuate from moment to moment, it is important to characterize the range of levels that may exist over a period. This is commonly done by using the following sound level metrics:

- The Maximum A-weighted Sound 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.
- The Energy-Average Sound 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 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 1-hour period and may be denoted as Leq1h. Leq is commonly used to describe environmental noise and relates well to human annoyance.
- The Day-Night Average Sound 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.
- The 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 1 second so that events with different durations can be evaluated in terms of their sound energy.

10.2 Regulatory Context

The following section summarizes the regulatory requirements (Federal and local) for assessing construction-period and operational condition noise and vibration impacts for the proposed Project.

10.2.1 Federal Laws and Regulations

Noise and vibration from the WUS Expansion Project will be assessed according to the following Federal regulations and guidance:

- Federal Railroad Administration's (FRA) *High-Speed Ground Transportation Noise and Vibration Impact Assessment*[65] (FRA guidance manual);
- Federal Transportation Agency's (FTA) *Transit Noise and Vibration Impact Assessment*[66] (FTA guidance manual); and
- Federal Highway Administration's (FHWA*) Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772).

The FRA guidance manual and the FTA guidance manual describe the technical approach for assessing noise and vibration for rail and transit projects in the United States. These guidance manuals address how to identify and categorize noise and vibration-sensitive land uses, criteria thresholds, methods to measure and predict noise and vibration, and the process for evaluating the need for and effectiveness of potential mitigation. While the FRA and FTA manuals are very similar, the FRA manual is intended to be used in conjunction with the FTA manual for projects with passenger train speeds above 90 miles per hour (mph). The FTA manual provides guidance for projects with passenger train speeds below 90 mph, ancillary sources like stations, and methods to assess noise from both railroad and roadway sources. Since trains operate below 90 mph in the study area, the FTA guidance manual will be used to assess noise and vibration conditions for the WUS Expansion Project.

The FHWA regulation for the *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772)[67] provides the procedures to help protect public health and welfare, to supply abatement criteria, and to establish the 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. Further information on the DDOT Noise Policy is provided in the following section.

Construction noise and vibration from the WUS Expansion Project will be assessed according to the FTA guidance manual. The FTA guidance manual describes the technical approach for evaluating noise and vibration from construction activities and provides noise and vibration guideline criteria. These criteria are typically implemented when there are no relevant local construction noise impact criteria. The District's local construction noise ordinance, as described in the following section, limits construction activities during the night. Since the proposed Project is anticipated to have a long construction period, it is expected to be necessary for construction activities to occur during the nighttime period. Therefore, construction noise will be evaluated according to the FTA guideline criteria, which include nighttime noise limits, as well as the local District noise ordinance.

---

65 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.

66 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.

67 Federal Highway Administration, U.S. Code of Federal Regulations, Title 23: Highway – Part 772, Procedures for Abatement Highway Traffic Noise and Construction Noise, July 2010.

10.2.2 Local Ordinances and Policies

The DDOT's *Noise Policy*[68] (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. If a Project receives Federal aid highway funds or is otherwise subject to FHWA approval and meets the definition of a Type I project, then noise from all transportation sources including roadways, trains, and airplanes need to be evaluated according to the DDOT Noise Abatement Criteria (NAC). Type 1 projects include construction of a new highway on new locations, substantial horizontal or vertical alteration of existing roadways, addition of through traffic lanes to increase capacity, addition of an auxiliary lane, or addition or relocation of ramps. Based on the current level of design, the WUS Expansion Project does not meet the Type I project criteria and therefore noise abatement will not be considered according to the DDOT NAC.

The District noise ordinance (Municipal Regulations Chapter 20-27 and 20-28) promotes 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. Construction noise limits and time of day prohibitions are described in *Section 10.5.1*.

10.3 Study Area

The Study Areas for noise and vibration must extend sufficiently far from the Project limits to include all locations where substantial noise and vibration effects, potential impacts, and benefits from potential mitigation may occur.

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 impact 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

[68] District Department of Transportation. January 10, 2011. *DDOT Noise Policy.* https://comp.ddot.dc.gov/Documents/Highway%20Noise%20Policy.pdf. Accessed June 6, 2017.

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. This Environmental Impact Statement (EIS) will include a detailed evaluation of the land use surrounding the proposed Project. Based on the results of the land use evaluation, the vibration Study Area will extend up to 600 feet from the Project Area footprint to include residences within 200 feet, institutional buildings within 120 feet, and special-use buildings within 600 feet. 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 10.5.2*, 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 10-1**, 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).

Figure 10-1. Operational Noise and Vibration Study Area

Source: BBB, VHB, 2018

10.3.2 Study Area for Construction Noise and Vibration

The Study Areas for construction noise and vibration will evaluate potential effects including:

1. Noise from stationary construction sources at the project site,
2. Vibration from stationary construction sources at the project site,
3. 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
4. Vibration from mobile sources including heavy construction trucks.

The Study Areas for construction noise and vibration, as shown in **Figure 10-2**, 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).

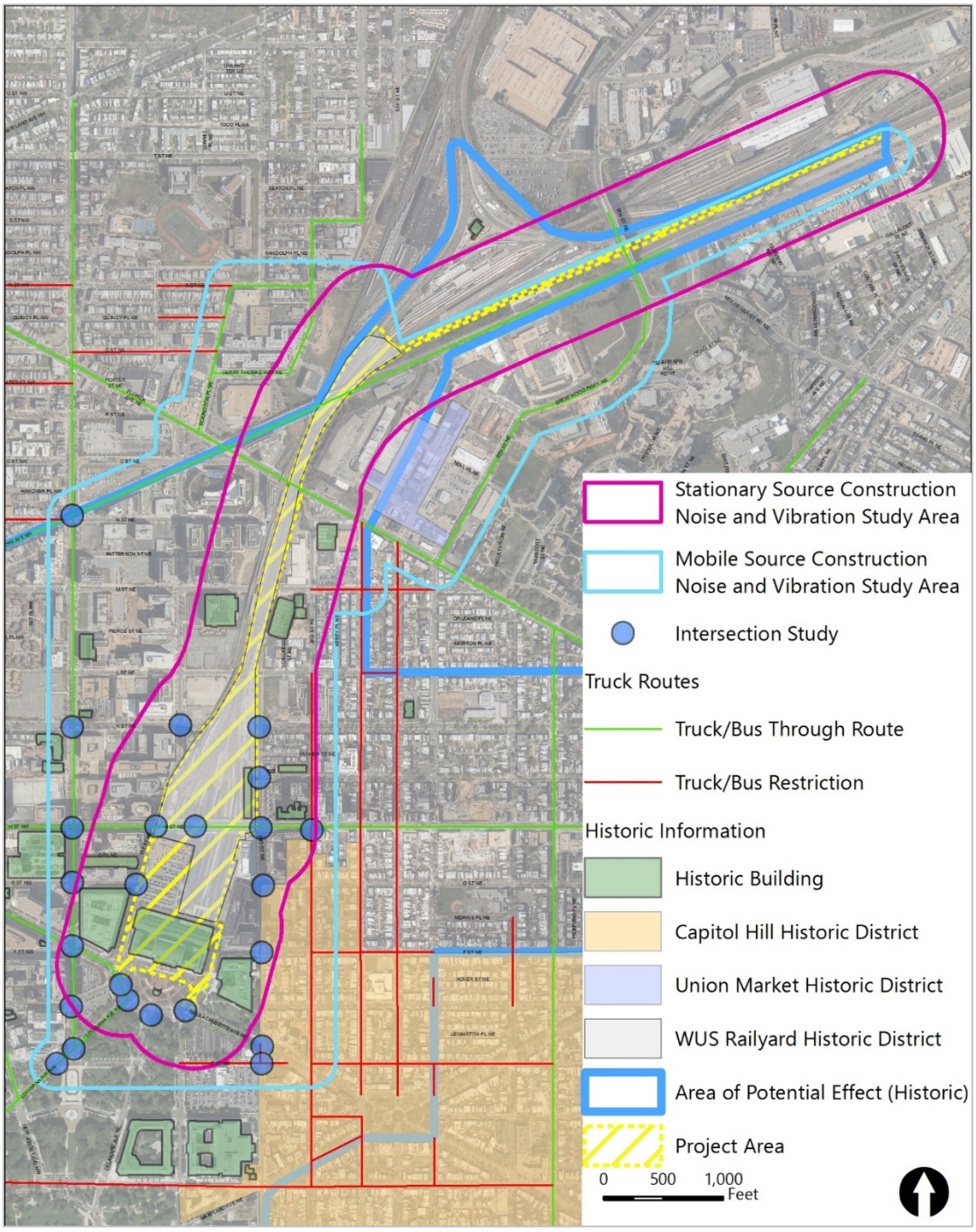
The stationary source construction vibration study area is 200 feet from the edge of construction. This study area is based on the most stringent construction vibration limits for potential human annoyance (65 VdB), and the maximum construction vibration emissions from construction equipment (typical pile driving, 104 VdB at 25 feet).

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 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 in 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.

Figure 10-2. Stationary and Mobile Source Construction Noise and Vibration Study Areas



Source: goDCgo, 2018. DC Truck and Bus Map, BBB, VHB, 2018

10.4 Affected Environment

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 Data Sources

The existing conditions will be based on a review of available reports and data, field investigation, and modeling.

Data sources include:

- Aerial mapping (2016), DC Office of Zoning geographic information system (GIS) database, and field observations of nearby sensitive uses.
- Project description information including existing track alignments and station design information.
- Existing rail and transit operations and roadway traffic data (see Chapter 5, *Transportation*).
- Noise and vibration measurements conducted in the Study Areas.
- Well-documented noise and vibration measurements conducted in support of other projects or studies. These studies may be of general ambient noise or vibration conditions in the Project Area or reference measurements of Amtrak, Virginia Railway Express (VRE), Maryland Area Regional Commuter (MARC) or Metro rail and transit sources (for example, *Virginia Railway Express Midday Storage Facility Noise and Vibration Technical Report*,[69] and Crystal City Station Relocation *Noise and Vibration Study* (in progress).

10.4.2 Methodology

Existing sensitive noise and vibration receptors in the Study Areas will be determined based on a review of aerial photography, DC Office of Zoning database, and field investigation. Receptors will be categorized based on their use as defined by the FTA (see **Table 10-1**). Receptors where quiet is an essential element of their use (such as amphitheaters or certain historic landmarks) are considered to be FTA Noise Category 1. Category 2 receptors include locations where people sleep such as residences, hospitals, and hotels. Category 3 receptors are institutional uses typically with daytime use where noise could interfere with their use such as schools, places of worship, libraries, and museums. 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

[69] VHB, Prepared for Virginial Railway Express. May 2017. *Virginia Railway Express Midday Storage Facility Noise and Vibration Technical Report.*

use. For example, historic residences are considered to be Category 2 receptors and a historic library would be a Category 3 receptor.

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. Existing noise and vibration conditions can also be predicted at 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.

Table 10-1 FTA Land Use Categories and Metrics for Transit Noise Impact Criteria

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 Leq[1]	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.

Noise and/or vibration monitoring will be conducted at up to 20 key locations to characterize the existing conditions, as shown in **Figure 10-3**. Most noise and vibration measurements will be 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 will be conducted at selected locations to determine the relationship of short-term (1-hour Leq) and long-term (24-hour Ldn) noise levels. A noise and vibration measurement plan will be prepared that identifies measurement locations and whether any approval to access the necessary locations is required.

At measurement sites representative of FTA Noise Category 3 land uses (such as museums, parks and libraries), the 1-hour noise measurement will be 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), either a 1-hour measurement during a peak period or three 1-hour measurements will be 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 will be 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 will be conducted with equipment that meets American National Standards Institute Type I accuracy and will include overall A-weighted and 1/3-octave band sound levels. The noise monitoring will also 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.

Existing noise and vibration measurements will be conducted at the following locations shown in **Table 10-2** and **Table 10-3**, respectively.

Table 10-2 Noise Measurement Sites

Site Number	Measurement Period	Location	Representative of Land Use (Category)
N1	AM or PM Peak (7am – 9am or 3pm – 6pm)	Columbus Circle	Park (Category 3) and Historic Property (Fountain)
N2	AM or PM Peak (7am – 9am or 3pm –6pm)	First Street NE between Mass Ave and G St	Postal Museum (Category 3) and Historic Property
N3	AM (7am – 9am) Midday (10am – 4pm) Night (10pm - 7am)	Vehicle Loop at Union Station (overlooking rail corridor)	Reference measurements and noise-compatible planning
N4	AM (7am – 9am) Midday (10am – 4pm) Night (10pm - 7am)	2nd Street NE near F St NE	Multi-family Residential (Category 2) and Place of Worship (Category 3) and Capitol Hill Historic District
N5	AM (7am – 9am) Midday (10am – 4pm) Night (10pm - 7am)	H Street NE (overlooking rail corridor)	Reference measurements and noise-compatible planning

Site Number	Measurement Period	Location	Representative of Land Use (Category)
N6	AM or PM Peak (7am – 9am or 3pm – 6pm)	H Street NE near North Capitol Street	CNN TV Studio Special Use
N7	AM (7am – 9am) Midday (10am – 4pm) Night (10pm – 7am)	Parker St NE between 2nd St and 3rd St	Single-Family Residential (Category 2) and Historic Residential Buildings
N8	AM or PM Peak (7am – 9am or 3pm –6pm)	L Street NE between corridor and First St	NoMa Junction Park (Category 3)
N9	AM (7am – 9am) Midday (10am – 4pm) Night (10pm – 7am)	2nd Street NE near K St NE	Residential - Toll Brothers City Living (Category 2 Under Development) and Historic Residential Buildings
N10	AM (7am – 9am) Midday (10am – 4pm) Night (10pm – 7am)	Metropolitan Branch Trail between L and M Streets NE	NOMA Station Proposed Development Residential (Category 2) and Historic Building (not sensitive to noise)
N11	24 hours	Central Armature Works	CAW Proposed Development Residential (Category 2)
N12	AM or PM Peak (7am – 9am or 3pm – 6pm)	Metropolitan Branch Trail south of Florida Ave NE	Courtyard Marriott Residential (Category 2)
N13	AM (7am – 9am) Midday (10am – 4pm) Night (10pm – 7am)	Florida Ave Between N St and 3rd St	Proposed Mixed-Use Developments Residential (Category 2)
N14	AM or PM Peak (7am – 9am or 3pm – 6pm)	Morse St NE west of 4th St NE	Proposed Mixed-Use Developments Residential (Category 2) and Union Market Historic District
N15	AM (7am – 9am) Midday (10am – 4pm) Night (10pm– 7am)	Harry Thomas Way NE north of Q St	The Gale Residential (Category 2)
N16	AM (7am – 9am) Midday (10am – 4pm) Night (10pm – 7am)	West of 4th St NE near Neal Place NE	Union Market Area Development Residential (Category 2) and Union Market Historic District
N17	AM or PM Peak (7am – 9am or 3pm – 6pm)	Columbus Circle	Park (Category 3)

Existing operational noise conditions will be 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 includes 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 will be used.

Railroad noise will be predicted based on the Detailed Noise Assessment methodology in Chapter 6 of the FTA Manual. FTA noise predictions will be validated by comparing to measurement results and predictions using standard methods outlined in the FTA Manual. Roadway noise will be predicted based on FHWA's TNM implemented by the Cadna-A software. Similar to railroad noise, roadway noise will be validated by comparing to measurements and results computed using FHWA's TNM version 2.5. In accordance with National Cooperative Highway Research Program (NCHRP) Report 791, *Supplemental Guidance on the Application of FHWA's Traffic Noise Model*,[70] third-party sound prediction software will be used to model the acoustic shielding from the dense high-rise buildings and portal opening effects associated with overbuilds. The overall existing noise results will include site-specific results at noise-sensitive receptors and graphical noise mapping results throughout the entire Study Area.

Vibration measurements will primarily be conducted at exterior ground-level locations to determine the maximum vibration levels from train pass-bys. Interior vibration levels will be predicted based on typical outdoor-to-indoor coupling factors.

Existing and future noise and vibration sources will be identified through a review of VRE, MARC, Amtrak, and Metro current and proposed train schedules and preliminary station design plans. This information will include the number of train operations throughout a 24-hour period to correspond with the measurement results.

Table 10-3 Vibration Measurement Sites

Site Number	Location	Representative of Land Use (Category)
V1	Station Platform	Reference measurements
V2	900 2nd Street NE	Historic Property (sensitive to potential structural damage, not sensitive to noise or vibration annoyance)
V3	2nd Street NE between H and K St	CNN TV Studio Special Use (Category 1)

[70] National Cooperative Highway Research Program. 2014. Report 791*, Supplemental Guidance on the Application of FHWA's Traffic Noise Model*. http://www.trb.org/Main/Blurbs/171433.aspx. Accessed June 6, 2017.

Site Number	Location	Representative of Land Use (Category)
V4	Delaware St NE and M St NE	Historic Property (sensitive to potential structural damage, not sensitive to noise or vibration annoyance)
V5	Florida Ave NE	Courtyard Marriott Residential (Category 2)
V6	2nd Street NE near K St NE	Residential - Toll Brothers City Living (Category 2 Under Development) & Historic Residential Buildings

Figure 10-3. Noise and Vibration Measurement Locations

10.5 Environmental Consequences

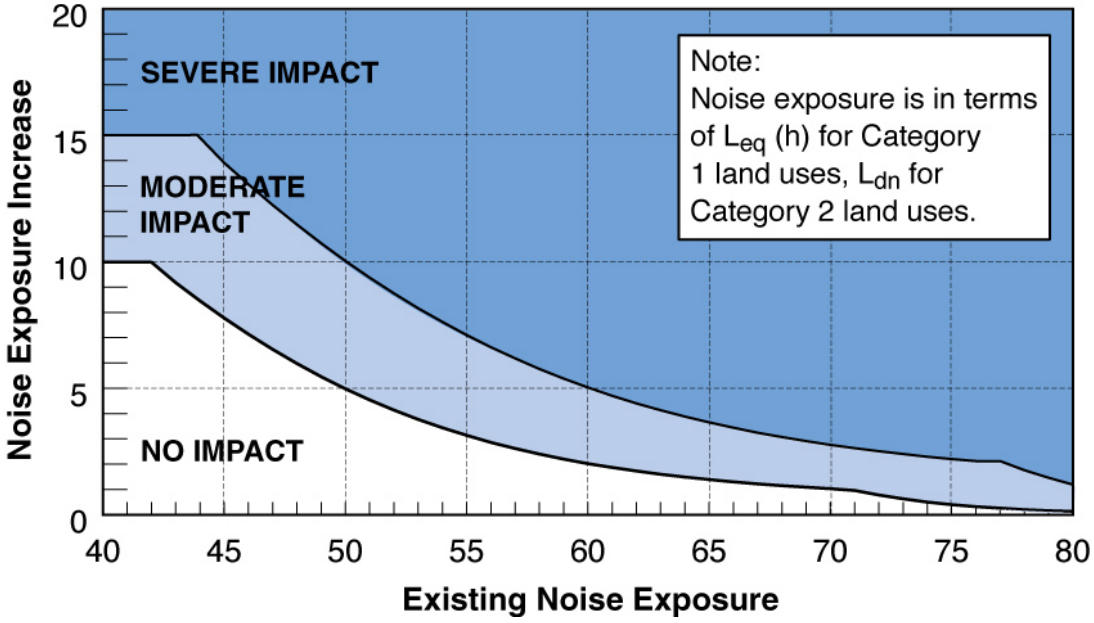
The environmental consequences analysis will include an evaluation of the noise and vibration effects of the proposed Project, assess the potential for impact, and evaluate the need for mitigation. The impact analysis will evaluate construction-period and operational conditions for the existing, No-Action, and Action Alternatives including train operations, streetcar operations, buses, vehicles, and stationary sources of noise (such as ventilation systems).

