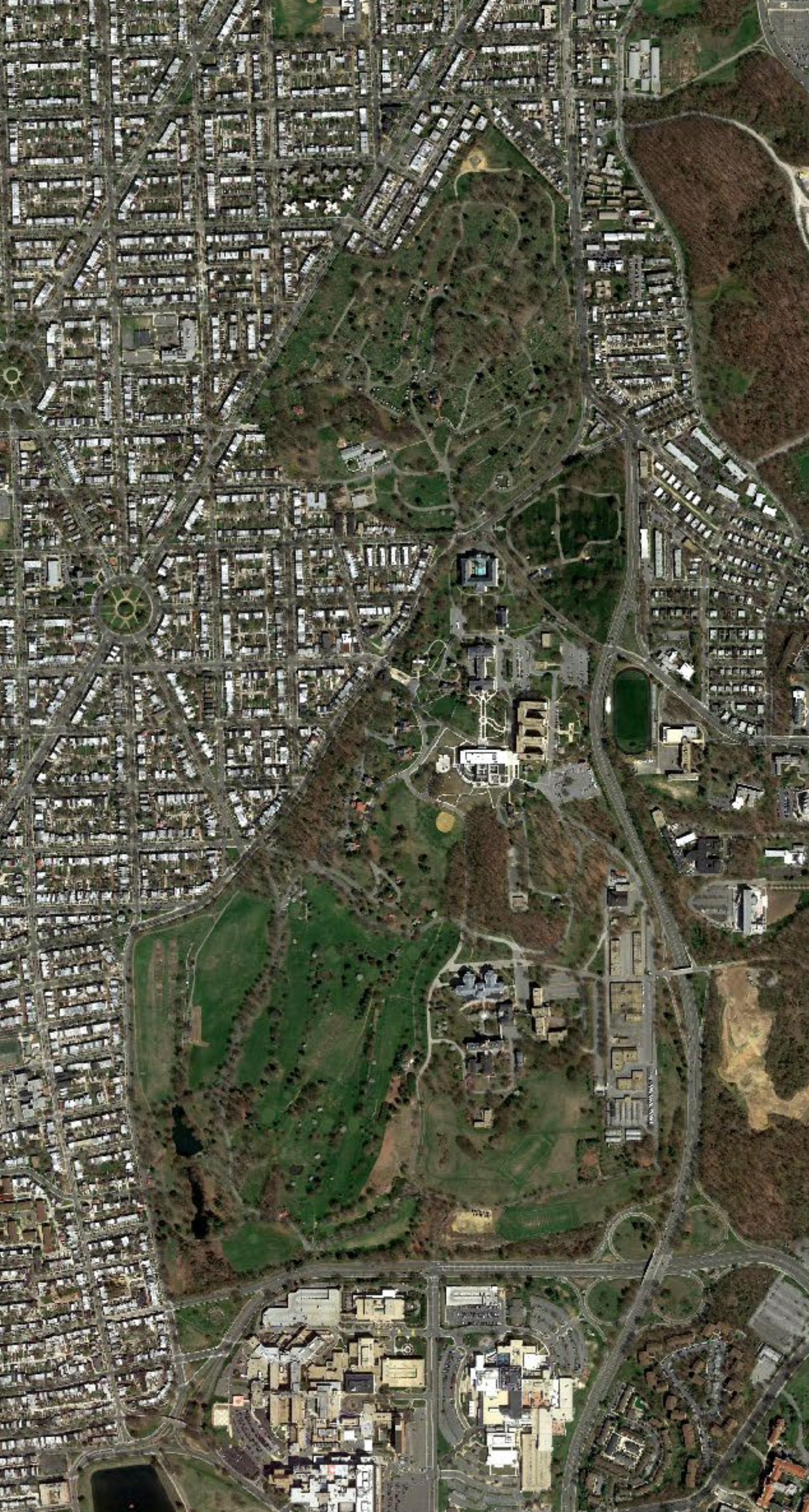

Armed Forces Retirement Home Master Plan Amendment 2

Final Supplemental Environmental Impact Statement - Appendix B

March 2022

Prepared by:

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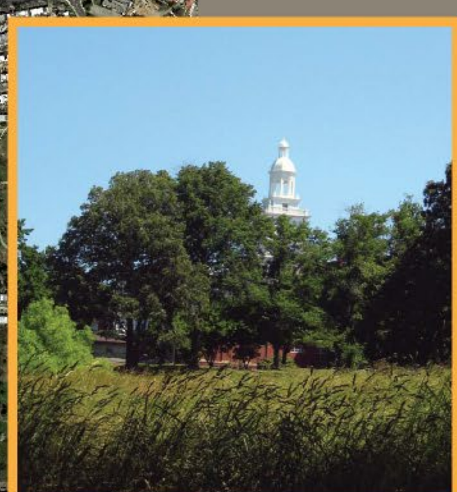

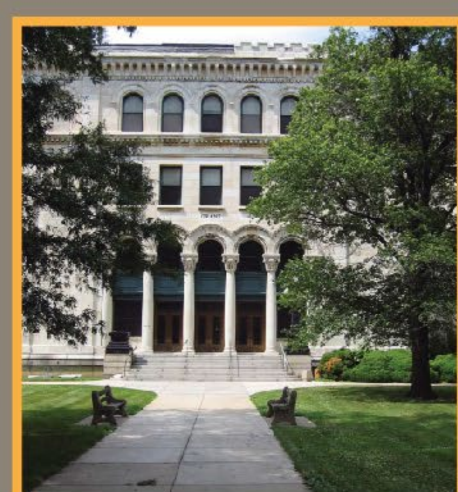

Appendix B. Air Quality Analysis

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Armed Forces Retirement Home

Air Quality Technical Report

March 16, 2022

Prepared for:

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1.0 INTRODUCTION

This air quality report has been prepared by Stantec Consulting Services (Stantec) for the Armed Forces Retirement Home (AFRH-W) to assess and report potential impacts that would result from the implementation of the U.S. Armed Forces Retirement Home Master Plan amendment for the redevelopment of a portion of AFRH-W property called Zone A in the Final Supplemental Environmental Impact Statement (SEIS), also called the "Project Site" in this air quality analysis.

1.1 PROJECT BACKGROUND

Currently, AFRH-W's fixed income sources are insufficient to fund campus operations and improvements. AFRH-W does not receive an annual congressional appropriation to fund its operations. For the past 165 years, AFRH-W has financed its operations with income from its Trust Fund established by Congress after the Mexican-American War, as detailed in 24 USC 419. The Trust Fund is capitalized through resident fees, $1.00 per paycheck contributions from active duty enlisted military personnel, fines and forfeitures by the military, and interest on the Trust Fund and other smaller investments. AFRH-W was plunged into a financial crisis in the 1990s when expenses routinely began to outstrip revenues. In 2002, Congress ordered AFRH-W to hire professional managers with experience in retirement community operations and gave AFRH-W permission to develop its underutilized property in order to replenish the Trust Fund and generate new funding sources.

To support this redevelopment, a Master Plan was needed to accommodate projected growth and support redevelopment efforts at the AFRH-W. A Final EIS that analyzed potential impacts associated with implementation of the Master Plan for AFRH-W was first issued in November 2007. In 2008, AFRH-W issued a Record of Decision (ROD) to implement the Master Plan, and at that time, selected a developer to lease underutilized land and implement a mixed-use program consisting of commercial, residential, institutional and other uses. Although, ultimately, the initial developer and the AFRH-W were not able to come to a workable agreement after the 2008 ROD, AFRH-W proceeded with preparation of a Draft SEIS addressing amendment of the AFRH-W Master Plan. In support of the SEIS and proposed Master Plan amendments, a comprehensive Traffic Study was also completed by Gorove Slade Transportation Engineers and Planners on October 19, 2021.

This air quality technical report assesses and reports the potential air quality impacts resulting from proposed re-development at the AFRH-W. The SEIS considers the No-Action Alternative and two Action Alternatives (Alternatives 2 and 3). Figure 1-1 shows the project location.