The following section describes the noise and vibration impact criteria and the methods to predict future noise and vibration conditions, assess potential impact for the Project alternatives, and evaluate mitigation.

10.5.1 Noise Impact Criteria

FTA noise impact criteria are known as "ambient-based" criteria, which evaluates the impact of a change in the noise environment due to the introduction of new noise sources and/or modification of existing sources. The noise impact criteria for human annoyance, presented in **Figure 10-4**, compare the existing outdoor Ldn for residential (Category 2) land use or peak transit hour Leq for institutional (Category 3) land use and the potential increase in future noise due to the proposed Project. Impacts are categorized as no impact, moderate impact, or severe impact. Severe impact is where a significant percentage of people would be highly annoyed by a project's noise. Moderate impact is where the change in the cumulative noise level would be noticeable to most people, but may not be sufficient to generate strong, adverse reactions.

Figure 10-4. FTA Noise Impact Criteria



Construction Noise Impact Criteria

The District of Columbia noise ordinance (Municipal Regulations Chapter 20-27 and 20-28) prohibits construction sound levels above 80 dBA (Leq) (except for pile driving) as measured at a distance of 25 feet from the outermost limits of the construction site between 7:00 AM and 7:00 PM unless a variance is granted. From 7:00 PM to 7:00 AM, construction activities may be limited to 65 dBA (Lmax) at a distance of 25 feet from the outermost limits of the construction site for noise originating in an industrial zone. These criteria are intended to apply to stationary construction sources.

The FTA construction noise guideline criteria for Detailed Assessment depend on the type of land use and the time of day, as shown in **Table 10-4**. These criteria are intended to apply to stationary construction sources.

Table 10-4 FTA Guideline Construction Noise Criteria

Land Use	8-hour (L_{eq})		L_{dn} (dBA)
	Day	Night	30-day Average
Residential	80	70	75[1]
Commercial	85	85	80[2]
Industrial	90	90	85[2]

1 In urban areas with very high ambient noise levels (L_{dn} > 65 dB), L_{dn} from construction operations should not exceed existing ambient + 10 dB.

2 Twenty-four-hour L_{eq}, not L_{dn}.

There are no applicable Federal or local noise criteria associated with construction mobile sources (i.e. trucks and worker vehicles). The FHWA/DDOT noise abatement criteria (NAC) (i.e. approach or exceed 66 dBA Leq for residential receptors) are only used to evaluate roadway noise for Type 1 highway projects. Type I highway projects are capacity improvements which add travel lanes or substantially altering the horizontal or vertical alignment of roadways. Existing roadway noise conditions may already exceed the DDOT NAC and therefore assessing noise according to these absolute criteria would not indicate whether construction mobile sources would cause a significant change in noise. Therefore, potential effects due to construction mobile source noise will be evaluated based on a comparison of existing and construction-period roadway noise conditions. If there would be a substantial increase in roadway noise, there may be a compelling need to evaluate mobile source noise reduction measures such as routing trucks away from sensitive receptors or assuring roads are maintained with a smooth surface. One basis for evaluating the significance of increases in roadway noise that may be used for this evaluation is that a 3-decibel change is generally considered the threshold of a perceptible change in sound. Therefore, changes in sound less than three decibels would likely be less than significant.

Vibration Impact Criteria

FTA vibration criteria are based on maximum levels for a single event and depend on the type of land use and the frequency of events. Additionally, for projects in existing rail corridor, such as the WUS Expansion Project, the vibration impact assessment depends on existing vibration conditions in the Study Area.

FTA has different vibration impact criteria depending on whether an FTA General Vibration Assessment or Detailed Vibration Assessment method is used. If vibration measurements and/or prediction provide only overall vibration level results, then the FTA Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Assessment, as shown in **Table 10-5**, are used. These vibration criteria are defined in terms of human annoyance for different land-use categories such as high sensitivity (Category 1), residential (Category 2), and institutional (Category 3). In general, the threshold of human perceptibility of vibration is 65 Vibration Decibels (VdB).

Table 10-5 FTA Ground-Borne Vibration and Ground-Borne Noise Impact Criteria for General Assessment[1]

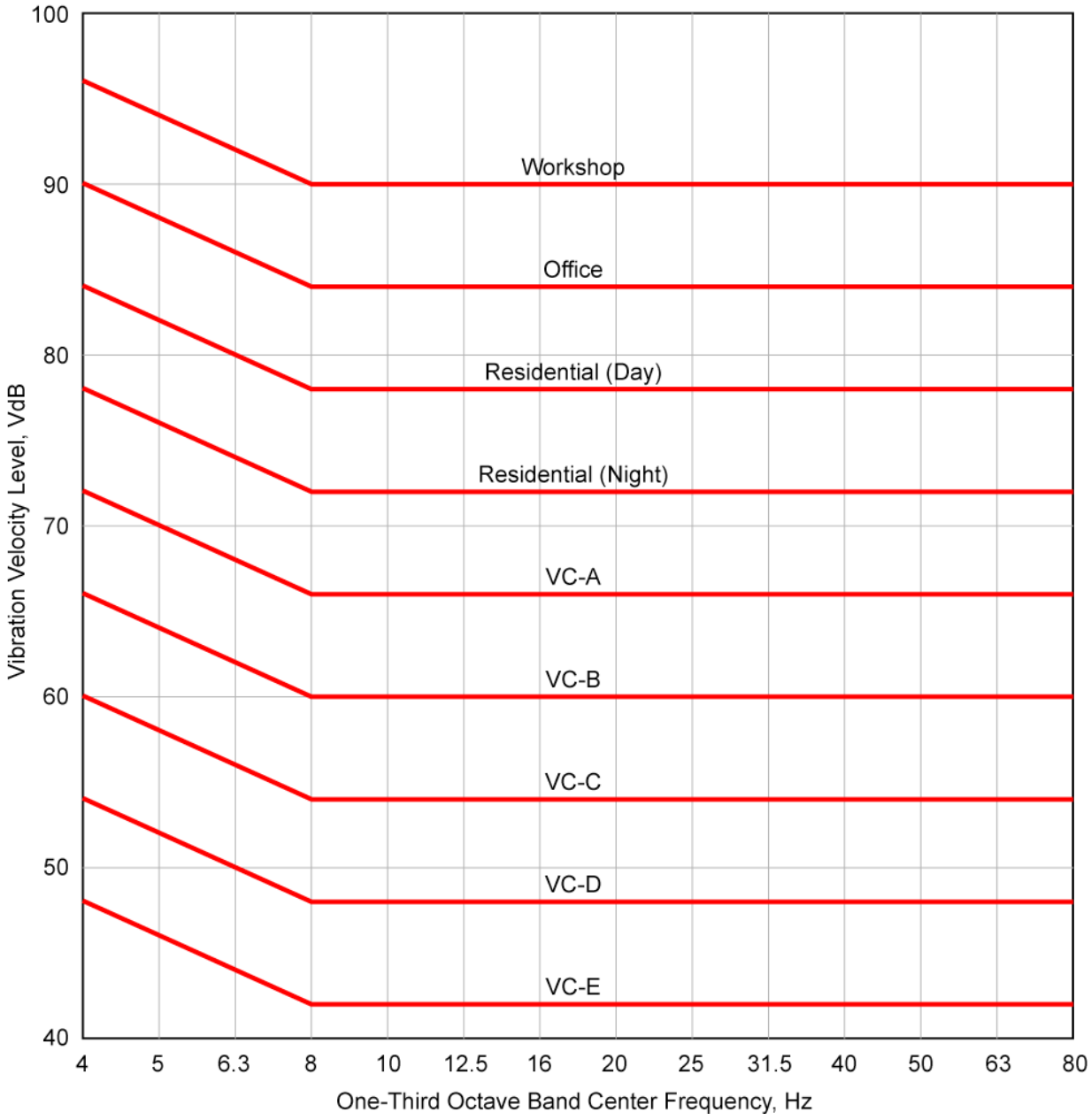
Land Use Category	Ground-Borne Vibration Levels (VdB)[1]			Ground-Borne Noise Levels (dBA)[2]		
	Frequent Events[3]	Occasional Events[4]	Infrequent Events[5]	Frequent Events[3]	Occasional Event[4]	Infrequent Event[5]
Category 1: Buildings where low vibration is essential for interior operations.	65	65	65	N/A[6]	N/A[6]	N/A[6]
Category 2: Residences and buildings where people normally sleep.	72	75	80	35	38	43
Category 3: Institutional buildings with primarily daytime use.	75	78	83	40	43	48

1 RMS vibration velocity levels are reported in VdB referenced to 1 micro inch per second (ips).
2 Ground-Borne noise levels are reported in dBA referenced to 20 micro Pascals.
3 "Frequent Events" is defined as more than 70 vibration events per day.
4 "Occasional Events" is defined as between 30 and 70 vibration events per day.
5 "Infrequent Events" is defined as less than 30 vibration events per day.
N/A means "not applicable." Vibration-sensitive equipment is not sensitive to ground-borne noise.

The FTA criteria for Detailed Vibration Analysis, as shown in **Figure 10-5**, are used when a Detailed Vibration Assessment is conducted which provides the frequency content of vibration in 1/3 octave band levels. These detailed vibration criteria apply to residential uses, institutional uses and vibration-sensitive equipment. If there are special-use buildings such as concert halls, recording studios, auditoriums or theatres, then specific vibration and ground-borne noise criteria would apply.

The vibration criteria also depend on existing conditions. For projects in existing rail corridors (more than 12 trains per day), a project will cause impacts if vibration levels were to exceed the FTA criteria and the project were to significantly increase the number of vibration events (approximately doubling the number of events) or if the project would increase vibration levels by 3 VdB or more. If a project moves existing tracks, there would be impacts only if the track relocation results in vibration levels exceeding the FTA criteria and increasing more than 3 VdB.

Figure 10-5. FTA Detailed Ground-Borne Vibration Criteria



Construction Vibration Impact Criteria

During certain construction activities, such as those during earthwork and foundation, there is the potential for structural damage to nearby buildings. Structural damage is typically limited to impact-type construction equipment such as impact-pile driving used at very close distances to buildings

(within 25 feet). Potential damage from vibration depends on the specific construction activity and how the building is constructed. FTA criteria for potential structural damage are shown in **Table 10-6**. Depending on their construction, historic buildings may require vibration levels that comply with Building Category IV. The criteria are presented in both vibration level (VdB) and peak-particle velocity (PPV) inches per second (in/s).

Table 10-6 FTA Criteria for Potential Structural Damage

		Vibration Criteria for Potential Damage to Structures	
Building Category		**Vibration Level (VdB)**	**Peak-Particle Velocity (in/s)**
I.	Reinforced-concrete, steel or timber	102	0.5
II.	Engineered-concrete and masonry	98	0.3
III.	Non-engineered timber and masonry	94	0.2
IV.	Buildings extremely susceptible to vibration damage	90	0.12

Construction-generated vibration also has the potential to cause human annoyance inside nearby sensitive receptors such as residences. Due to the relatively long construction period, the FTA vibration criteria for human annoyance, shown in **Table 10-5**, will be used to assess potential effects from construction trucks.

Operational and Construction Noise and Vibration Criteria for Section 106 Properties

Noise and vibration may affect historic properties directly or indirectly. In some cases, Project-related vibrations may cause physical damage and result in structural problems or loss of material. More commonly, noise and vibration may indirectly affect the integrity of a property's setting. Noise and vibration may be caused or heightened by Project construction and operation and by Project-related traffic, attributed to both construction and long-term operation.

Noise and vibration will be assessed for Section 106 properties according to their use similar to other receptors. Based on the results of the assessment, the historic properties that may be affected will also be evaluated against the seven aspects of integrity, which convey a property's significance. If the noise and vibration are determined to cause an effect that would compromise the building's physical structure or the integrity from which the significance of the property is derived—especially its integrity of setting—a finding of adverse effect will be made.

10.5.2 Impact Assessment Methodology

Noise and vibration impacts will be assessed by measuring and predicting noise and vibration conditions for the existing, No-Action, and future Action Alternatives and comparing to applicable

criteria. Accurately evaluating impact is important for future decisions regarding alternatives, mitigation measures, and commitments.

Operational No-Action and future Action Alternative noise conditions will be modeled throughout the Study Area using a method similar to that used for existing conditions (see *Section 1.4.2*), including contributions from railroad, streetcar, roadway, and stationary sources. Railroad noise will be predicted based on the Detailed Noise Assessment methodology in the FTA Manual, roadway noise will be predicted based on the FHWA's TNM, and stationary sources will be included based on best practices. The modeling results will be implemented in Cadna-A software and validated by comparing with predictions from standard methods outlined in the FTA Manual and from FHWA's TNM version 2.5. The overall existing noise results will include site-specific results at noise-sensitive receptors and broader noise mapping results throughout the entire Study Area.

A Detailed Vibration Assessment will be conducted based on Chapter 8 of the FTA Manual to predict future vibration conditions from trains. Since the Project already has existing rail infrastructure and the same types of trains would be operating at WUS, vibration can be predicted based primarily on measurements of existing trains. Vibration propagation conditions can be determined through measurement of existing sources at a range of distances. Typical adjustments will be included, as needed, such as outdoor-to-indoor vibration attenuation, changes in vibration due to train speeds, and track condition or type. Since many station tracks will be supported by deep foundations integrated in to the station, there may be additional vibration attenuation relative to typical adjustments. All structures are evaluated for the risk of potential structural damage due to construction or operational vibration. Historic buildings are of interest in this evaluation since historic structures may be more fragile and susceptible to damage from vibration.

Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared against existing conditions to evaluate changes between existing and future noise and vibration conditions without the proposed Project. While differences in noise and vibration will be evaluated, impact is not assessed for the No-Action Alternative because the NEPA process and FTA criteria are specifically intended to consider noise and vibration effects due to the proposed Project. The most substantial change in noise and vibration included in the No-Action Alternative analysis is the future private air-rights development overbuild that will enclose portions of the railroad corridor, which will reduce train noise in the Study Area, and the introduction of new ventilation structures that generate noise.

Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to existing conditions and the No-Action Alternative in each of the analysis years. In accordance with FTA methods, operational noise impact will be assessed based on the changes in railroad, roadway, and stationary sources that are due to the proposed Project. Since the WUS Expansion Project will facilitate more train operations and generate vehicular traffic due to increased service, impact will be assessed including the changes in operations and infrastructure such as track and station improvements.

Methodology for Evaluating Construction Impacts

The methodology for assessing construction noise and vibration impacts varies based on the type of noise and vibration source. The following presents the methods that will be used for evaluating stationary source construction equipment and mobile source construction vehicles.

10.5.3 Stationary Source Construction Noise and Vibration

Construction noise and vibration will be predicted using the methods described in the FTA manual (Chapter 12), *FHWA Roadway Construction Noise Model*, EPA construction noise data, a combination of these methods, or an equivalent method, supplemented as necessary by professional judgment. Data sources will include construction staging locations, equipment, methods, and schedules. Construction noise and vibration will be evaluated based on typical equipment and methods used during different phases of the proposed Project such as track re-construction, foundation work, superstructure, and finish/interior fit out.

Stationary source noise modeling will involve combining the sound from all equipment that will be used during a construction phase and the amount of time, or usage factor, that the equipment will be utilized. Construction noise will be assessed according to noise criteria described above to determine if there is a potential for impact.

Vibration from stationary construction equipment will be modeled based on the methods described in the FTA guidance manual. Vibration will be predicted for each piece of equipment that would produce substantial vibration during construction such as impact pile driving and excavators.

Mobile Source Construction Noise and Vibration

Mobile source construction noise and vibration will be evaluated based primarily on the addition of heavy trucks such as dump trucks and concrete trucks, traffic due to workers traveling to and from the site, and construction trains that will haul muck away and deliver materials.

Mobile source construction noise will be predicted similar to the method used for operational noise, which implements both the FHWA Traffic Noise Model and FTA methods. which implements both the FHWA Traffic Noise Model and FTA methods. Noise and vibration emission levels of construction trucks are provided by the FTA manual (Chapter 12).

Noise and Vibration Mitigation Evaluation

Depending on the impact assessment results, the need for noise and vibration mitigation will be evaluated, a Noise and Vibration Mitigation Policy will be developed to determine a feasible and reasonable approach to mitigating impact according to FTA criteria, and specific mitigation recommendations will be provided. FTA guidance states that the need for noise mitigation is most compelling if there would be significant (severe) noise impact. If there would be moderate noise impact, the need for mitigation should be evaluated considering factors such as the absolute future noise level, the acoustical and cost effectiveness of mitigation options, the sensitivity of the receptors, and where noise levels would be within the range of the moderate impact criteria.

Noise abatement may include noise barriers, using special-trackwork at turnouts and crossovers to reduce noise and vibration, modifying roadway alignments, modifying pavement types, modifying roadway speed limits, restricting truck traffic, or providing building sound insulation. The Noise and Vibration Mitigation Policy will address the need for mitigation and the safety, constructability, cost effectiveness, and acoustical effectiveness of potential solutions. The Noise and Vibration Mitigation Policy will also address potential mitigation of historic properties which can have special requirements. For example, noise barriers or building soundproofing (e.g. new windows and doors) must be evaluated in relation to its potential to adversely affect historic properties..

The need for construction noise and vibration mitigation will also be evaluated and preliminary mitigation recommendations will be provided depending on the impact assessment results. The assessment will recommend a list of commonly employed source and path mitigation measures and best management practices to reduce the potential for noise and vibration impact. A review of impacted receptor locations, if any, will consider the optimal locations for path mitigation measures, such as temporary noise barriers, for incorporation into a future Construction Noise and Vibration Management Plan. Should any structures be located so that vibration levels may exceed potential structural damage limits, alternative construction methods or restrictions of location of equipment usage will be recommended. Should the mobile source construction noise or vibration assessment indicate a potential for impact, mitigation measures will be evaluated such as re-routing truck traffic through less sensitive neighborhoods.

11 Aesthetics and Visual Quality

11.1 Overview and Definition

The aesthetic and visual quality impact analysis will evaluate the direct and indirect impacts caused by the change in the visual environment resulting from the Washington Union Station (WUS) Expansion Project. A viewshed analysis will be developed that will yield simple diagrammatic views from strategic vantage points. These views will then be used to inform both the visual and cultural resources analyses. The analysis will be consistent with the assessment of effects conducted in accordance with Section 106 of the National Historic Preservation Act (NHPA), as amended.

11.2 Regulatory Context

Important Federal and DC regulations and guidelines concerning aesthetics or changes to visual resources include:

- National Environmental Policy Act (NEPA) (42 USC 4321-4355)
- NHPA of 1966, as amended;
- Section 106 of the NHPA;
- 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 (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*;
- Executive Order 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);
- The Height of Buildings Act of 1910; and
- District of Columbia Municipal Regulations, *Zoning Regulations Special Purpose Zones*, 11 K DCMR § 305.

11.3 Study Areas

The primary Study Area corresponds to the Area of Potential Effect (APE), identified in Chapter 12: *Cultural Resources*, in accordance with Section 106 of the NHPA.[71] The APE corresponds to the primary area of focus where visual impacts would likely occur under the No-Action Alternative and the proposed Action Alternatives.

The visual impacts to significant viewsheds outside of the APE will also be assessed. Such viewsheds are defined by their nostalgic and culturally significant views 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 and Section 106 undertakings in the District.

11.4 Affected Environment

The Affected Environment section will document existing conditions and characterize existing views of WUS from key viewpoints. Such viewpoints may be character-defining and impact the integrity of WUS as a cultural resource.

To define the Affected Environment, cultural resources and urban design experts will carry out visual reconnaissance of views of the Project Area and identify the existing visual character of the area. This will include an assessment of the views and vistas and urban design context in the study area.

The visual character of the site embodies the defining and most memorable site features and relates to the urban design context as well as views and vistas. Urban design context relates to the surrounding environment of the site or District, including salient street features; neighborhood architectural scale, form, and materials; and open spaces that contribute to the overall visual character of the larger project area. Street views and significant viewsheds are also important to the visual character of the affected environment. Street views towards the Project Area provide a direct visual connection to the commercial, mixed-use, public, and residential corridors. The majority of street views correspond to the main streets and avenues of the L'Enfant and McMillan Plans of DC, which are listed on the National Register of Historic Places (NRHP). Significant viewsheds are also located outside of the APE and include Arlington National Cemetery, the Old Post Office Building, the Washington Monument, the Capitol, the Washington National Cathedral, and St. Elizabeths west campus.

The existing visual character conditions will be documented by:

- Describing the urban design context of the Study Area (APE and significant viewsheds)
- 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

[71] Refer to Chapter 12: Cultural Resources for description and graphic of the APE

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.

11.5 Environmental Consequences

Construction of the Project Alternatives or the No- Action Alternative will result in additional buildings, structures, and access points to and from WUS. Thus, there will be changes to the aesthetic and visual character of the area in and around WUS. The following methodology will be used to assess the daytime aesthetic and visual impacts of each Project Alternative and identify mitigation measures to avoid and minimize such impacts.

11.5.1 General Methodology

Aesthetic and visual impacts attributed to the Project will be assessed in comparison to the existing conditions and the No-Action Alternative. Impact analysis will be based on field observations and visual simulations, as well as a review of maps and photographs of the Project Area. To assess aesthetic and visual impacts the following actions will be taken:

- Describe the visual effects related to each proposed Alternative and describe how the visual character would change.
- Perform visual simulations to assess aesthetic and visual impacts for the No-Action Alternative and the proposed Action Alternatives.
- Simulate the visual impact by superimposing the built forms of the Project Alternatives onto existing conditions photographs of identical views using 3D modeling and post-production techniques. Such diagrams are meant to illustrate building mass, height, and setback on the site and to quantitatively assess impact. Visual simulations will be performed for the viewpoints and viewsheds described in the Affected Environment section.
- Characterize and assess aesthetic and visual impacts of each alternative. Assess impacts based on the change in the visual character of the area, views and vistas, and urban design context in comparison to the existing conditions. Consider the *compatibility* of the overall change, the *sensitivity*, and the *degree* of the impact to existing aesthetic and scenic resources. Assessment of aesthetic and visual impacts will be coordinated with the Section 106 process of the NHPA. Knowledge of the historic significance of key visual resources, views, and vistas will be incorporated into the evaluation process.

The following definitions are provided to describe how impacts to the visual quality of the environment will be assessed.

- *Compatibility* of impact: Defined as the ability of environment to visually absorb the proposed project as a result of the project and the environment having compatible visual

characteristics. The proposed Project can be considered compatible or incompatible. Compatibility will be influenced by visual characteristics, which may include massing, form, and materials.

- *Sensitivity* to impact: Defined by the ability of viewers to see and care about a project's impacts. The sensitivity to impact is based on viewer's sensitivity to changes in the visual character of visual resources. Viewers are either sensitive or insensitive to impacts. By itself, the sensitivity of the impact should not be confused or conflated with the value of the impact.
- *Degree* of impact: Defined as either a beneficial, adverse, or neutral change to visual quality. A proposed project may benefit visual quality by either enhancing visual resources or by creating better views of those resources and improving the experience of visual quality by viewers. Similarly, a project may adversely affect visual quality by degrading visual resources or obstructing or altering desired views. Together, the *compatibility* of the impact and the *sensitivity* of the impact yield the *degree* of the impact to visual quality.

11.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to existing conditions and will include station and track improvements conducted by Amtrak and the Virginia Railway Express (VRE), local transportation projects including the H Street bridge replacement, and the private air-rights development project above the WUS rail yard. The No-Action Alternative also assumes the retention of the WUS parking garage. To assess the aesthetic and visual impacts of the No-Action Alternative the following actions will be taken:

- Describe the visual effects related to the No-Action Alternative and describe how the visual character would change.
- Perform visual simulations to assess aesthetic and visual impacts for the No-Action Alternative. Simulate the visual impact by superimposing the maximum potential volume within DC zone district USN PDR-3 as represented by height and building footprint. Visual simulations will be performed for the viewpoints and viewsheds described in the Affected Environment section.
- Characterize and assess aesthetic and visual effects of the No-Action Alternative. Assess effects based on the change in the visual character of the area, views and vistas, and urban design context in comparison to the existing conditions. Consider the *compatibility* of the impact, the *sensitivity* of the impact, and the *degree* of the impact to aesthetic and scenic resources as described above.

11.5.3 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to existing conditions and the No-Action Alternative. Permanent impacts will be assessed for the long-term duration of the Project.

- Describe the visual effects related to the Action Alternatives and describe how the visual character or visual quality could change.
- Perform visual simulations to assess aesthetic and visual impacts.
  - Utilize the same viewsheds selected to assess the existing conditions and the No-Action Alternative.
  - Simulate the visual impact by superimposing the potential volume as described in each Preliminary Project Alternative.

The analysis will characterize and assess the aesthetic and visual effects of all Action Alternatives based on the change in the visual character of the area, views and vistas, and urban design context in comparison to the existing conditions. The analysis will also consider the *compatibility* of the impact, the *sensitivity* of the impact, and the *degree* of the impact to aesthetic and scenic resources as described above.

11.5.4 Methodology for Evaluating Construction Impacts

Construction impacts will be evaluated based on project timeline and will be assessed at "peak construction year." Construction impacts will be assessed based on the change in the visual character of the area, views and vistas, and urban design context of the site in comparison to the existing conditions. Short term impacts that may affect the aesthetic and visual quality of the environment include the presence and location of construction screening walls that conceal excavation, stockpiling, and construction equipment and materials and how these elements disrupt the visual character of the Project Area. Steps for evaluating construction impacts include:

- Understanding constructability phases and processes of the No-Action and Action Alternatives. Identify what construction impacts would likely occur; and
- Describing the visual effects related to construction activity and describe how the visual character or visual quality could change.
- Characterizing and assessing the aesthetic and visual impact of construction activities' effects according to the change in the visual character of the area, views and vistas, and urban design context. The analysis will consider the *compatibility* of the impact, the *sensitivity* of the impact, and the *degree* of the impact to aesthetic and scenic resources as described above.

11.5.5 Methodology for Evaluating Mitigation Measures

Depending on impact assessment results, the need for mitigation will be evaluated and preliminary mitigation recommendations will be provided. Mitigation measures will be identified for any unavoidable adverse impacts associated with the Proposed Action and will be defined through the NEPA mitigation process and/or the Section 106 process. Steps for identifying and proposing possible mitigation measures include:

- Assess the degree to which mitigation measures comply with the regulatory context.
- Assess the degree to which mitigation measures avoid and minimize adverse effects.

Such measures may include but are not limited to further design review; the retention of site, landscape, and streetscape elements; providing interpretation; and design guidelines for construction screening.

12 Cultural Resources

12.1 Overview and Definition

This section identifies the cultural resources that are present within the Washington Union Station (WUS) Expansion Project Study Area and defines the methodology for assessing impacts to such resources. The Study Area to assess impacts to cultural resources corresponds directly with the Area of Potential Effect (APE) as defined in accordance with Section 106 of the National Historic Preservation Act (NHPA) regulations (36 CFR 800.4). Cultural resources are characterized as historic properties, archaeological resources, cultural landscapes, museum objects, and ethnographic resources.

Section 106 requires the identification of historic properties, which are defined by the NHPA as any prehistoric or historic district, site, building, structure, or object included in or eligible for listing in the National Register of Historic Places (NRHP). Culturally important properties that do not meet these criteria (for example, properties exempt from the NHPA, listed on the DC Inventory of Historic Sites but not eligible for the NRHP, and local monuments that are not eligible for the NRHP) will be identified as "cultural resources" in the Environmental Impact Statement (EIS).

12.2 Regulatory Context

The NHPA of 1966, as amended, is the principal legislation for regulating Federal actions that have the potential to affect cultural resources. Section 106 of the NHPA requires that all Federal agencies consider the effects (impacts) of their undertakings on historic properties. Further, Federal agencies must consult with the State Historic Preservation Officer (SHPO); Tribal Historic Preservation Officer (THPO), if applicable; Advisory Council on Historic Preservation (ACHP), as required; and other relevant consulting parties invited to participate in the Section 106 consultation process to help identify and determine effects to historic properties. If adverse effects are determined, agencies are required to continue consultation to avoid, minimize, or mitigate the effects to historic properties that would alter the characteristics that qualify the property for inclusion in the NRHP.

The Section 106 process is being coordinated with the National Environmental Policy Act (NEPA) of 1969 as encouraged in Council on Environmental Quality's (CEQ) *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act,* (40 CFR 1500-1508) and the regulations that implement Section 106, *Protection of Historic Properties* (36 CFR 800). Such coordination provides efficiencies, improves public understating, and leads to more informed decisions.

In addition to NHPA and NEPA, other important laws and regulations designed to protect cultural resources include:

- Section 110 of the NHPA, charging Federal agencies with the responsibility for establishing preservation programs for the identification, evaluation, and nomination of historic properties to the NRHP;
- Section 4(f) of the Department of Transportation Act which prohibits the U.S. Department of Transportation (USDOT) agencies from using land from publicly owned parks, recreation areas, wildlife and water fowl refuges, or public and private historic properties, unless there is no feasible and prudent alternative to that use and the action includes all possible planning to minimize harm to the property resulting from such a use (23 CFR 774);
- Section 106 Regulations: 36 CFR 800 – *Protection of Historic Properties* (as amended in August 2004)
- Native American Graves Protection and Repatriation Act (NAGPRA), 1990;
- American Indian Religious Freedom Act (AIRFA), 1978;
- Archaeological Resources Protection Act (ARPA), 1979.

12.3 Study Areas

The Project APE was developed through site visits, photographic studies, and consultation with consulting parties, including the DC Historic Preservation Office (DCHPO). Due to the prominent location of WUS and its relationship to the monumental core of Washington, DC, impacts will be assessed for sites within the APE, as well as for significant viewsheds described in *Section 12.3.2*.

12.3.1 Local

The local Study Area includes the Project Area (the construction footprint of the Project) and the broader Area of Potential Effect. The APE was confirmed on September 29, 2017 by the DC Historic Preservation Office. However, as currently drawn, the APE encompasses a wide area surrounding WUS and the Project Area. It extends from the US Capitol Grounds north and is generally bound by Third Street SW, First Street NW, and New Jersey Avenue NW to the west; New York Avenue and the Washington Metropolitan Area Transit Authority (WMATA) rail yard to the north; and New York Avenue, Fourth Street NE, L Street NE, 10th Street NE, F Street NE, Sixth Street NE, Maryland Avenue NE, and Second Street NE to the east, as shown in **Figure 12-1**. The APE was developed based on the potential for direct and indirect effects to occur during and as a result of the Project. Direct and indirect effects include ground disturbance, visual impacts, audible impacts, and changes to traffic patterns, land use, and public access.

12.3.2 Regional

Significant viewsheds are also considered to be a part of the APE. Such viewsheds are defined by their nostalgic and culturally significant views from Arlington National Cemetery, the Old Post Office Building, the Washington Monument, the Capitol, the Washington National Cathedral, and St. Elizabeth's west campus. Views from these locations are important within Washington, DC and have

been identified in other Section 106 undertakings in the District. The impacts of the Project on these viewsheds will be assessed in Chapter 11: *Aesthetics and Visual Quality*.

12.4 Affected Environment

In accordance with ACHP regulations for implementing the Section 106 process (36 CFR 800), historic properties within the APE are identified and potential adverse effects are assessed. Historic properties are defined as those included in or eligible for inclusion in the National Register of Historic Places. In addition to the historic properties evaluated in the Section 106 process, other cultural resources are also located within the APE and are evaluated in the NEPA EIS. Such resources include historically or culturally significance properties that are exempt from the NHPA, listed on the DC Inventory of Historic Sites but not eligible for the NRHP, and other resources that are not eligible for the NRHP. According to NEPA regulations cultural resources include historic properties, cultural landscapes, and archaeological resources.

12.4.1 Data Sources

Multiple resources will be consulted in the identification of cultural resources including:

- The National Register of Historic Properties,
- The DC Inventory of Historic Sites,
- The Architect of the Capitol's List of Heritage Assets, and
- The list of memorials and monuments within the National Park Service's National Mall and Memorial Parks.
- *The Union Station Historic Preservation Plan* (HPP)
- Consultations with consulting parties and the DCHPO.

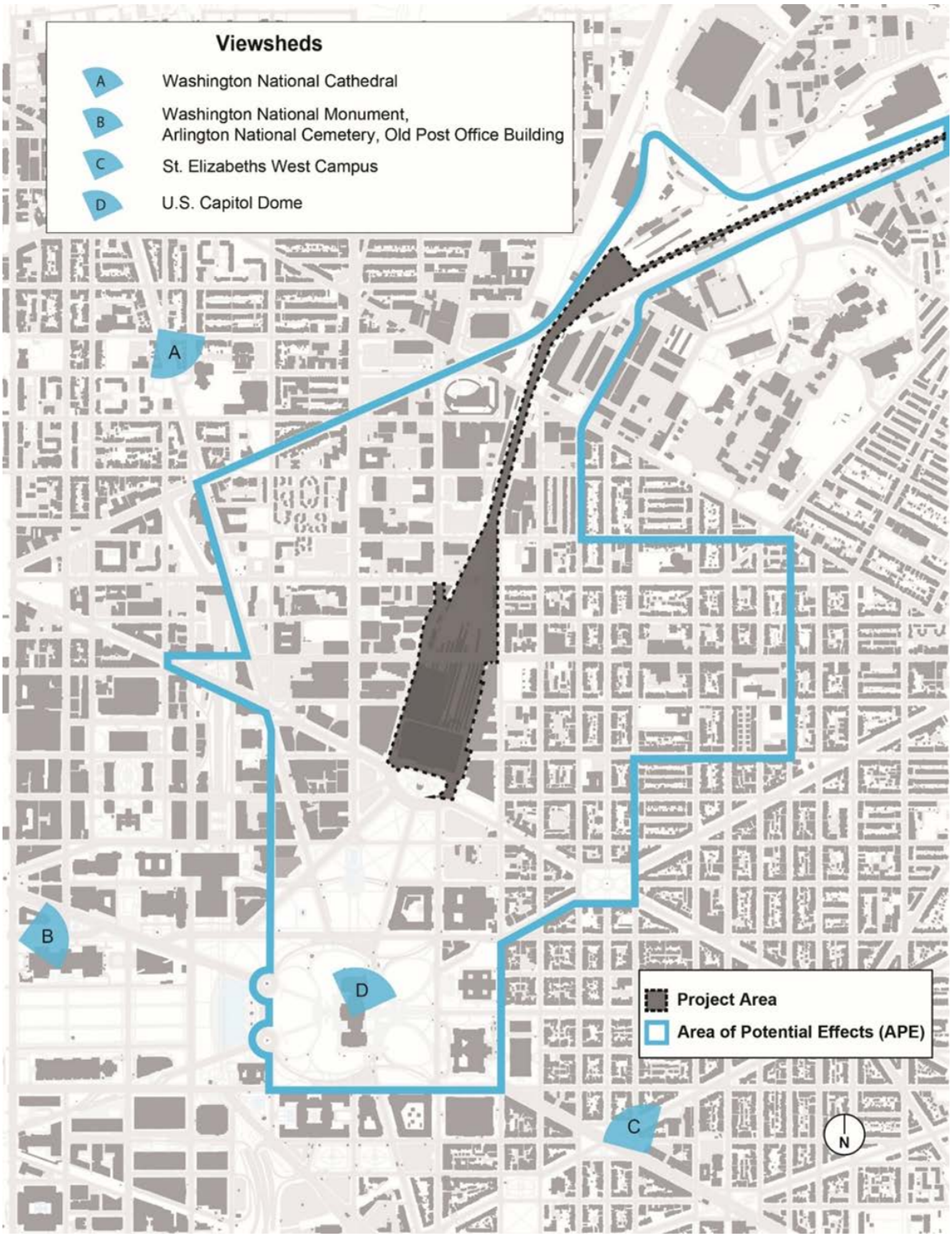
12.4.2 Methodology

In order to inform the identification of the APE, Federal Railroad Administration (FRA) identified a "Proposed Study Area" at the second Consulting Parties meeting on May 9, 2016. The Proposed Study Area 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 (**Figure 12-1**). FRA presented the preliminary concepts to the consulting parties at the third consulting parties meeting on October 6, 2016. At this meeting, the Study Area was again presented along with the known cultural resources within and surrounding the proposed Study Area. Cultural resources were identified by analyzing the various data sources available. Having received no comments on the Proposed Study Area and identification of cultural resources after the October meeting, FRA sent an email to the consulting parties on February 10, 2017 asking them to confirm their concurrence with and/or provide any final comments on the Proposed Study Area and the identification of cultural resources within 30 days.