The Draft SEIS fully describes the project alternative selection process. Master Plan Action Alternative 2 would provide an additional 4,403,083 gsf of additional building space within the Zone A Project Site area of the AFRH-W property. Master Plan Alternative 3 (also called "Master Plan Amendment 2" or simply "Amendment 2"), the preferred alternative, would provide an additional 5,304,075 gsf of building space. Both alternatives retain 1,319,239 gsf of institutional building space and 398,000 gsf space dedicated to institutional, residential, and recreational activities via an on-site golf course.

1.2 PROJECT NEED

In accordance with the guidelines set forth by 23 CFR Part 771, 49 CFR Part 622, the Clean Air Act (CAA U.S.C. Title 42, Chapter 85, 1970, as amended 1990), and the National Environmental Policy Act (NEPA), an air quality analysis is necessary to document the existing air quality conditions in the vicinity of the AFRH-W and to evaluate the potential changes that would occur as a result of the development of two action alternatives. According to the Metropolitan Washington Council of Governments (MWCOG), air quality in the vicinity of the AFRH-W and in the region, which is influenced primarily by transportation-related mobile sources, predominantly motor vehicle traffic on adjacent roadways, has been steadily improving in recent decades (MWCOG, 2020).

This air quality analyses examines the potential effects of the AFRH-W Master Plan amendments on air-sensitive residential, institutional, and recreational facilities near the AFRH-W. The mobile source air quality analysis considered the effects of air pollutant emissions generated due to added commuter trips on the area roadways and the stationary source air quality analysis associated with two Master Plan Action Alternatives (Alternatives 2 and 3). This report also considers construction, indirect, and cumulative effects.