In February and March 2017, five consulting parties, including the DCHPO, 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. Additional comments addressed the identification of cultural resources including historic properties and properties that were potentially eligible for the DC Inventory of Historic Sites and National Register of Historic Places. A letter from the DCHPO asked that a Determination of Eligibility (DOE) be prepared for the WUS Rail Yard. Currently, a DOE is being written for the WUS Historic District, which includes WUS, Union Station Plaza, and the Terminal Rail Yard extending from the station north to Florida Avenue NE.

Because WUS is in an area that has been thoroughly studied by many public and private historic preservation entities, it is believed that all cultural resources have been identified. No further research or studies, except for the DOE for the was confirmed on September 29, 2017 WUS Historic District will be conducted to identify cultural resources as a part of the WUS Expansion Project. The EIS will list and describe all cultural resources within the APE.

Figure 12-1. WUS Expansion Project Draft APE



12.5 Environmental Consequences

Environmental consequences will be determined by applying the criteria for the assessment of adverse effects (36 CFR 800.5) and by considering ways to avoid, minimize, or mitigate such impacts. Under the implementation of regulations for Section 106, a determination of either adverse effect or no adverse effect must be made for affected historic properties. Such determinations will be expanded to include all cultural resources for the EIS, which will undergo an assessment of adverse impact. An adverse impact occurs whenever an action alters, directly or indirectly, any characteristic of a cultural resource that defines or illustrates its significance. Examples of adverse impacts are identified in 36 CFR 800.5 and include, but are not limited to:

- Physical destruction of or damage to all or part of the property;
- Alteration of a property, including restoration, rehabilitation, repair, maintenance, stabilization, hazardous material remediation, and provision of handicapped access, that is not consistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR 68) and applicable guidelines;
- Removal of the property from its historic location;
- Change of the character of the property's use or of physical features within the property's setting that contribute to its historic significance;
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features;
- Neglect of a property that causes its deterioration, except where such neglect and deterioration are recognized qualities of a property of religious and cultural significance to and Indian tribe or Native Hawaiian organization, and
- Transfer, lease, or sale of property out of Federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

12.5.1 General Methodology

Impacts to cultural resources attributed to the Project will be assessed in comparison to the existing conditions within the APE. This will serve as a baseline for which to compare the impacts of the No-Action and Action Alternatives in the analysis year (2040). For all alternatives, the analysis will examine potential effects to the historic WUS as well as other resources within the APE.

Analysis of potential impacts will be carried out for each Project alternative and Project timeframe. For example, short-term and long-term impacts will be assessed. The timeframes/durations to be assessed will be defined during the alternatives refinement phase of the NEPA process. A finding of "no adverse impact" or "adverse impact" will be found for each cultural resource in response to each alternative. A finding of "no adverse impact" means there is either no impact or that the impact would not diminish in any way, the characteristics of the cultural resource.

Impacts to cultural resources will be described for the No-Action and Action Alternatives. Adverse impacts will occur when the impact diminishes the integrity of the resource's character-defining features which defines or illustrates its significance. The seven aspects of integrity include location, design, setting, materials, workmanship, feeling, and association. The assessment of impacts to all cultural properties will directly correspond to the assessment of adverse effects used in the Section 106 process.

In addition to the written summary of effects, a matrix will be created to describe the impacts to each cultural resource. Ground disturbance, visual impacts, vibration impacts, traffic impacts, noise disturbance, and economic impacts are examples of adverse impacts that may affect cultural resources. The following questions will be asked to assess whether an impact will occur:

1. Will the Project Alternative cause the neglect, damage, destruction, or removal of cultural resources? Which cultural resources will be affected in this way?
    - Resources will likely be affected in this manner if they are within the Project Area
2. Will the Project Alternative cause the alteration of a cultural resource including the restoration, rehabilitation, repair, maintenance, stabilization, or modification that is not consistent with the *Secretary's Standards for the Treatment of Historic Properties*? Which cultural resources will be affected in this way?
    - Resources will likely be affected in this manner if they are within the Project Area
3. Will the Project Alternative cause a change in use or access to cultural resources? Which cultural resources will be affected in this way?
    - Resources will likely be affected in this manner if they are within the Project Area or area immediately surrounding the Project Area and are impacted by road closures or traffic during Project construction.
4. Will the Project Alternative introduce audible, visual, or atmospheric changes to the setting of cultural resources? Which cultural resources will be affected in this way?
    - Cultural resources may be affected by atmospheric changes. To assess if the impact will diminish the integrity of the property's significant historic features it will be important to identify the resource's significance and character-defining features.
    - Visual impact studies, noise and vibration studies, and traffic studies will also be used to assess impacts to cultural resources.

12.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to existing conditions. The No-Action Alternative includes station and track improvements conducted by Amtrak and Virginia Railway Express (VRE), local transportation projects including the H Street bridge replacement, and the private air-rights development project above the WUS rail yard.

All projects included in the No-Action Alternative may affect the cultural resources identified in the Study Area. Impacts to cultural resources will be assessed based on each of the major programmed improvements: station and track improvements, local transportation projects, and the private air-rights development and based on Project duration.

- Programmed WUS and Track Improvements
  - Impacts will be assessed by asking the questions provided in the general methodology above and will be considered for the short-term and long-term duration of the Project. Impacts will be assessed for all cultural resources. Adverse impacts occur when the integrity, and thus significance, of the resource's character-defining features is diminished.
- Local Transportation Projects
  - Local transportation projects included in the No-Action Alternative include the extended DC streetcar line and the associated replacement of the H Street Bridge.
  - Impacts will be assessed by asking the questions provided in the general methodology above and will be considered for the short-term and long-term duration of the Project. Impacts will be assessed for all cultural resources. Adverse impacts occur when the integrity, and thus significance, of the resource's character-defining features is diminished.
- Private Air-Rights Development within Project Area
  - A proposed mixed-use development is to be constructed above the WUS rail yard, within the air-rights area owned by a private developer. The development is an independent project and can proceed separately from the WUS Expansion Project. The zone district associated with the development site is Union Station North (USN) zone PDR-3, PDR-4, and MU-9. Zoning regulation 305 (Height for USN) has established a maximum permitted building height for the USN zone. Height restrictions step up from a maximum height of 90 feet, not including the penthouse, within 150 feet of the southern property line, to a maximum of 130 feet at 300 feet and beyond from the southern property line. The measurement of building height will be taken from the elevation of the sidewalk on H Street at the middle of the front of the building, to the highest point of the roof or parapet.[72] No bonus height is associated with the USN zone.
  - Impacts will be assessed by asking the questions provided in the general methodology above and will be considered for the short-term and long-term duration of the Project. Impacts will be assessed for all cultural resources. Adverse impacts occur when the integrity, and thus significance, of the resource's character-defining features is diminished.

[72] District of Columbia Office of Zoning. *Zoning Handbook, Union Station North, Zoning Regulation 305.2.* http://handbook.dcoz.dc.gov/zones/special-purpose-zones/union-station-north/usn/. Accessed June 5, 2017.

12.5.3 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to existing conditions and the No-Action Alternative. Impacts will be assessed by asking the questions provided above and will be considered for the short-term and long-term duration of the Project. Impacts will be assessed for all cultural resources within the APE. Adverse impacts will occur when the integrity, and thus significance, of the resource's character-defining features is diminished in comparison to existing conditions and the effects of the No-Action Alternative.

12.5.4 Construction Impacts

Construction effects will be assessed at "peak construction year." Construction impacts will be assessed according to a change to the character-defining features of a cultural resource in comparison to the existing conditions. Construction impacts that will likely affect cultural resources include excavation, stockpiling, construction equipment and materials, and disruption of both physical and visual access to WUS, WUS rail yard, and surrounding neighborhoods. Steps for evaluating construction impacts include:

- Understand constructability phases and processes of the No-Action and Action Alternatives. Identify what construction impacts would likely occur;
- Describe the likely impacts to cultural resources related to construction activity and describe how certain character-defining features may be affected;
- Characterize and assess the impacts of construction related activities, including the effects of increased truck traffic such as noise and vibration. Adverse impacts will occur when the integrity of the property's character-defining features is diminished; and
- Identify proposed mitigation.

12.5.5 Methodology for Evaluating Mitigation Measures

Depending on the assessment of impacts, the need for mitigation will be evaluated and preliminary mitigation recommendations will be provided. Mitigation measures will be identified and discussed for any unavoidable adverse impacts associated with the Project. Steps for identifying and proposing possible mitigation measures include:

- Continue consultation with the DCHPO and Consulting Parties per Section 106 regulations, and possible development of a Memorandum of Agreement or Programmatic Agreement.
- Consider ways to avoid, minimize, and mitigate adverse impacts. Such steps may include but are not limited to further design modification, documentation and interpretation, data recovery, relocation, and curation.

13 Parks and Recreation Areas

13.1 Overview and Definition

The parks and recreation areas impact assessment will consider the Washington Union Station (WUS) Expansion Project's potential to impact public parks and areas used for general recreation. The impact assessment also considers the potential impacts on recreation activities not confined to a specific site, including general cycling and walking around WUS. Potential effects could result from changes to accessibility, physical impacts to parks and recreation areas property, or other external impacts that could affect the use and enjoyment of parks and recreation areas, such as increased noise and vibration or a visual obstruction.

13.2 Regulatory Context

This section identifies regulatory requirements for assessing construction and post construction operation period impacts to parks and recreation areas.

The National Park Service (NPS) was created under the National Park Service Organic Act (16 USC 1-4) to administer the Nation's national parks, which are areas of national significance afforded special recognition and protection. The NPS is a cooperating agency, and has jurisdiction over some parks and recreation areas in the proposed Project's vicinity. The NPS Director's Order 12[73] (DO-12) and the accompanying NPS NEPA Handbook[74] set the policies and procedures by which the NPS complies with NEPA. The FRA will consider these policies and procedures in evaluating the potential effects of the proposed Project on parks and recreation areas.

Section 4(f) refers to the original section within the U.S. Department of Transportation (USDOT) Act of 1966 which requires avoidance and minimization of impacts to public park and recreation lands, wildlife and waterfowl refuges, and public or private historic properties, during the planning and design of transportation projects. Section 4(f) applies to the proposed project, and a separate Section 4(f) determination is included in Chapter 18 of this Methodology Report.

The Architect of the Capitol (AOC) is the builder and steward of the landmark buildings and grounds of Capitol Hill in Washington DC. The AOC has jurisdiction over grounds in the vicinity of the

[73] United States Department of the Interior, National Park Service. October 5, 2011. *Director's Order #12: Conservation Planning, Environmental Impact Analysis, and Decision-Making.*

[74] 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.

proposed Project. The AOC does not have specific policies or regulatory approval processes applicable to the proposed Project.

13.3 Study Areas

This section defines the local and regional Study Areas. The Project Area (the footprint of the project) contains no public parks or recreation areas.

13.3.1 Local

The local Study Area for parks and recreation areas includes the Project Area and all parcels that directly abut WUS and the tracks in the Project Area.

13.3.2 Regional

The regional Study Area includes the Project Area, the local Study Area, and nearby neighborhoods of the H Street Corridor, Capitol Hill, the National Mall, NoMa, Mount Vernon Triangle, Atlas District, Judiciary Square, and Gallaudet. The regional Study Area for Parks and Recreation Areas is larger than the local Study Area, and extends approximately 0.25 to 0.5 miles from the Project Area to capture the surrounding neighborhood context. The regional Study Area is congruent with the Study Area for the Section 4(f) Determination described in Chapter 18, Section 4(f) Determination, and was developed based on the potential for the proposed Project to impact parks and recreation areas.

13.4 Affected Environment

This section will identify public and private recreational facilities open to the public within the local Study Area and regional Study Area.

13.4.1 Data Sources

Data sources include information and plans from several Federal and municipal entities. The National Capital Planning Commission (NCPC) is a Federal agency that serves as the Federal government's planning agency for Washington, DC and the surrounding region.[75] The agency is a cooperating agency, and developed the *Federal elements of the Comprehensive Plan for the National Capitol* which contains both Federal and district specific elements.[76] 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. The NCPC also developed the Capital Space Plan, and a subsequent progress report in 2012, in coordination with the NPS, the DC Department of Parks and Recreation (DC DPR), and the DC Office of Planning. The

[75] The Metropolitan Washington Council of Governments is the metropolitan planning organization (MPO) for the Washington, DC region.

[76] The Parks and Open Space element was last updated in 2004; NCPC anticipates that an updated element will be adopted in 2018.

plan coordinates existing management plans to create a unified park system development plan for the Washington, DC area.

Municipal departments with jurisdiction over parks and recreation areas near WUS include the DC DPR, the DC Office of Planning, and the DC Office of Zoning. Parks and recreation areas are managed by these departments through the development and implementation of planning studies, zoning controls, and other municipal plans. Municipal plans and studies applicable to parks and recreation areas near WUS include the DC Office of Planning's Downtown East Re Urbanization Strategy, Mount Vernon Square District Project Study, and Center City Action Agenda. The planning and zoning functions of the DC Office of Zoning are discussed under Chapter 9, Land Use and Property.

Data sources include:

- Consultation with NPS, DC DPR, and AOC;
- Local and regional parks and open space plans, including:
  - NPS National Mall Plan;[77]
  - National Capital Planning Commission Capital Space Plan[78] and 2012 Progress Report;
  - DC Office of Planning Center City Action Agenda;[79]
  - DC Office of Planning Downtown East Re Urbanization Strategy;[80] and
  - DC Office of Planning Mount Vernon Square District Project.
- Local and regional trail networks and areas used for non-site-specific activities like hiking and cycling; and
- Information specific to identified individual Parks or Recreation Areas within the local and regional Study Areas, including, but not limited to:
  - Columbus Circle;
  - Lower and Upper Senate Parks;
  - Stanton Park;
  - Cobb Park/DPR 1089;
  - The US Capitol Grounds;
  - Union Square;

77 National Park Service (NPS). 2010. *National Mall Plan.* https://www.nps.gov/nationalmallplan/FEISdocs.html. Accessed June 01, 2017.

78 National Capital Planning Commission, National Park Service (NPS), and District of Columbia. 2010. *Capital Space Plan.* https://www.ncpc.gov/plans/capitalspace/. Accessed June 01, 2017

79 DC Office of Planning. 2008. *Center City Action Agenda*. https://planning.dc.gov/node/598342. Accessed June 01, 2017.

80 DC Office of Planning. 2015. *Downtown East Re-Urbanization Strategy*. https://planning.dc.gov/node/1064262. Accessed June 01, 2017.

- The Metropolitan Branch Trail shared use path; and
- Various other pocket parks.

13.4.2 Methodology

The description of existing conditions will include a figure identifying all parks and recreation areas in the regional Study Area; information received through coordination with relevant authorities (national, regional, and local) concerning recreation areas; and will Identify and describe parks and recreation areas within the local Study Area and regional Study Area, including a description of the features and attributes of the areas.

13.5 Environmental Consequences

The analysis will evaluate the Project's direct and indirect impacts (both negative and beneficial) on parks and public recreation opportunities, for both the construction and post-construction periods.

13.5.1 General Methodology

- Identify direct impacts (beneficial and adverse) to parks and recreation areas (both privately and publicly owned). Impacts would be evaluated based on any potential direct effects (property taking) and the potential indirect effects from other resource categories, including traffic, noise, land use, pedestrian and vehicular access, and other categories.
- Consult with the appropriate agencies (such as NPS and DC DPR) to ensure relevant impacts are evaluated with respect to park or recreation area use.

Impacts to NPS resources will be identified, preferably quantitatively, during the Impacts Assessment process. Additionally, any decisions needed from NPS will be identified and coordinated with them. Mitigations to minimize impacts to specific NPS resources will also be detailed and documented. Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be evaluated by describing the anticipated future condition of parks and recreation areas and comparing this to the conditions described in the Affected Environment. The comparison would consider anticipated changes in facilities, functions, access, and other conditions, and any visual, noise, air quality, land use, or access changes that would result from the No-Action Alternative. The No-Action Alternative evaluation will be conducted by assessing the consequences of continued existing conditions in combination with planned or reasonably foreseeable future projects. The impact to parks and recreation areas associated with the No-Action Alternative will be documented based on any changes to properties resulting from the No-Action Alternative. This section will note any assumptions regarding future conditions that would be presumed to occur under the No-Action Alternative.

13.5.2 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to existing conditions and the No-Action Alternative in each analysis year. Impacts of the alternatives on sites devoted to parks and recreational activities would be assessed. The assessment would also consider potential impacts on activities that are not confined to a single site, like hiking and bicycling, as well as impacts on sites that are not designated for a specific activity, like those that are designated "open space." The comparison would consider anticipated changes in facilities, functions, access, and other conditions, and any visual, noise, air quality, land use or access changes that would result from the Action Alternatives.

13.5.3 Methodology for Evaluating Construction Impacts

This section will describe potential temporary impacts for each alternative during the construction period on recreation areas, including ground disturbing activities, limitations in use or access, noise and vibration, or other construction impacts.

13.5.4 Methodology for Evaluating Mitigation Measures

Depending on the potential for the proposed Project and Project alternatives to have an effect on parks and recreation areas, the need for mitigation measures will be evaluated and preliminary mitigation recommendations will be provided. Potential mitigation measures would be developed based on the anticipated impacts, the function of the affected site, the value of the affected site (as determined through coordination with the official with jurisdiction), and input from the official with jurisdiction.

14 Social and Economic

14.1 Overview and Definition

The social and economic impact assessment will consider the Washington Union Station (WUS) Expansion Project's potential to impact the socioeconomic environment, including community disruption or cohesion; demographic shifts; impacts to existing commerce and new commercial activity; job creation; and tax revenues. Potential effects could result from an increase in economic activity associated with expanding the existing transportation use of WUS.

14.2 Regulatory Context

The following Federal and local regulations and guidance provide the regulatory context for this analysis:

- U.S. Department of the Interior, National Park Service, National Park Service NEPA Handbook;[81]
- 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;[82] and
- DC Office of the Deputy Mayor for Planning and Economic Development, DC's Economic Strategy: Strategy Report.[83]

14.3 Study Areas

This section defines the local and regional Study Areas for the social and economic impact analysis.

---

81 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.

82 DC 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.

83 DC 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.

14.3.1 Local

Since WUS is in a dense, urban area, the local Study Area will include the Project Area itself – which spans from the historic entrance to K Street NE above the tracks – as well as the 2010 U.S. Census block groups within one-half mile of the Project Area. The local Study Area was defined based on generally-accepted planning practices, reasonableness, and consistency with other resources evaluated in this Environmental Impact Statement (EIS).

14.3.2 Regional

Given that tax receipts are measured on a District-wide basis, the regional Study Area will be comprised of the entirety of the District of Columbia. WUS plays a critical role in transportation mobility in the District, and therefore is vital to the economic well-being of not just WUS area but the entire District of Columbia.

14.4 Affected Environment

This section will identify existing social, demographic, and economic characteristics of the local and regional Study Areas, including WUS.

14.4.1 Data Sources

Existing social, demographic, economic, and commuting characteristics of the Study Areas will be 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 may also be used in developing the Affected Environment analysis. The analysis will also rely 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);[84] and
- DC Office of Planning, *The Comprehensive Plan for the National Capital: District Elements – Central Washington Area Element* (Vol. 2, Ch. 16).[85]

14.4.2 Methodology

This section will draw from these data sources to build a socioeconomic profile and establish a baseline for existing social, demographic, and economic conditions in each of the Study Areas. These socioeconomic profiles will include the following indicators:

---

84 DC Office of Planning. 2006. *The Comprehensive Plan for the National Capital: District Elements.* https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20I_Chapter%204_April%208%202011.pdf. Accessed June 7, 2017.

85 DC Office of Planning. 2006. *The Comprehensive Plan for the National Capital: District Elements.* https://planning.dc.gov/sites/default/files/dc/sites/op/publication/attachments/District%20Elements_Volume%20II_Chapter%2016_April%208%202011.pdf. Accessed June 7, 2017.

- Demographics (age, gender, race, median income);
- Minority-owned business (to the extent that such data is available through District resources)
- Jobs (type and location);
- Tax and other public revenues;
- Current economic conditions of the neighborhood(s);
- Commercial activity; and
- Local government services.

This section will include Study Area maps displaying existing conditions for one or more socioeconomic indicators. Maps will be developed using ArcGIS.

14.5 Environmental Consequences

The social and economic environmental impact analysis will evaluate the Project's direct and indirect impacts on the communities adjacent to the Project Area and on the Washington, DC, metropolitan area as applicable to this Project. This section will evaluate potential impacts to:

- Demographics, including age, gender, race, and median income;
- Jobs, including types and locations of jobs;
- Tax and other public revenues;
- Potential for community disruption and additional demographic shifts;
- Commercial activity, including at WUS, the surrounding communities, and the region; and
- Local government services.

The analysis will include discussion of the potential for community disruption and demographic shifts resulting from the Project. This section will evaluate potential impacts for both the post construction and construction periods. Both positive and negative potential impacts will be identified and discussed, and the duration and intensity of these impacts will be identified as feasible and appropriate.

14.5.1 General Methodology

The social and economic impacts of the Project will be discussed using both quantitative and qualitative methods, and where feasible and applicable, will be identified with a particular component of the Project. Impacts will be identified for each alternative.

Post-construction social impacts of each alternative will include, but not be limited to:

- Potential for community disruption and demographic shifts;

- Social benefits, such as improved regional and intercity multimodal connectivity, improved neighborhood character, improved neighborhood continuity, and provision of and access to services; and
- Negative social impacts, such as reduced community cohesion, physical relocation or supplanting of established populations or communities.

Post-construction economic impacts of each alternative will include, but not be limited to:

- Employment, including type and location of jobs;
- Tax revenue, including sales tax generated;
- Retail space created and retail income generated because of the Project; and
- Other qualitative direct and indirect economic impacts, both local and regional, including economic benefits of improved regional and intercity multimodal connectivity.

Where the potential for adverse impacts on socioeconomic conditions are identified, mitigation strategies to avoid or minimize these impacts will be discussed. While not anticipated in the post-construction phase, business and housing displacement will be evaluated as part of this analysis.

As this EIS assumes that the WUS Expansion Project is required to attain the level of service identified in the NEC FUTURE FEIS, this section will include a qualitative discussion of the potential indirect socioeconomic impacts associated with increased regional and intercity rail service.

14.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to the existing conditions and associated indicators developed in the Affected Environment analysis.

As this EIS assumes that the WUS Expansion Project is required to attain the level of service identified in the NEC FUTURE FEIS, this section will include a qualitative discussion of the potential indirect socioeconomic impacts associated with a more modest increase in regional and intercity rail service than that identified in the NEC FUTURE FEIS.

14.5.3 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to the relevant indicators developed for the existing conditions and the No-Action Alternative in each analysis year.

14.5.4 Methodology for Evaluating Construction Impacts

A quantitative economic impact analysis for the construction phase will be conducted based on the following indicators: job creation, direct and indirect construction spending, potential disruptions to commercial activity, business and housing displacement, and potential disruptions to community cohesion and continuity. Construction impacts will be presented by year and in aggregate.

14.5.5 Methodology for Evaluating Mitigation Measures

Should the impact assessment indicate that one or more negative social or economic impacts may be generated based on the Project, preliminary mitigation recommendations will be provided. Potential mitigation recommendations appropriate to the intensity and duration of the potential impacts will be identified. The mitigation recommendations will include measures intended to avoid, minimize, or reduce the impact or to compensate for an impact through replacement or substitution of resources.

Potential mitigation measures will be assessed for their ability to:

- Avoid or limit adverse impacts to economic activity, jobs, and tax revenues;
- Avoid or limit adverse impacts to multimodal connectivity, neighborhood continuity, and access to services;
- Avoid or limit community disruption; and
- Prevent displacement of businesses and residences, or provide adequate compensation for such displacement.

15 Safety and Security

15.1 Overview and Definitions

This section defines the resource category and describes the methodology for defining existing conditions and assessing impacts.

Assessments of public safety and security for purposes of this methodology, include the resources and concerns relating to human safety and welfare. The following is a list of common definitions related to public safety and security:

- **Operational Safety**: Operational safety relates to the issues needed to keep railroad operations performed safely. The intercity, regional, and commuter services operate along a corridor with different equipment types, at different speeds, and with different stopping patterns. The mix of operators with separate operating practices together contributes to the overall safety of the railroad. Train collisions or derailments are representative of the type of incident related to operating practices.
- **Infrastructure Safety**: The accidents or incidents caused by the failure of existing railroad infrastructure due to natural events or human activity. Infrastructure failures can contribute to either train-related or station-related incidents involving operating personnel and passengers.
- **Community Safety**: Vehicular safety, rail and airports, pedestrian and bicycle safety, educational facilities, child-care facilities, nursing homes, police stations, emergency medical services, fire stations, ambulance squads, prisons and behavioral correctional facilities, places of worship, businesses, community centers, and municipal government facilities are institutions and activities included in community safety.
- **Construction Safety:** Potential impacts and exposures to structures, construction workers, passengers, employees, the general public, and emergency services from construction activities. Any increased risk of loss, injury, or death during construction and operation of the project.
- **High-Risk Facilities:** Locations of hazardous materials (for example, high-pressure pipelines, fuel storage tanks, vertical storage silos and refinery distillation columns, refineries, chemical plant facilities) near the alternatives.
- **Fall Hazards:** Potential structures that pose risks of falls and are in the Study Area.
- **Emergency Services:** Emergency response capabilities, response times, and access across rail rights-of-way would be keys to successful response in the event of an accident or incident requiring emergency response. Resources such as water supply, roadway, communications, and emergency transportation should be considered, as well.

- **Security:** This is the protection from intentional acts, including protection of people and property from such deliberate acts and the foreseeable effects of these acts. Security can be proactive (in the forms of patrols or monitoring cameras) or reactive (in the form of police investigation).

15.2 Regulatory Context

There is a substantial existing Federal regulatory context for the issues of public security and safety. Different Executive Orders outline the Federal government's interest in accounting for public safety issues in Federal actions. For example, Executive Order 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."[86]

Safety and security issues for rail stations and travel are overseen by the Federal Railroad Administration, the Transportation Security Administration, the Department of Homeland Security, and Amtrak (including Amtrak Police).

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.

This section identifies regulatory requirements (Federal and District) for assessing post construction and construction-period safety impacts. Relevant Federal regulations are listed below:

- Federal Railroad Administration (FRA) Safety Standards (49 CFR 200 – 299);
- Amtrak safety and security procedures[87]
- NCPC, *The Comprehensive Plan for the National Capital: Federal Elements*, Urban Design Element;[88]
- National Capital Urban Design and Security Plan;[89]
- Executive Order 13717, *Establishing a Federal Earthquake Risk Management Strategy* [90]

---

86 U.S. Environmental Protection Agency. 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.

87 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.

88 National Capital Planning Commission. "Urban Design." *Federal Elements of the Comprehensive Plan of the National Capital.* 2016. https://www.ncpc.gov/docs/02_CP_2016_Urban_Design_Element_2.29.16.pdf. Accessed December 21, 2017.

89 National Capital Planning Commission. *National Capital Urban Design and Security Plan.* 2002. https://www.ncpc.gov/docs/National_Capital_Urban_Design_and_Security_Plan.pdf. Accessed December 21, 2017.

90 Executive Order 13717. 2016. https://obamawhitehouse.archives.gov/the-press-office/2016/02/02/executive-order-establishing-federal-earthquake-risk-management-standard. Accessed December 21, 2017.

- FRA High-Speed Passenger Rail Safety Strategy;[91]
- Rail Safety Improvement Act of 2008 (Public Law 110-432);
- U.S. Code on Railroad Safety (49 USC.20101 et seq.);
- Emergency Planning and Community Right-to-Know Act (42 CFR. 116);
- Architectural Barriers Act of 1968 (42 USC);
- U.S. DOT *Climate Adaptation Plan: Ensuring Transportation Infrastructure and System Resilience*;[92]
- 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*.[93]

15.2.1 District Laws and Regulations

The standards that the District government has adopted that impact public health, safety, and security include:

- DC Fire Code;[94]
- DC Construction Codes Supplement;[95] and
- DC Municipal Regulations, Title 24, *Public Space and Safety*.[96]
- Many state and local safety requirements refer to the National Fire Protection Association (NFPA) Codes and Standards. The NFPA develops, publishes, and disseminates over 300 consensus codes and standards intended to eliminate death, injury, property, and economic loss due to fire, electrical, and related hazards. NFPA 130 2010: Standard for Fixed Guideway and Passenger Rail Systems specifies guidance on incorporating passenger safety in system design;

---

91 U.S. Department of Transportation, Federal Railroad Administration. 2009. *High-Speed Passenger Rail Safety Strategy.* https://www.fra.dot.gov/eLib/Details/L03624. Accessed June 7, 2017.

92 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.

93 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.

94 District of Columbia. DC Municipal Regulations. Title 12-H Fire Code Supplement of 2013. http://www.dcregs.dc.gov/Gateway/TitleHome.aspx?TitleNumber=12-H. Accessed June 7, 2017.

95 District of Columbia. "Construction Codes Supplement of 2008," *District of Columbia Register* 55.52 (2008): 13905-13493. https://dcra.dc.gov/sites/default/files/dc/sites/dcra/publication/attachments/02%20-%202008%20Construction%20Codes%2012-17-08.pdf

96 District of Columbia. DC Municipal Regulations. Title 24 Public Space and Safety. http://www.dcregs.dc.gov/Gateway/TitleHome.aspx?TitleNumber=24

egress routes in the event of an emergency; emergency response planning, training, and operations; and fire and smoke prevention and suppression.[97]

15.3 Study Areas

This section defines the Project Area, local, and regional Study Areas.

15.3.1 Project Area

The Project Area includes the WUS, track, and platform areas being modified by the Project. This area includes spaces used by passengers, visitors, and workers, and for train activities, loading of goods, and retail uses. It will include the portions of the 1st Street Tunnel where track modifications will be made and locations where the Project interfaces with public streets.

15.3.2 Local Study Area

Unless otherwise noted, the local Study Area will include the Project Area and one-half mile immediately adjacent to the construction footprint. It will include WUS grounds, tracks, and platforms, as well as the portions of the 1st Street Tunnel where track modifications will be made. Analysis will be performed for safety and security impacts within the local Study Area.

15.3.3 Regional Study Area

The regional Study Area for safety and security will include service boundaries for fire, law enforcement, and emergency services in the larger District of Columbia area. These service boundaries will include specific forces relevant to WUS and the District of Columbia, including Amtrak Police, Metro Transit Police, U.S. Park Police, and U.S. Capitol Police.

15.4 Affected Environment

This section will identify existing safety conditions and hazards, and emergency responders within the relevant Study Areas.

15.4.1 Data Sources

The following data sources will be considered in developing the impact assessment on public safety and security:

Safety

- National Uniform Crime Reporting (UCR) Program for crime statistics for local Study Area;
- National Highway Traffic Safety Administration crash data, as applicable;

[97] National Fire Protection Association. 2014. *NFPA 130-2010.* http://www.nfpa.org/Assets/files/AboutTheCodes/130/ProposedTIA1080NFPA130.pdf

- NFPA Codes and Standards, as applicable;
- Metropolitan Police Department and District Department of Transportation crash data;
- *DC Vision Zero Plan* to address traffic fatalities;[98]
- Police and fire mutual aid agreements; and
- DC Emergency service and operation plans.

Security

- Department of Homeland Security (DHS) preparedness information;
- Local transit providers (WMATA and DDOT) emergency and safety plans;
- Adopted District of Columbia security operating procedures; and
- Threat, Vulnerability, and Risk Assessment (TVRA) report prepared for WUS.

15.4.2 Methodology

A concise summary will be included that describes existing emergency services, law enforcement, emergency medical services, emergency response plans, and community safety features, such as vehicular safety, rail, pedestrian and bicycle safety, schools in the Project area and local Study Area, and the identification of high-risk facilities, accessibility barriers, and fall hazards in the Project area. The assessment will consider entrances, transit connections, retail and food areas, concourses, platforms, and support facilities.

The following actions will be used to describe the existing conditions in the local Study Area. The existing conditions for the regional Study Area will cover high-level safety and security planning issues.

- The location of government facilities, hospitals, police stations, Fire/EMS stations, and where public services are provided) will be identified.
- The existing conditions will be described with respect to vehicular safety, rail, pedestrian and bicycle safety, schools, high-risk facilities, and fall hazards.
- Present and future local pedestrian safety initiatives.
- A general description of security and law enforcement services in the Study Area will be provided.
- District and regional policies concerning the provision of emergency services, law enforcement, emergency medical services, and emergency response planning will be documented.

[98] District Department of Transportation. 2015. *DC Vision Zero Action Plan.* http://www.dcvisionzero.com/assets/updated-dc-vision-zero-action-plan.pdf. Accessed June 7, 2017.

- Stakeholder issues from personal contact with local agencies will be documented in the EIS.
- This section will be cross-referenced with other sections of the EIS that describe the resources or are 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.
- Rail line access points and the security concerns associated with rail yards within the Study Area will be documented.

15.5 Environmental Consequences

The evaluation of impacts will include both qualitative and quantitative methods for both direct and indirect impacts. These impacts are considered for both temporary (for example, construction staging) and long-term (permanent structures) impacts to public safety and security. The methodology used to evaluate public safety and security impacts takes direction from sources listed above. A Threat, Vulnerability, and Risk Assessment has been prepared to inform the safety and security analysis in the EIS. This Assessment details security risks to WUS and recommended building and operational practices to mitigate those risks. Much of the security analysis for this Project including the Threat, Vulnerability, and Risk Assessment, due to its sensitive nature, will not be publicly available. However, in accordance with Federal regulations governing such information that informs EIS analyses, FRA will make available security information that can be publicly shared.

The analysis will include a qualitative description of how the Project could affect health based on a literature review approach, followed by a discussion of avoidance and minimization measures if needed. The direct and indirect impacts related to public health, safety, and security will be analyzed through qualitative analysis based on the local and Federal guidelines for public health, safety, and security assessment, for each alternative for both temporary (construction period) and permanent impacts. Impacts may also be beneficial, if the project design includes accessibility, safety, or security improvements. Impacts will be considered for both WUS users and people within the Study Areas, as appropriate.

15.5.1 General Methodology

- Security Post-Construction Analysis
  - Identify impacts to security elements (if any) associated with the proposed Project elements;
  - Identify changes, including improvements, to the security practices of WUS and potential impacts on surrounding area; and
  - Identify any changes, including improvements, in access to security facilities.
- Public Safety Post-Construction Analysis

- Identify impacts to public safety (if any) associated with the proposed Project elements, namely the platforms, concourses, Amtrak support facilities, loading of goods, and multimodal activities at WUS;
- Identify impacts to access for emergency services/first responders;
- Identify any public safety benefits of each alternative;
- Identify any changes in access to public safety facilities;
- Evaluate operational safety impacts to residences, schools, and other adjacent facilities;
- Evaluate exposures of workers and passengers to hazards related to operational safety;
- Assess the potential for dangerous conditions around WUS facilities that could lead to an increase in vehicle, pedestrian or cyclist accidents;
- Assess the potential for vulnerabilities related to terrorist acts and criminal activity aboard trains, at or near stations, and at or near platforms;
- Assess the potential for vulnerabilities related to the loading of goods at WUS, as well as passenger access.
- Identify any increase in demand for emergency response that could result in a need for new or altered facilities to maintain acceptable service ratios, response times, or other performance objectives for public services, including fire protection, police protection, and emergency services;
- Assess potential affects and changes in response time of emergency services as well as access to community health care facilities;
- Evaluate potential for temporary or permanent removal of established safety features;
- Evaluate the effects to operational and infrastructure safety in relation to proposed improvements to infrastructure, changes in equipment, or changes in operating practices; and
- Identify any public safety benefits of each alternative.

15.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to existing conditions. The changes in public safety and security associated with the No-Action Alternative within the local Study Area will be documented. These changes include potential safety and security risks created by new development, including private air-rights development.