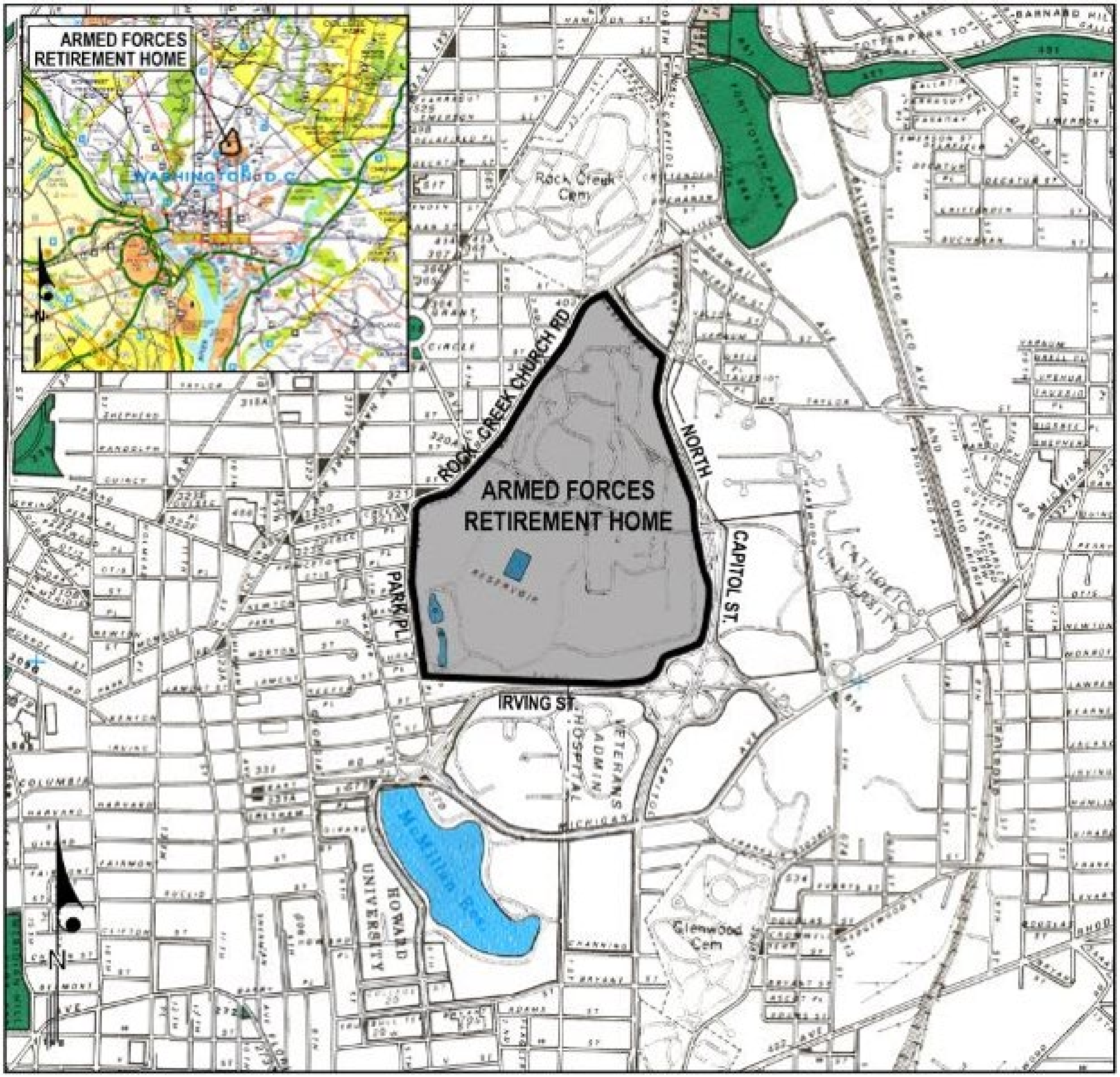

Figure 1-1 AFRH-W Vicinity Map.

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2.0 AFFECTED ENVIRONMENT

The AFRH-W is located within the bounds of Washington, D.C. (**Error! Reference source not found.**). The main entrance to the AFRH-W is at the North Capitol Street NW & Scale Gate Road Interchange's Scale Gate west-bound approach. The Zone A Project Site is located directly across Irving Street NW from a medical campus housing the Children's National Hospital, the MedStar Washington Hospital Center, and the Washington, D.C. Veteran's Administration Medical Center. Several primary and secondary schools are located in the vicinity of the AFRH-W and the Zone A Project Site including:

1. Bruce-Monroe Elementary School – Located approximately 0.5 miles west of Zone A;
2. Petworth Elementary School – Located approximately 0.65 miles northwest of Zone A;
3. E.L. Haynes Public Charter School - Located approximately 0.65 miles west of Zone A;
4. Briya Public Charter School - Located approximately 0.75 miles northwest of Zone A;
5. Tubman Elementary School – Located approximately 0.85 miles south-southwest of Zone A;
6. Meridian Public Charter Middle School - Located approximately 0.6 miles south-southwest of Zone A, and
7. Theodore Roosevelt High School - Located approximately 1.0 miles northwest of Zone A;

While this list of hospitals and schools in the immediate vicinity of the Project Site is by no means exhaustive, it does demonstrate that the project is located in a densely populated urban are located very close to facilities known to house and serve sensitive and vulnerable populations. AFRH-W, by virtue of being located in the heart of our nation's capital, is within several miles of multiple National Parks and Monuments including The National Mall and Arlington National Cemetery, located approximately 3.5 miles south-southwest of the Project Site. To the south and east of the AFRH-W exist several National Parks including Anacostia Park, approximately 5.0 miles directly south of Zone A.

The Project Site itself, is currently largely underdeveloped with most of the building facilities servicing the AFRH-W located outside of Zone A, where construction activities will be focused during Phases 1 (2022) through Phase 4 (2037 buildout year). During the course of construction, essentially the entirely of the Zone A Project Site, will be converted from light industrial or undeveloped usage to residential, retail, and medical facility usage.