15.5.3 Methodology for Evaluating the Action Alternatives

The public safety and security impacts of each Action Alternative will be compared to existing conditions and the No-Action Alternative in each analysis year, qualitatively. The EIS will assess the transportation or use of any hazardous materials, [99] 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, as well as potential impacts to riders and passersby. The impacts of the Project on public safety and security, as well as the ability for local agencies to provide for safety and security, will be considered. The impacts of the Project on the visual quality and functionality of public space within, and in terms of access to, the station will also be considered. The impacts of the Project on the visual quality and functionality of public space within, and in terms of access to, WUS will also be considered.

15.5.4 Methodology for Evaluating Construction Impacts

Temporary construction-period impacts to each category will be evaluated qualitatively and, where possible, quantitatively, for each alternative using the criteria listed below.

- Security Construction Analysis
  - Identify impacts to public safety associated with construction operations;
  - Identify any changes in access to security elements;
  - Identify any changes in security practices (both human and technological); and
  - Identify any appropriate mitigation measures.
- Public Safety Construction Analysis
  - Identify impacts to public safety (if any) associated with construction operations;
  - Identify any changes in access to public safety facilities and emergency response services;
  - Assess the potential for temporary removal of established safety features during construction activities and the resulting impacts;
  - Assess the potential for dangerous conditions around WUS facilities that could lead to an increase in vehicle, pedestrian, or cyclist accidents;
  - Assess the potential for vulnerabilities related to terrorist acts and criminal activity aboard trains, at or near stations, and at or near platforms;
  - Identify any increase in demand for emergency response that could result in a need for new or altered facilities to maintain acceptable service ratios, response times, or other

[99] Please see Chapter 4, *Hazardous Materials* for more information on this topic area.

performance objectives for public services, including fire protection, police protection, and emergency services;

- Assess potential affects and changes in response time of emergency services as well as access to community health care facilities;
- Evaluate the potential for temporary removal of established safety features to facilitate construction;
- Evaluate the effects to operational and infrastructure safety in relation to proposed construction practices, changes in equipment, or changes in operating practices;
- Evaluate operational safety impacts to residences, schools, and other adjacent facilities;
- Evaluate exposures of workers and passengers to hazards related to operational safety;
- Assess the potential for vulnerabilities related to the loading of goods at WUS, as well as passenger access;
- Evaluate the potential for security impacts to the Project Area during the construction period, related to the movement of workers and goods in and out of the Project Area; and
- Identify any appropriate mitigation measures.

15.5.5 Methodology for Evaluating Mitigation Measures

Depending on the impact assessment results, the need for public safety and security mitigation will be evaluated and preliminary mitigation recommendations will be provided for each alternative. Potential mitigation, including the screening of people and goods for safety and security reasons, will be assessed based on the significance of the impacts identified. More rigorous mitigation will be proposed for impacts that pose larger and more serious threats to public safety and security. Specific aspects of the evaluation of mitigation measures for the different areas under this section are defined below.

Safety and security elements of the Project will be planned and designed to minimize impacts on the public, police, other security services, fire, and emergency, and medical services to the maximum extent possible. The design and engineering for the project and associated infrastructure is being developed to incorporate long-term resilience considerations, including design elements aimed against evolving security threats, to help minimize the potential for future impacts. If there are inconsistencies with safety and security requirements and procedures, protocols and infrastructure will be defined for inclusion in the Action Alternative(s). Mitigation approaches suggested in the prepared Threat, Vulnerability, and Risk Assessment report will be evaluated for their ability to effectively and feasibly mitigate safety and security risks. Specific mitigation procedures that will be considered based on their feasibility and efficacy in addressing the identified safety and security challenges include:

- Screening of people, baggage, and vehicles;

- Proactive human and technological security measures;
- The location and staffing of on-site safety and security personnel;
- The hardening of the existing and future structures of WUS; and
- Improvements in access to WUS for safety and security personnel.

16 Public Health, Elderly, and Persons with Disabilities

16.1 Overview and Definitions

This section defines the resource category and describes the methodology for defining existing conditions and assessing impacts.

Assessments of public health, for purposes of this methodology, include the resources and concerns relating to human health, and welfare. This section also considers the impacts of the Project on the elderly and people with disabilities. It is vital to ensure that impacts to public health are adequately identified and evaluated for the short-term (acute) and long-term (chronic) health effects on people within the vicinity of a project. The Federal Railroad Administration's (FRA) *Procedures for Considering Environmental Impacts*[100] state that the "Environmental Impact Statement (EIS) shall assess impacts of the alternatives on the transportation and general mobility of the elderly and handicapped." The following is a list of common definitions related to public health, safety, and security:

- Public Health Resources: Facilities such as hospitals, clinics, and other health care establishments.
- Emergency Services: Emergency response capabilities, response times, and access across rail rights-of-way would be keys to successful response in the event of an accident or incident requiring emergency response. Resources such as water supply, roadway, communications, and emergency transportation should be considered, as well.

16.2 Regulatory Context

There is a substantial existing Federal regulatory context for the issues of public health. The U.S. Environmental Protection Agency (EPA) is principally responsible for issues of public health caused by environmental factors. The U.S. Department of Health and Human Services is the lead public health agency. Different Executive Orders outline the Federal government's interest in accounting for public health issues in Federal actions. For example, Executive Order 13045, *Protection of*

[100] Federal Railroad Administration. 1999. *Procedures for Considering Environmental Impacts.* https://www.fra.dot.gov/eLib/Details/L02710. Accessed June 1, 2017.

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."[101] 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 and Energy and the Environment.

This section identifies regulatory requirements (Federal and District) for assessing post construction and construction-period public health impacts. Relevant Federal regulations are listed below:

Public Health

- Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*;
- Executive Order 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;[102]
- National Ambient Air Quality Standards (40 CFR Part 50);
- Safe Drinking Water Act (SDWA) (42 USC 300 f);
- Clean Water Act (CWA) (33 USC 1251);
- Federal Water Pollution Control Act (Clean Water Act) of 1972 (33 USC 1251-1376) as amended by the U.S. Clean Water Act (1977) and the Water Quality Act (1987);
- Occupational Safety and Health Administration (OSHA) Lead in Construction Standard: 29 CFR 1926.62;
- The EPA National Emission Standards for Hazardous Air Pollutants (NESHAP) Regulations (40 CFR 61);
- 40 CFR 312, Standards and Practices for All Appropriate Inquiries (AAI) under CERCLA (42 USC 9601);

Elderly and People with Disabilities

---

101 U.S. Environmental Protection Agency. 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.

102 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

- Americans with Disabilities Act regulations;[103]
- Transportation Services for Individuals with Disabilities (49 CFR Part 37); and
- Federal Transit Administration (FTA) Americans with Disabilities Act Guidance (FTA Circular 4710.1).).

16.2.1 District Laws and Regulations

The standards that the District government has adopted that impact public health include:

- DC Municipal Regulations, Title 22-B, *Public Health and Medicine*.[104]
- The *District of Columbia Building Code*[105] includes a chapter (Chapter 11) on accessibility and notes that facilities should be designed and constructed with accessibility considerations for persons with physical disabilities.

16.3 Study Areas

This section defines the Project Area, local, and regional Study Areas.

16.3.1 Project Area

The Project Area includes station, track, and platform areas being modified by the Project. This area includes spaces used by passengers, visitors, and workers, and for train activities, loading of goods, and retail uses. It will include the portions of the 1st Street Tunnel where track modifications will be made and locations where the Project interfaces with public streets.

16.3.2 Local Study Area

Unless otherwise noted, the local Study Area will include the Project Area and one-half mile immediately adjacent to the construction footprint. It will include station grounds, tracks, and platforms, as well as the portions of the 1st Street Tunnel where track modifications will be made. To the extent that the local Study Area varies for referenced sections (Air Quality, Water Quality, Solid Waste Disposal and Hazardous Materials), analysis will be performed for public health and the elderly and persons with disabilities.

---

103 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.

104 District of Columbia. DC Municipal Regulations. Title 22-B Public Health and Medicine. http://www.dcregs.dc.gov/Gateway/TitleHome.aspx?TitleNumber=22-B

105 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.

16.3.3 Regional Study Area

The public health study area will mirror the sections in Chapter 15, *Safety and Security*. Unless otherwise noted, the regional Study Area for public health will cover the District of Columbia. To the extent that the local Study Area varies for referenced sections (Air Quality, Water Quality, Solid Waste Disposal and Hazardous Materials), the public health Study Area will mirror those sections. A review of public health issues will be conducted at a regional level. It is considered unlikely that impacts related to elderly and disabled persons would occur at a regional level. Therefore, a regional review is considered not applicable.

16.4 Affected Environment

This section will identify existing public health conditions within the relevant Study Areas. This section will assess the existing facility and rail infrastructure for any barriers to the elderly or disabled.

16.4.1 Data Sources

The following data sources will be considered in developing the impact assessment on public health, security, safety, and elderly and disabled persons:

Public Health

- EPA Human Health Risk Assessment tools, databases, and guidelines;[106]
- EPA Emergency Planning and Community Right-to-Know Act (EPCRA) existing Tier I and Tier II reports and other requirements under that law;[107]
- U.S. Department of Health and Human Services health data;
- Accident statistics reports and railcar maintenance reports from Amtrak and FRA; and
- District Department of Health data.

Elderly and Disabled

Data sources include census data pertaining to the elderly/senior and disabled populations in the local Study Area. Data would also include available information on existing accessibility and ADA compliance features (for example, ramps or elevators) and any known issues within the station and track facilities.

---

106 U.S. Environmental Protection Agency. *Human Health Risk Assessment.* https://www.epa.gov/risk/human-health-risk-assessment. Accessed June 2, 2017.

107 U.S. Environmental Protection Agency. *Emergency Planning and Community Right-to-Know Act.* https://www.epa.gov/epcra. Accessed July 27, 2017.

16.4.2 Methodology

A concise summary will be included that describes existing emergency medical services in the Project area and local Study Area. The assessment will consider entrances, transit connections, retail and food areas, concourses, platforms, and support facilities. The assessment will consider 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. This section will also describe the existing elderly and disabled population that makes use of WUS, as well as those within the local Study Area.

The following actions will be used to describe the existing conditions in the local Study Area. The existing conditions for the regional Study Area will cover high-level public health planning issues.

- The location of hospitals and where public services are provided will be identified.
- District and regional policies concerning the provision of emergency medical services will be documented.
- Stakeholder issues from personal contact with local agencies will be documented in the EIS.
- This section will be cross-referenced with other sections of the EIS that describe the resources or are related to public health (such as, air quality, water quality, and solid waste and hazardous materials).

16.5 Environmental Consequences

The evaluation of impacts will include both qualitative and quantitative methods for both direct and indirect impacts. These impacts are considered for both temporary (for example, construction staging) and long-term (permanent structures) impacts to public health, and elderly and disabled persons. The methodology used to evaluate public health impacts takes direction from sources listed above.

The analysis will include a qualitative description of how the Project could affect health based on a literature review approach, followed by a discussion of avoidance and minimization measures if needed. The direct and indirect impacts related to public health will be analyzed through qualitative analysis based on the local and Federal guidelines for public health for each alternative, and for both temporary (construction period) and permanent impacts. Impacts may also be beneficial, if the project design includes accessibility improvements. Impacts will be considered for both station users and people within the Study Areas, as appropriate.

For elderly and people with disabilities, the analysis will identify impacts and benefits to accessibility (if any) associated with the proposed Project elements. The assessment will consider entrances, transit connections, retail and food areas, concourses, platforms, and support facilities.

16.5.1 General Methodology

- Public Health Post-Construction Analysis

- Identify impacts to public health (if any) associated with air quality, water quality, solid waste, hazardous materials, noise or vibration impacts;
- Identify any changes in access to emergency health facilities and emergency response services; and
- Identify any public health benefits of each alternative.

■ Elderly and Disabled Persons Post-Construction Analysis

- Identify any changes in access to the concourse, platforms, and pedestrian entrances to WUS; and
- Evaluate effects of those changes on elderly and disabled users of WUS;
- Document accessibility code compliance as feasible; and
- Identify any access benefits to elderly and disabled persons for each alternative.

16.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be compared to existing conditions. The changes in public health associated with the No-Action Alternative within the local Study Area will be documented. Changes to accessibility associated with the No-Action Alternative within the Project Area will also be documented. Impacts on high-level public health will be documented within the regional Study Area. Impacts to the elderly and disabled will also be documented.

16.5.3 Methodology for Evaluating the Action Alternatives

The public health, and elderly and disabled population impacts of each Action Alternative will be compared to existing conditions and the No-Action Alternative in each analysis year qualitatively. The EIS will assess the transportation or use of any hazardous materials,[108] 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, as well as potential impacts to riders and passersby. The impacts of the project on accessibility within, and in terms of access to, WUS will be considered.

16.5.4 Methodology for Evaluating Construction Impacts

Temporary construction-period impacts to each category will be evaluated qualitatively and, where possible, quantitatively, for each alternative using the criteria listed below.

■ Public Health Construction Analysis for Each Alternative:

[108] Please see Chapter 4, *Hazardous Materials* for more information on this topic area.

- Identify impacts to public health (if any) associated with air quality, water quality, solid waste, hazardous materials, noise, or vibration impacts; and
- Identify any changes in access to emergency health facilities and emergency response services.

- Elderly and Disabled Population Analysis
  - Evaluate temporary changes to accessibility (including potential impacts to ADA issues, as possible) at station entrances, transit connections, retail and food areas, concourses, platforms, and support facilities;
  - Evaluate effects of those changes on elderly and disabled users of WUS; and
  - Document accessibility code compliance as feasible.

16.5.5 Methodology for Evaluating Mitigation Measures

Depending on the impact assessment results, the need for public health mitigation will be evaluated and preliminary mitigation recommendations will be provided for each alternative. Rigorous mitigation will be proposed for impacts that pose larger and more serious threats to public health and greater challenges for members of the elderly and disabled community. Specific aspects of the evaluation of mitigation measures for the different areas under this section are defined below. As noted below, some mitigation measures for public health will be driven by technical analysis in related sections.

Public Health

- Measures will be evaluated for their effectiveness in reducing air quality public health risks as identified in that chapter;
- Measures will be evaluated for their effectiveness in reducing water quality public health risks as identified in that chapter;
- Measures will be evaluated for their effectiveness in reducing public health risks associated with solid waste and hazardous materials as identified in that chapter;
- Measures to address other public health issues not identified in other chapters will be assessed for their ability to improve public health, while balancing the need for the successful operation of the future WUS;
- Measures to reduce transportation-related pollution through strategies identified in the transportation chapter will be considered; and
- Techniques to reduce and eliminate building contaminants for users of WUS will be considered.

Elderly and People with Disabilities

Members of these groups are particularly susceptible to the public health issues that are being evaluated in this chapter and in related chapters noted above. Mitigation for these groups will depend on an assessment of a more stringent threshold level of exposure. Mitigation techniques will be similar to those described as above in the public health mitigation section, but will seek to be more stringent in response to the expected presence of these groups in and around WUS.

Any issues that prevent universal access and use of WUS by people with disabilities will be evaluated for mitigation. Mitigation will seek to achieve a design where there are no barriers to the use of WUS by people with disabilities.

17 Environmental Justice

17.1 Overview and Definition

This section describes the methodology for identifying environmental justice (EJ) communities and assessing any potential disproportionately high and adverse effects to these communities as a result of the project alternatives. As outlined in Federal Transit Administration (FTA) Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit Administration Recipients*, 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 or low-income populations. This includes incorporating environmental justice and non-discrimination principles into transportation planning and decision-making processes, as well as project-specific environmental reviews.

17.2 Regulatory Context

There are several Federal and state executive orders, laws, or regulations that provide the regulatory context for the environmental justice analysis:

- Executive Order 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*;[109]
- USDOT Order 5610.2(a), *Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*;
- USDOT, *Environmental Justice Strategy*;[110]

[109] Council on Environmental Quality. 1997. Environmental Justice: Guidance Under the National Environmental Policy Act. https://www.epa.gov/sites/production/files/2015-02/documents/ej_guidance_nepa_ceq1297.pdf. Accessed August 17, 2017.

[110] U.S. Department of Transportation. November 15, 2016. Environmental Justice Strategy. https://www.transportation.gov/policy/transportation-policy/environmental-justice-strategy. Accessed August 17, 2017.

- *Promising Practices for EJ Methodologies in NEPA Reviews: Report of the Federal Interagency Working Group on Environmental Justice & NEPA Committee*;[111]
- FTA Transit Laws, 49 USC 53; and
- FTA Circulars:
  - 4702.1A *Title VI and Title VI-Dependent Guidelines for FTA Recipients*; and
  - 4703.1 *Environmental Justice Policy Guidance for Federal Transit Administration Recipients*.

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal agencies to take appropriate and necessary steps to identify and address disproportionately high and adverse environmental effects of Federal agency actions (including transportation projects) on minority and low-income populations.

The U.S. DOT Order *Actions to Address Environmental Justice in Minority Populations and Low-Income Populations* (USDOT Order 5610.2(a), May 2, 2012) sets forth the USDOT policy to consider EJ principles in all USDOT programs, policies, and activities. It describes how the objectives of EJ are integrated into planning and programming, rulemaking, and policy formulation. The Order defines a disproportionately high and adverse effect on minority and low-income populations as "an adverse effect that:

1. is predominantly borne by a minority population and/or a low-income population, or

2. will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or low-income population."[112]

Because the FTA is a Cooperating Agency, and because the project sponsor may pursue FTA funding for construction, the environmental justice analysis for the project must be consistent with FTA guidance. FTA Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit Administration Recipients* (FTA, 2012), provides guidance for incorporating environmental justice principles into plans, projects, and activities receiving funding from FTA. FTA includes incorporation of environmental justice and non-discrimination principles into transportation planning and decision-making processes and project specific environmental reviews.

---

111 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 & NEPA Committee. https://www.epa.gov/sites/production/files/2016-08/documents/nepa_promising_practices_document_2016.pdf. Accessed August 17, 2017.

112 USDOT, Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Order 5610.2(a), May 2, 2012), Appendix, 1(g) (https://www.fhwa.dot.gov/environment/environmental_justice/ej_at_dot/orders/order_56102a/dot56102a.pdf. Accessed August 1, 2017).

17.3 Study Areas

In general, the Study Area for environmental justice extends beyond the Project Area to account for effects that may be felt outside the area of direct impacts. The Study Area for identification of environmental justice groups will include the census blocks or block-groups that are within one-half mile of the Project Area. Each census block or block group that is completely within or intersects the half-mile buffer will be included in the Study Area. The Study Area for analysis will be based on the Study Areas for relevant impact categories. If impacts to these categories are anticipated beyond the half-mile buffer, additional analysis will be performed to document the presence of EJ communities in the expanded Study Area.