2.1 NATIONAL AMBIENT AIR QUALITY STANDARDS

The CAA authorizes the U.S. Environmental Protection Agency (USEPA) to develop National Ambient Air Quality Standards (NAAQS) for certain air pollutants (criteria pollutants) deemed harmful to public health and the environment. USEPA has set both primary and secondary standards. The primary standards protect public health including sensitive populations such as asthmatics, children, and the elderly. The secondary standards protect the public welfare, including protection against reduced visibility and damage to crops, animals, vegetation, and buildings. The criteria pollutants include nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), particulate matter ($PM_{2.5}$/PM_{10}), and lead

(Pb). The standards are given as pollutant concentrations such as parts per million (ppm), parts per billion (ppb), and micrograms per cubic meter of air (µg/m³). The concentration standards for each of these criteria pollutants are presented in Table 2-1.

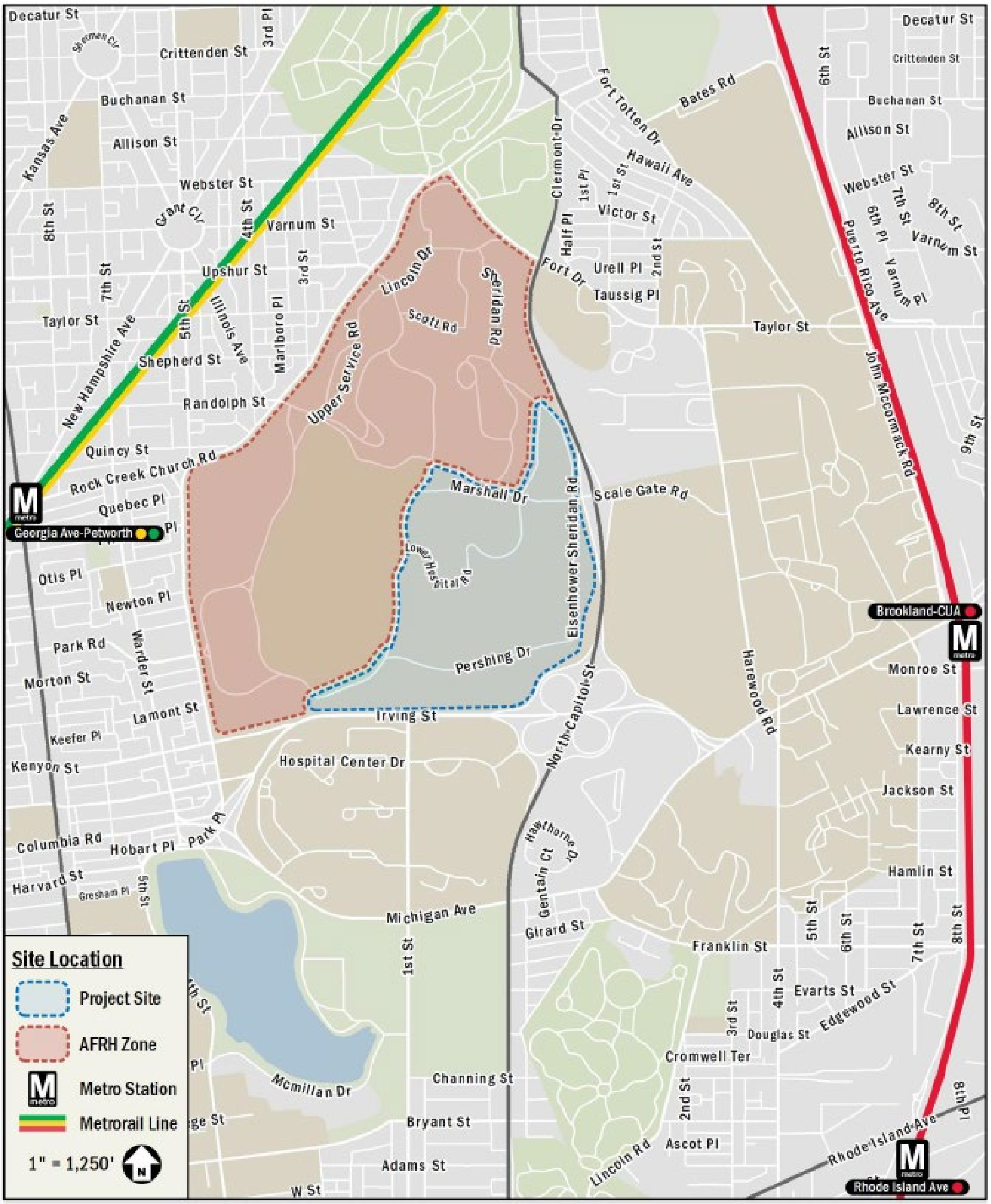

Figure 2-1 AFRH-W Area Boundaries (Image courtesy of Gorove Slade, 2021)

Table 2-1. National Ambient Air Quality Standards

Pollutant		Primary/Secondary	Averaging Time	Level	Form
Carbon Monoxide (CO)		primary	8 hours	9 ppm (10 mg/m^3)	Not to be exceeded more than once per year
			1 hour	35 ppm (40 mg/m^3)	
Lead (Pb)		primary and secondary	Rolling 3-month average	0.15 µg/m^3 (1)	Not to be exceeded
Nitrogen Dioxide (NO_2)		primary	1 hour	100 ppb (188 µg/m^3)	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		primary and secondary	1 year	53 ppb (2) (100 µg/m^3)	Annual Mean
Ozone (O_3)		primary and secondary	8 hours	0.070 ppm (3)	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
Particle Pollution (PM)	$PM_{2.5}$	primary	1 year	12.0 µg/m^3	Annual Mean, averaged over 3 years
		secondary	1 year	15.0 µg/m^3	Annual Mean, averaged over 3 years
		primary and secondary	24 hours	35 µg/m^3	98th percentile, averaged over 3 years
	PM_{10}	primary and secondary	24 hours	150 µg/m^3	Not to be exceeded more than once per year on average over 3 years
Sulfur Dioxide (SO_2)		primary	1 hour	75 ppb (4) (196 µg/m^3)	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
		secondary	3 hours	0.5 ppm (1300 µg/m^3)	Not to be exceeded more than once per year

Pollutant	Primary/Secondary	Averaging Time	Level	Form
(1) 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. (2) 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. (3) 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. (4) 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 an implementation plan providing for attainment of the current (2010) standard has 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 required NAAQS.				
Source: National Ambient Air Quality Standards Table				

2.2 NATIONAL AMBIENT AIR QUALITY STANDARD ATTAINMENT STATUS

Areas where concentrations of criteria pollutants are below the NAAQS are designated by USEPA as being in "attainment" and areas where a criteria pollutant level exceeds the NAAQS are designated as being in "nonattainment." Ozone (O_3) nonattainment areas are categorized based on the severity of nonattainment: marginal, moderate, serious, severe, or extreme. CO and PM_{10} nonattainment areas are categorized as moderate or serious. Washington, D.C. is designated as a marginal nonattainment area for O_3 under the 2015 8-hour standard (USEPA 2020)[1] (area has a design value of 0.071 ppm up to, but not including 0.081 ppm). Washington, D.C. is designated as in attainment or maintenance of the NAAQS for all other criteria pollutants. For further details please refer to Section 2.4.

2.3 AIR QUALITY MONITORING DATA

The Washington, D.C. Department of Energy & Environment operates 4 air quality monitoring sites throughout the District. These monitoring sites measure ground-level concentrations of criteria pollutants, and pollutant concentrations from monitoring sites is available from USEPA's AirData website (USEPA, 2022). The closest air monitoring station to the study area is located 1.3 miles south of the AFRH-W campus. Ambient O_3 and CO data recorded from this monitoring station from 2019 to 2021 are presented in Table 2-2 below. Exceedances of the O_3 8-hour standard were reported during each year – four times in 2019, and six times in 2021. It should be noted that the NAAQS is the 4th high 8-hr averaged over three years. No exceedances of any CO NAAQS were recorded during the same timeframe.