17.4 Affected Environment

The framework for the environmental justice evaluation is based on FTA Circular 4703.1, described above, which outlines a methodology that addresses EO 12898 including both a robust public participation process and an analytical process with five basic steps:

1. Identify the area where the alternatives may cause impacts;

2. Determine whether there are minority or low- income populations present in the Study Area;

3. If minority or low-income populations are present, determine the potential effects of the Project on these populations;

4. Determine whether the alternatives have the potential to cause disproportionate high and adverse effects to EJ communities; and

5. Determine whether any adverse effects could be avoided, minimized, or mitigated.

17.4.1 Data Sources

The data source for the identification of minority populations will be the Year 2010 U.S. Census. Minority populations will be 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 United States. The Census also collects information on home ownership, sex, age, race, and ethnicity.

The data source for the identification of low-income populations will be the American Community Survey (ACS) five-year average data for 2011 – 2015. Low-income populations will be 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, and 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 period 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 United States.

The area surrounding WUS has undergone rapid demographic change since the 2010 US Census data were collected. Therefore, additional data sources will be used to confirm the location of minority and low-income populations. Additional sources may include data from business improvement districts (BIDs), government assisted housing programs, District Department of Transportation (DDOT) and District Office of Planning (DCOP) ward planners, and a review of redevelopment projects within the Project Study Area.

17.4.2 Methodology and Definitions

Using the data sources described above, minority and low-income populations in the Study Area will be identified.

As defined in FTA Circular 4703.1, 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 proposed Project. Minority population includes 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. This environmental justice analysis also considers minority to include persons identified as being either “some other race” or “two or more races” in the census data. Census data will be used to identify Census blocks within the Study Area where there are minority residents.

As defined in FTA Circular 4703.1, a low-income person is one whose household income is at or below the Department of Health and Human Services (HHS) poverty guidelines for 2015. 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. Similar to the identification of minority population areas, ACS data will be used to identify Census block groups within the Study Area where there are residents meeting the HHS poverty guidelines. Because the HHS poverty 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 will also be identified for each block group.

Additional data sources beyond the ACS five-year average data for 2011 – 2015 and the 2010 U.S. Census will be consulted to identify demographic changes since the data were collected and distinct low-income or minority communities within the Study Area by:

- Interviewing representatives of BIDs within the Study Area, as well as DDOT and DCOP ward planners, to identify:
  - More recent data sources for minority and low-income populations in the Study Area;

- Recent redevelopment projects that have resulted in changes to the demographic characteristics of the residents; and
- The location of public housing in the Study Area.
- Minority-owned business (to the extent that such data is available through District resources)

- Reviewing available data for individuals receiving housing assistance in the Study rea.

17.5 Environmental Consequences

The environmental justice impact analysis will evaluate the Project's direct and indirect impacts on minority and low-income populations, for both the post-construction and construction periods. In accordance with FRA Environmental Procedures, the EIS will address environmental justice considerations as required by EO 12898 *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, USDOT Order 5610.2(a), and FTA Circular 4703.1.

17.5.1 General Methodology

The environmental justice analysis will evaluate whether each alternative would result in disproportionately high and adverse impacts to minority and low-income populations. Based on FTA guidance, the evaluation will consider the following criteria:

- Would the alternative's adverse impacts be predominantly borne by minority or low-income populations? This will be determined by identifying whether adverse impacts are concentrated in minority or low-income communities.
- Would adverse impacts to minority or low-income populations be appreciably more severe or greater in magnitude than those suffered by non-minority or low-income populations?
- Does the Project affect a resource that is especially important to an EJ population? For example, does the Project affect a resource that serves an especially important social, religious, or cultural function for an EJ population?
- What would be the effect of the alternative's offsetting benefits when considering these impacts?
- What would be the effect of mitigation measures that would be incorporated into the alternative and any other enhancements or betterments that would be provided in lieu of mitigation when considering these impacts?

All environmental categories will be reviewed to identify those that will not result in any adverse effects. The environmental categories with no adverse effects identified will not be considered for additional environmental justice analysis due to no potential for disproportionately high and adverse effects to minority or low-income populations. Environmental categories that would result in adverse effects will be retained to determine if and to what extent these adverse effects would have the potential to be disproportionately high and predominately borne by minority or low-income

populations. The analysis will include consideration of mitigation measures that would be incorporated into the alternatives, as well as the benefits of the alternatives that may offset impacts.

17.5.2 Methodology for Evaluating the No-Action Alternative

For any environmental category where adverse effects are identified as a result of the No-Action Alternative, the analysis described above will be performed to determine if and to what extent the adverse effects would have the potential to be disproportionately high and predominately borne by minority or low-income populations.

17.5.3 Methodology for Evaluating the Action Alternatives

For any environmental category where adverse effects are identified based on the Action Alternatives, the analysis described above will be performed to determine if and to what extent the adverse effects would have the potential to be disproportionately high and predominately borne by minority or low-income populations.

17.5.4 Methodology for Evaluating Construction Impacts

For any adverse effects identified based on construction activities, the analysis described above will be performed to determine if and to what extent the adverse effects would have the potential to be disproportionately high and predominately borne by minority or low-income populations.

17.5.5 Methodology for Evaluating Mitigation Measures

The assessment of the potential for disproportionately high and adverse effects to minority or low-income populations includes an analysis of the mitigation proposed for each environmental category where adverse impacts are anticipated. Any practicable additional mitigation measures will be identified. In accordance with USDOT Order 5601.2(a), the social, economic (including costs), and environmental effects of avoiding or mitigating the adverse effects will be taken into account when determining whether a mitigation measure or alternative is practicable.

If there are no additional mitigation measures proposed, this section will describe the reasons for not proposing any further mitigation to avoid, minimize, or reduce the impacts or to compensate for an impact through replacement or substitution of resources. In accordance with USDOT Order 5601.2(a), FRA is responsible for ensuring that "programs, policies, or activities that will have disproportionately high and adverse effect on populations protected by Title VI ("protected populations") will only be carried if:

1. A substantial need for the program, policy, or activity exists, based on the overall public interest; and

2. Alternatives that would have less adverse effects on protected populations (and that still satisfy the need identified in subparagraph 2(I) above), either:

(a) would have other adverse social, economic, environmental or human health impacts that are severe; or

(b) would involve increased costs of extraordinary magnitude."[113]

17.5.6 Public Outreach

The neighborhoods surrounding WUS are in the midst of rapid transition and development. The members of environmental justice communities with links to these neighborhoods will be intensely interested in what the proposed action means for them. Therefore, a robust, sustained, and transparent engagement process is essential through the life of the project.

The public participation process for WUS focuses on engaging potentially affected residents through public meetings and materials, social media, and a Community Communications Committee (CCC), whose purpose is to improve community engagement in the NEPA process and beyond. Members of the CCC include representatives of the communities potentially affected by the Proposed Action, who were selected based on:

- Recognized leadership for their constituency;
- Service in an official capacity; and
- Demonstrated capacity to support communication with, and engagement of, the consistency around this Project.

CCC meetings will be convened at logical points throughout the EIS process such as prior to public meetings. Five meetings are envisioned:

1. Post Public Scoping Meeting #1 (completed)
2. Prior to Public Meeting #2 on the Informational Forum (completed)
3. Prior to Public Meeting #3 to show range of concepts (completed)
4. Prior to Public Meeting #4 to show preferred alternative
5. Prior to Public Meeting #5 (Draft EIS)

After an initial "launch" meeting when scoping is completed, the CCC will meet prior to the remaining public meetings so that the EIS team can "preview" or "pretest" preliminary presentations for suggestions on clarity, comprehension, etc. and for advance notice about questions and issues likely to be of highest interest at the meeting. If there is an extended period between public meetings the CCC may be convened to provide a high-level report on progress and hear any questions or issues from the community. In either instance CCC meetings will also be the

[113] USDOT, Actions to Address Environmental Justice in Minority Populations and Low-Income Populations (Order 5610.2(a), May 2, 2012), Section 8(d), (https://www.fhwa.dot.gov/environment/environmental_justice/ej_at_dot/orders/order_56102a/dot56102a.pdf, accessed August 1, 2017).

opportunity for enlisting members in disseminating information and in hearing suggestions about opportunities for informing the public.

CCC members will understand that meetings are not for the purpose of offering comments on the EIS and will be advised to make comments through the formal process. “Terms of Reference” will also state explicitly that this is not a decision-making group, and provide other participation guidelines.

Per FTA Circular 4703.1, *Environmental Justice Policy Guidance for Federal Transit Administration Recipients* (FTA, 2012), traditional public outreach will occur through interactive public meetings that communicate information about the Project in a manner that is user-friendly, clear, and concise. Translation services will be offered at each meeting, and handout materials will be available in multiple languages. The public will be notified through online and traditional means of public meetings. Public engagement will include comment periods, and the Project website accepts public comments at any time.

Five large scale public meetings are envisioned within the scope of the EIS:

1. Public Meeting #1 - Public Scoping (during the Public Scoping Period) (completed)
2. Public Meeting #2 - Informational Forum (completed)
3. Public Meeting #3 – Presentation of draft range of concepts (completed)
4. Public Meeting #4 – Presentation of draft Preferred Alternative
5. Public Meeting #5 – Draft EIS Presentation

Public outreach materials and public meetings will be available in multiple languages and will be Section 508 compliant.

In addition to public meetings, outreach will include dissemination of detailed project information through emails sent to an extensive database of elected officials including ANCs and councilmembers, community organizations, media contacts, listservs, key community stakeholders, and businesses.

To build stakeholder understanding of project plans and solutions, the team will develop educational outreach materials and advertising to effectively communicate key project messages. Proposed communication tools include flyers, press releases, and electronic newsletters.

18 Cumulative Impacts

18.1 Overview and Definition

Under NEPA regulations (40 CFR 1508.7), a cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

18.2 Regulatory Context

In *its Procedures for Considering Environmental Impacts*,[114] FRA requires an assessment of indirect and cumulative impacts of a proposed action. Guidelines prepared by the CEQ, for implementing NEPA broadly define both cumulative and secondary impacts. The methodology follows processes recommended by CEQ (1997 and 2005) and the regulations at 40 CFR 1508.7. The cumulative impact analysis will be consistent with CEQ and other agency guidance documents:

- *Considering Cumulative Effects Under the National Environmental Policy Act*;[115]
- *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*;[116]
- *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*;[117]
- *Interim Guidance: Questions and Answers Regarding Indirect and Cumulative Impact Considerations in the NEPA Process*;[118]

---

114 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.

115 Council on Environmental Quality Executive Office of the President. 1997. *Considering Cumulative Effects Under the National Environmental Policy Act.* https://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-ConsidCumulEffects.pdf. Accessed August 2, 2017.

116 Council on Environmental Quality Executive Office of the President. 2005. *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*. https://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-PastActsCumulEffects.pdf. Accessed August 2, 2017.

117 Federal Highway Administration (FHWA). 1992. *Secondary and Cumulative Impact Assessment in the Highway Project Development Process*. Position Paper. https://www.environment.fhwa.dot.gov/guidebook/content/Secondary_Cumulative_Impact_Assessmt.asp. Accessed June 7, 2017.

118 Federal Highway Administration (FHWA). 2003. *Questions and Answers Regarding the Consideration of Indirect and Cumulative Impacts in the NEPA Process*. https://www.environment.fhwa.dot.gov/guidebook/qaimpact.asp. Accessed June 7, 2017.

- *National Cooperative Highway Research Program (NCHRP) 25-25 Task 11: Indirect and Cumulative Impact Analysis*;[119] and
- *NCHRP Report 423A: Land Use Impacts of Transportation: A Guidebook*.[120]

18.3 Study Areas

In general, the study area for cumulative impacts includes a broader study area to encompass regional actions in which effects could incrementally add to the impacts of the Proposed Action. Spatial boundaries for the analysis will vary by resource, based on the specific characteristics of the resource, regulatory jurisdictions, and the availability of meaningful data. The cumulative impacts boundary will encompass all resource-specific study areas in addition to accounting for any regional actions, as specified above, that are not included in those study areas.

18.4 Affected Environment

An Affected Environment, or existing conditions, assessment will not be conducted for Cumulative Impacts. This methodology section describes the cumulative impacts of the Project, considered with other projects. The Affected Environment documents existing conditions, which cannot be assessed in this case because the Project would not be in place.

18.5 Environmental Consequences

The Cumulative Impact analysis will evaluate the Project's cumulative effects on environmental resources, for both the post-construction and construction periods. The purpose of a cumulative impacts analysis is to identify impacts that may be minimal and therefore neither significant nor adverse when examined within the context of the Proposed Action, but that may accumulate and become both significant and adverse over a large number of actions.

The effects of past actions may need to be considered in the cumulative impact assessment. According to CEQ guidance, the cumulative impact assessment requires "analysis and a concise description of the identifiable present effects of past actions to the extent that they are relevant and useful in analyzing whether the reasonably foreseeable effects of the agency proposal for action and its alternatives may have a continuing, additive and significant relationship to those effects."[121] This guidance goes on to state that agencies should use the scoping process to determine which past and present actions are necessary for the cumulative impacts analysis. The availability of past data also

[119] Transportation Research Board. 2006. *National Cooperative Highway Research Program (NCHRP) 25-25 Task 11: Indirect and Cumulative Impact Analysis*. http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25(11)_FR.pdf. Accessed August 8, 2017.

[120] Transportation Research Board. 1999. *NCHRP Report 423A: Land Use Impacts of Transportation: A Guidebook.*

[121] Council on Environmental Quality Executive Office of the President. 2005. *Guidance on the Consideration of Past Actions in Cumulative Effects Analysis*. https://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-PastActsCumulEffects.pdf. Accessed August 2, 2017.

may determine how far back past actions are examined. If data describing past actions is scarce, the analysis of past effects may be qualitative.[122]

For most resources, prior changes will be evaluated for the period from 2012 to 2016. This time period may be further refined as the existing conditions are assessed for each resource area. Past actions should be examined if it informs the current state of a resource or helps to predict the direct or indirect effects of proposed action.[123] This time period was selected due to changes in the local economy affecting development patterns. According to local development data, 2012 represented the first year that that the local economy appeared to have rebounded from the effects of the Great Recession.[124] Subsequently, the "sequester," a mandated reduction in Federal spending, went into effect on March 1, 2013, which has caused broad changes to local economic activity.[125] The cumulative impact assessment of past actions will not be assessed on an individual basis but will consider the aggregate effects of past actions.[126]

For each resource, the Planning Year 2040 will be analyzed for each alternative.

18.5.1 Data Sources

The analysis will use readily available data sources for past and future changes. Data sources used to identify past and future actions include Amtrak, MARC, VRE, MWCOG, the Office of the Deputy Mayor, DDOT, WMATA, NCPC, the 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 Appeals, the Mount Vernon Triangle Business Improvement District, the NoMa Business Improvement District, the Capitol Hill Business Improvement District, the local Advisory Neighborhood Commissions, and District and local development plans and policies.

18.5.2 Methodology for Evaluating Cumulative Impacts

The cumulative impacts of the WUS Expansion Project will be analyzed for each of the alternatives.

Cumulative impacts will be qualitatively addressed in the EIS. The EIS will:

---

122 Council on Environmental Quality Executive Office of the President. 1997. *Considering Cumulative Effects Under the National Environmental Policy Act*. https://energy.gov/sites/prod/files/nepapub/nepa_documents/RedDont/G-CEQ-ConsidCumulEffects.pdf. Accessed August 2, 2017.

123 Transportation Research Board. 2006. National Cooperative Highway Research Program (NCHRP) 25-25 Task 11: Indirect and Cumulative Impact Analysis. http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25(11)_FR.pdf. Accessed August 8, 2017.

124 Washington, DC Economic Partnership. 2016. *Washington, DC Development Report 2016/2017 Edition*. http://wdcep.com/wp-content/uploads/2016/11/DCDR_2016_100dpi.pdf. Accessed December 28, 2017.

125 Fuller, Stephen S. 2013. "The Economic Impact of Sequestration Budget Cuts to DOD and non-DOD Agencies as Modified by the American Taxpayer Relief Act of 2012." George Mason University Center for Regional Analysis. http://cra.gmu.edu/pdfs/Sequestration_Update.pdf. Accessed December 28, 2017.

126 Transportation Research Board. 2006. *National Cooperative Highway Research Program (NCHRP) 25-25 Task 11: Indirect and Cumulative Impact Analysis.* http://onlinepubs.trb.org/onlinepubs/archive/NotesDocs/25-25(11)_FR.pdf. Accessed August 8, 2017.

- Review land use and development planning documents in the WUS area with respect to the WUS Expansion Project;
- Identify approved, on-going, and proposed developments in WUS and evaluate their impacts relative to the WUS Expansion Project; and
- Identify potential mitigation strategies to offset adverse impacts.

The analysis will identify and consider reasonably foreseeable projects that are planned and programmed for construction within the analysis timeframe (see Section 18.3, *Study Areas*). The analysis will also identify and consider past actions.

The WUS Expansion Project will be needed in order to meet the plans laid out in the *NEC FUTURE Tier 1 EIS*.[127] The plans laid out in the *VRE 2040 System Plan*[128] and *MARC Train 2040 Growth and Investment Plan*[129] could be realized without the Project. The cumulative impacts assessment will assess any indirect impacts related to rail operations as compared to the No-Action Alternative. Other projects and plans that are required to meet the NEC FUTURE, VRE, and MARC plans will also be considered and evaluated.

A preliminary list of reasonably foreseeable development projects is provided in **Table 18-1** and **Figure 18-1** identifies the locations of these projects. Transportation projects within the Project Area, including the H Street Bridge replacement, the Streetcar Extension, and WMATA Station Improvements, have been defined as part of the No-Action Alternative and will be considered in the cumulative impacts assessment. Transportation projects beyond the Project Area, such as the VRE Midday Storage Facility, will be considered in the cumulative impacts analysis.

Table 18-1 Reasonably Foreseeable Development Projects in Proximity to Project Area[130]

Project Number (Corresponds with Figure 18-1)	Project Name	Project Status
1	901 5th St, NW	Planning
2	455 Eye St, NW	Completed
3	400 K St, NW	In Construction
4	4th and L Street Apartments	Completed
5	Plaza West	Planning

127 Federal Railroad Administration. 2017. *NEC FUTURE Tier I Final Environmental Impact Statement*. http://www.necfuture.com/tier1_eis/feis/. Accessed June 6, 2017.

128 Virginia Railway Express. 2014. *System Plan 2040.* http://www.vre.org/vre/assets/File/2040%20Sys%20Plan%20VRE%20finaltech%20memo%20combined.pdf. Accessed June 6, 2017.

129 Maryland Transit Administration. 2013. *MARC Growth and Improvement Plan Update: 2013 to 2050.* https://mta.maryland.gov/sites/default/files/mgip_update_2013-09-13.pdf. Accessed June 6, 2017.

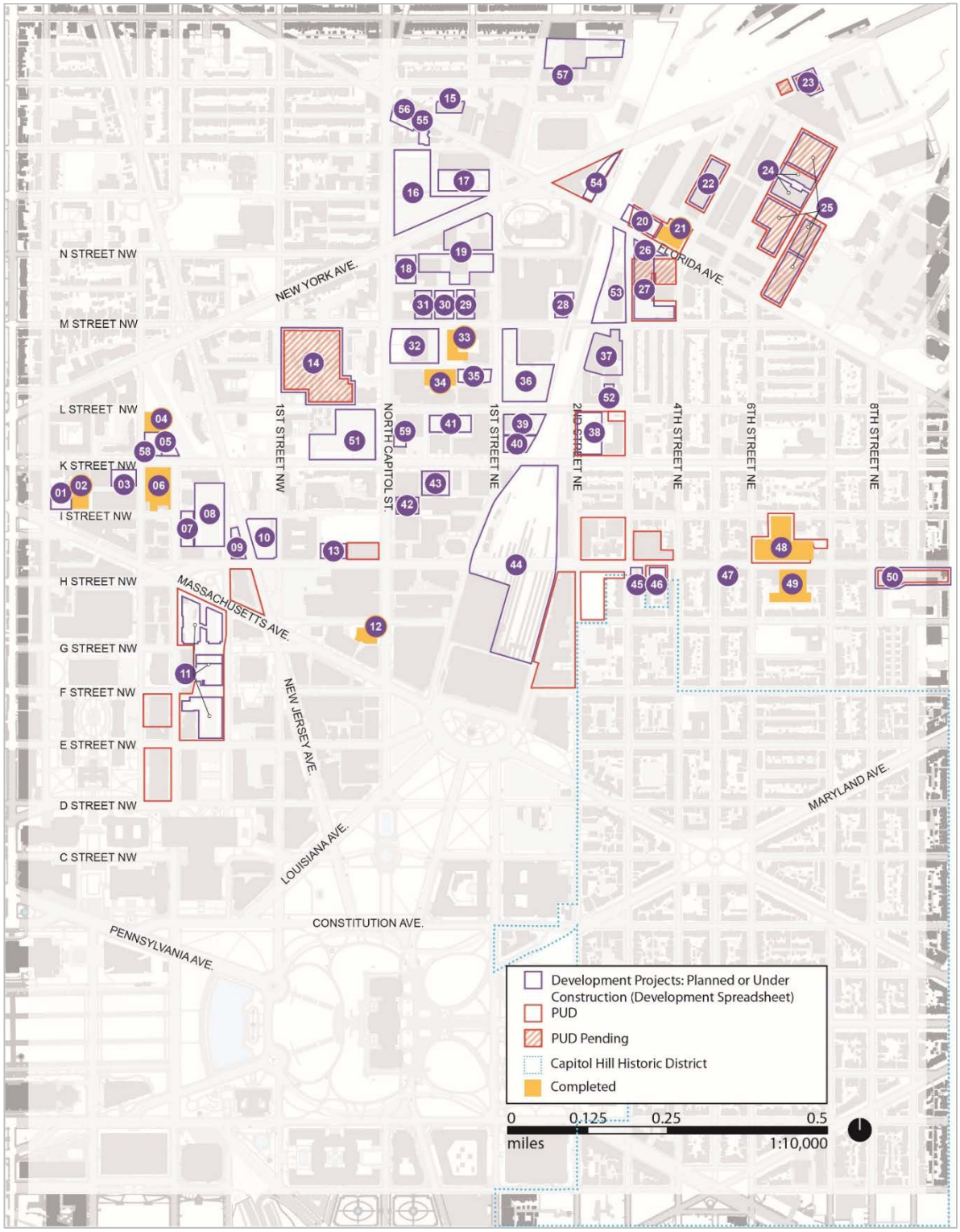
130 The project status is current as of this date. However, as the EIS cumulative impacts analysis is conducted, the project status will be updated.

Project Number (Corresponds with Figure 18-1)	Project Name	Project Status
6	300 K St, NW	In Construction
6	901 4th St, NW	Completed
6	950 3rd St, NW	Planning
7	801 3rd St, NW	Planning
8	2nd and H St	RFP out
9	Capitol Vista	Planning
10	801 New Jersey Ave, NW	Planning
11	Capitol Crossing	In Construction
12	Republic Square (Phase II)	Completed
13	55 H St NW	Planning
14	Sursum Corda Redevelopment	Planning
15	50 Florida Ave NE	In Construction
16	O St Sites	Planning
17	Lot 854	Planning
18	Northwest One (Phase II)	Planning
19	N Street NoMa	In Construction
19	N Street NoMa	Planning
19	N Street NoMa	Planning
19	33 N St, NE	In Construction
20	The Highline at Union Market	In Construction
21	The Edison at Union Market	Completed
22	The Shapiro Residences	In Construction
23	411 New York Avenue, NE	Planning
24	Union Market Office and Theater	Planning
25	Gallaudet University 6th Street NE Properties	Planning
26	301 Florida Ave, NE	In Construction
27	301/331 N Street	Planning
27	300 M St, NE	In Construction
28	Constitution Square	In Construction
29	Skanska USA	In Construction
30	Skanska USA	In Construction
31	Skanska USA	In Construction
32	DC Housing Authority	Planning
33	Ava NoMa	Completed
34	Camden NoMa	Completed

Project Number (Corresponds with Figure 18-1)	Project Name	Project Status
35	1150 1st St NE	Planning
36	NoMa Station Phases II-IV	Planning
37	Uline Arena	Completed
38	Toll Brothers City Living	In Construction
38	Toll Brothers City Living - Phase II	In Construction
39	Storey Park	Planning
40	100 K St, NE	In Construction
42	Union Square III	Planning
44	Burnham Place at Union Station	Planning
45	301-303 H Street NE	In Construction
46	315-327 H Street NE	Planning
47	501 H St, NE	Planning
48	Apollo	Completed
49	625 H Street, NE	Completed
50	901 H St, NE	In Construction
51	Northwest One (33 K St)	RFP responses received
52	1109 Congress St NE	In Construction
53	Central Armature Works	Planning
54	Washington Gateway - Phases II and III	Planning
55	22 P St NE	Planning
56	1 Florida Ave NE	Planning
57	Eckington Yards	Planning
58	4th and K St, NW	Planning
59	John and Jill Ker Conway Residence	In Construction

Source: VHB

Figure 18-1 Reasonably Foreseeable Projects (Draft)



Projects identified for consideration within the cumulative impacts analysis will be assessed to determine if they meet one or more of the following criteria:

- Projects of similar size and scope or other key characteristics with potential for environmental impacts that can be measured or be expected to occur.
- Projects with environmental impacts that do, or are likely to, act in a cumulative fashion with the impacts of other past or future projects and activities that are likely to occur.
- The Project's contribution to cumulative impacts can be reasonably expected to affect the viability or sustainability of the resource or value such as a regulatory "threshold" or standard.

For each resource area, the cumulative impact analysis will assess past impacts, reasonably foreseeable future impacts without the WUS Expansion Project, and the cumulative impacts of the Project considered in combination with past and reasonably foreseeable future impacts. The analysis will consider how impacts in one category (for example, traffic changes) might affect other categories (for example, air quality). The analysis will consider potential direct and indirect impacts of the Project for the following resource areas if the Proposed Action would have an adverse effect in that category:

- Natural Ecological Systems
- Water Resources and Water Quality
- Solid Waste Disposal and Hazardous Materials
- Transportation
- Air Quality
- Greenhouse Gas Emissions and Resiliency
- Energy Resources
- Land Use, Land Planning, and Property
- Noise and Vibration
- Aesthetics and Visual Quality
- Cultural Resources
- Parks and Recreation
- Social and Economic
- Public Health, Safety and Security, Elderly and Persons with Disabilities
- Environmental Justice

18.5.3 Methodology for Evaluating Mitigation Measures

For each resource category, mitigation measures will be proposed for unavoidable adverse impacts. When assessed cumulatively, it is possible that additional impacts associated with the Project will rise to the level of significance. Mitigation measures will be proposed for any significant cumulative impacts. Developing mitigation measures for cumulative impacts would require coordination with the relevant technical experts, Amtrak, USRC, and FRA. If no mitigation measures are proposed for cumulative impacts, this section will describe the reasons for not proposing any further mitigation.

19 Section 4(f) Evaluation

19.1 Section 4(f) Evaluation Purpose

The purpose of this Section 4(f) Evaluation is to document information considered by the Federal Railroad Administration (FRA) to determine the use of properties protected by Section 4(f) legislation (Title 49 U.S.C. Section 303, Title 23 U.S.C. Section 138) and FRA *Procedures for Considering Environmental Impacts*.[131]

19.2 Regulatory Context and Definitions

19.2.1 Regulatory Context

Section 4(f) refers to the original section within the U.S. Department of Transportation (USDOT) Act of 1966 which provides consideration of park and recreation lands, wildlife and waterfowl refuges, and historic sites, during the planning and design of transportation projects. Section 4(f) applies only to actions undertaken by the DOT and subsidiary agencies, including the Federal Railroad Administration (FRA).

Section 4(f) of the Department of Transportation Act of 1966 states:

> *The Secretary shall cooperate and consult with the Secretaries of the Interior, Housing and Urban Development, and Agriculture, and with the States in developing transportation plans and programs that include measures to maintain or enhance the natural beauty of the lands traversed. After the effective date of this Act, the Secretary shall not approve any program or project which requires the use of any land from a public park, recreation area, wildlife and waterfowl refuge, or historic site unless (1) there is no feasible and prudent alternative to the use of such land, and (2) such program includes all possible planning to minimize harm to such park, recreational area, wildlife and waterfowl refuge, or historic site resulting from such use.*

The USDOT Act of 1966 was codified in Title 49 U.S.C. Section 303. A provision related to Section4(f) which applies only to the Federal-Aid Highway Program was added to Title 23 U.S.C. Section 138.

Section 6009(a) of the 2005 Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) revised the existing Section 4(f) codes in Title 49 U.S.C. and 23 U.S.C. Section

[131] 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.

138. These revisions simplified the review and approval process for projects with a *de minimis* impact on lands identified under Section 4(f).

In 2008, the Federal Highway Administration (FHWA) issued a Final Rule to clarify the Section 4(f) approval process and simplify the regulatory requirements. The Final Rule relocated the implementing regulations for Section 4(f) to 23 C.F.R. 774. The Section 4(f) evaluation also considers the FRA *Procedures for Considering Environmental Impacts*, Section 12.

The FRA has prepared this Section 4(f) evaluation concurrent with an Environmental Impact Statement (EIS), prepared in accordance with the National Environmental Policy Act (NEPA), 1969. The potential effects of the project on parks and recreation areas are evaluated under NEPA separately from this Section 4(f) evaluation under Chapter 13, *Parks and Recreation Areas*.

19.2.2 Definitions

- Section 4(f) properties include the following:
  - Parks and recreational areas of national, state, or local significance that are both publicly owned and open to the public;
  - Publicly owned wildlife and waterfowl refuges of national, state, or local significance that are open to the public to the extent that public access does not interfere with the primary purpose of the refuge; and
  - Historic sites of national, state, or local significance in public or private ownership regardless of whether they are open to the public (23 U.S.C. § 138(a) and 49 U.S.C. § 303(a)).
- Section 4(f) requires DOT and subsidiary agencies to assess potential impacts to Section 4(f) properties based on whether a "use" would occur. A use of a Section 4(f) property occurs:
  - When land is permanently incorporated into a transportation project;
  - When there is a temporary occupancy of land that is adverse in terms of the statute's preservation purpose; or
  - When there is a constructive use (a project's proximity impacts are so severe that the protected activities, features, or attributes of a property are substantially impaired).
- A *de minimis* impact, for publicly owned public parks, recreation areas, and wildlife and waterfowl refuges, is one that will not adversely affect the activities, features, or attributes of the Section 4(f) property.
- A *de minimis* impact, for historic sites, means that FRA has determined that either no historic site is affected by the project or that the project will have "no adverse effect" on historic sites (as described in 36 C.F.R. Part 800, regulations for implementing Section 106 of the National Historic Preservation Act [NHPA]).

- Section 4(f) does not apply to privately owned parks, recreational areas, or wildlife and waterfowl refuges, even if these areas are open to the public. However, these areas may be considered to be publicly owned (on a case by case basis) if a governmental body has a permanent proprietary interest in the land (like an easement or long-term lease).
- A publicly owned park, recreational area, or wildlife or waterfowl refuge is presumed to be a Section 4(f) resource unless the official(s) with jurisdiction over the property determine that the property, considered in its entirety, is not significant (23 C.F.R. 774.11(c)).

19.3 Description of the Proposed Action and Purpose and Need

This section will describe the proposed action and describe the following components:

- The project Purpose and Need;
- The project location and logical termini;
- The proposed action; and
- The Action Alternatives under consideration, including the No-Action Alternative.

The descriptions of the components listed above will draw from the overall project purpose and need, project description, and alternatives analysis and provide a concise and brief summary of each.

19.4 Description of Section 4(f) Properties

This section identifies and describes the Section 4(f) properties within the local study area.

19.4.1 Study Area

Section 4(f) requires FRA to evaluate the potential for the proposed action to have an effect on Section 4(f) properties. The study area for the Section 4(f) evaluation includes the Project Area and abutting neighborhoods in an area surrounding WUS. The study area is congruent with the Project Area of Potential Effect (APE) described under Chapter 12, *Cultural Resources* and with the regional study area for Parks and Recreation Areas described under Chapter 13, *Parks and Recreation Areas*, and was developed based on the potential for a use of Section 4(f) property to occur as a result of the proposed project.

19.4.2 Data Sources

This section describes data sources used to identify and describe Section 4(f) properties. These data sources include:

- Information received through coordination with relevant authorities (national, state, and local) concerning Section 4(f) properties;
- Information on Parks and Recreation Areas in the study area identified and described under Chapter 13, *Parks and Recreation Areas*; and

- Information on cultural and historic resources in the study area identified and described under Chapter 12, *Cultural Resources*.

19.4.3 Methodology

The identification and description of Section 4(f) properties would follow the methodology described below.

- Develop a figure identifying all Section 4(f) properties in the study area;
- Incorporate information from the Section 106 process that identifies Historic Properties within the local study area and regional study area; and
- Identify and describe other Section 4(f) properties within the local study area and regional study area, including a description of the features and attributes of the resource, the use of the resource, and whether the resource is considered significant. A resource is presumed to be significant unless the official(s) with jurisdiction over the property determine that the property, considered in its entirety, is not significant (23 C.F.R. 774.11(c)). The description of property characteristics would include:
  - Provide a general description of Section 4(f) properties within the study area;
  - Describe the type of Section 4(f) property (park, recreation area, wildlife refuge, etc.);
  - Identify the ownership of the Section 4(f) property (city, county, state, or private);
  - Describe the function of the property and available activities on the property;
  - Identify the location of all existing and planned facilities on Section 4(f) properties;
  - Describe the access to the property;
  - Describe the usage characteristics of the property;
  - Describe the relationship between Section 4(f) properties and similarly used lands in the vicinity that are not considered Section 4(f) properties;
  - Identify applicable clauses affecting property ownership like leases, easements, covenants, restrictions, or conditions; and
  - Describe any unusual characteristics like flooding issues, steep grades, or other features that affect the value of the property.

19.5 Impacts to Section 4(f) Properties

The Section 4(f) impact analysis evaluates the Project's direct and indirect impacts (uses) on Section 4(f) properties, for both the post-construction and construction periods.

19.5.1 General Methodology

The assessment of potential impacts to Section 4(f) properties would follow the methodology described below.

- Provide a table of the potential impacts (both permanent and construction) to identified Section 4(f) properties with the following elements:
  - Amount of Section 4(f) property used for transportation purposes;
  - Facilities, functions, activities, features, access, or attributes affected;
  - Direct impacts to significant functions, activities or contributing features;
  - Visual impacts; and,
  - Other potential impacts from specific resource categories (i.e. air quality, floodplain, noise, etc.).
- Post-construction – Describe the potential use (both permanent and constructive) of resources protected by Section 4(f) regulation based on the analysis.
- During Construction – Describe potential constructive uses or temporary uses based on the analysis.
- Describe consultation with officials having jurisdiction over any of the identified Section 4(f) properties (if any occurred).

19.5.2 Methodology for Evaluating the No-Action Alternative

The No-Action Alternative will be evaluated against the existing conditions. This section will note any assumptions regarding future conditions that would be presumed to occur under the No-Action Alternative.

19.5.3 Methodology for Evaluating the Action Alternatives

Each Action Alternative will be compared to existing conditions and the No-Action Alternative in the milestone year. For each alternative, the section would first identify whether a “use” will occur for any Section 4(f) properties. If a use would occur, then the section would describe the nature of that use, the consultation of officials having jurisdiction over the Section 4(f) property in question, and the outcome of such consultation.

19.5.4 Construction Impacts

This section describes temporary uses and constructive uses to resources protected by Section 4(f).

19.6 Avoidance Alternatives

This section identifies which of the alternatives do not require the use of any Section 4(f) property and evaluate the prudence and feasibility of the alternative. Each such alternative includes a discussion of:

- If it could be built with sound engineering;
- If it would compromise the project to a degree that it would make it unreasonable to proceed in context of the purpose and need;
- If, after reasonable mitigation, it would cause severe issues to social, economic, or environmental conditions; and
- If it would result in additional costs of extraordinary magnitude.

19.7 Measures to Minimize Harm

Content for this section would be developed only if there were no feasible and prudent avoidance alternatives. This section discusses how each alternative includes all possible planning to minimize harm or mitigate adverse impacts or effects to Section 4(f) properties. These factors would include the ability to mitigate adverse impacts, potential beneficial effects, relative severity of the harm to properties, relative significance of the Section 4(f) properties (after consulting with officials with jurisdiction), the views of the officials with jurisdiction, the degree to which the alternative meets the purpose and need, the magnitude of potential impacts to other non-Section 4(f) resources, magnitude of costs, and history of concurrent planning or development between the project and the Section 4(f) property.

19.8 Mitigation

This section identifies and describes appropriate mitigation and enhancement measures not already incorporated into the proposed action or alternatives. This section describes mitigation measures in a manner consistent with NEPA, as specified in 40 C.F.R. 1508.20.

19.9 Coordination

This section identifies and describes agency coordination regarding the identification and evaluation of Section 4(f) properties. This section will be cross-referenced with the EIS chapter on public engagement.