[1] USEPA Greenbook Designation Area Report 8-hr Ozone (2015) https://www3.epa.gov/airquality/greenbook/jbca.html

Table 2-2. Ambient Air Quality Data for O_3 and CO, 2019-2021

AQS Site 11 001 0043, McMillan NCore PAMS, 2500 1st Street, N.W., Washington, D.C.					
Pollutant	**Averaging Time**	**Form**	**2019**	**2020**	**2021**
Ozone (O_3) [ppm]	8-hour	First Highest	0.076	0.068	0.082
		Second Highest	0.073	0.066	0.074
		Third Highest	0.072	0.065	0.073
		Fourth Highest	0.071	0.063	0.072
		# of Exceedances	4	0	6
		Average Fourth High	0.069		
Carbon Monoxide (CO) [ppm]	1-Hour	First Highest	1.984	2.007	1.732
		Second Highest	1.818	1.951	1.654
		Third Highest	1.777	1.861	1.617
		Fourth Highest	1.773	1.768	1.549
		# of Exceedances	0	0	0
		Average Fourth High	1.700		
Carbon Monoxide (CO) [ppm]	8-Hour	First Highest	1.500	1.600	1.600
		Second Highest	1.500	1.600	1.600
		Third Highest	1.500	1.600	1.500
		Fourth Highest	1.500	1.600	1.500
		# of Exceedances	0	0	0
		Average Fourth High	1.533		
Source: USEPA AirData, AQS Site ID 11-001-0043, Interactive Map of Air Quality Monitors					

2.4 GENERAL CONFORMITY

Section 176(c) of the CAA prohibits Federal entities from taking actions in non-attainment or maintenance areas which do not conform to the State Implementation Plan (SIP) for the attainment and maintenance of the NAAQS. In November 1993, the USEPA promulgated the General Conformity Regulations (58 FR 63214) to ensure that Federal actions do not cause or contribute to new violations of the NAAQS, do not worsen existing violations of the NAAQS, and do not delay attainment of the NAAQS. The General Conformity regulations laid out in 40 CFR Part 93.153(b) ensure that all Federal actions not covered by the Clean Air Act's Transportation Conformity regulations conform to the State Implementation Plan (SIP) for achieving the NAAQS.

As mentioned in Section 2.2, the AFRH-W is located in the heart of Washington, D.C. which is designated as Marginal Nonattainment for the 2015 8-Hour Ozone NAAQS. Previously, the area was designated as a Maintenance Area under the 1971 CO NAAQS, the now-revoked 1997 fine particulate ($PM_{2.5}$) NAAQS, and the 2008 Ozone NAAQS. Lastly, the area was classified as maintenance under the now-revoked 1997 Ozone NAAQS. Table 2-3 includes a summary of current and past Nonattainment and Maintenance designations.

Table 2-3 Summary of Nonattainment and Maintenance designations for the project area.

National Ambient Air Quality Standard (NAAQS) District of Columbia	Status Description for Project Area[1]
1971 Carbon Monoxide	Redesignated to “in Maintenance” on March 15, 1996.
1997 PM2.5 (Now-revoked)	Redesignated to “in Maintenance” on November 5, 2014.
1979 1-Hour Ozone (Now-revoked)	Designated as “Severe Nonattainment” until revocation of the Standard in 2004.
1997 8-Hour Ozone (Now-revoked)	Designated as “Moderate Nonattainment” in 2004; Standard revoked on April 6, 2015.
2008 8-Hour Ozone	Redesignated as “Marginal Nonattainment” on August 15, 2019.
2015 8-Hour Ozone	This Standard replaced the 2008 Standard and the area was Designated as “Marginal Nonattainment” in 2018.

[1] EPA Greenbook – District of Columbia, retrieved in March 2022 from online portal: https://www3.epa.gov/airquality/greenbook/anayo_dc.html.

To demonstrate General Conformity with all relevant NAAQS, direct and indirect emissions were estimated for CO, PM2.5/10, NOx and VOC using EPA’s MOVES3.0.3 emissions model and compared to published allowable emission rates defined in 40 CFR 93.153(b)(1) and 93.153(b)(2). During construction and pre-construction, direct emissions include:

- Construction equipment tailpipe emissions for each alternative examined, and
- Fugitive particulate emissions from earth-moving activities.

Once construction is completed and regular operations at the site commence, direct emissions will be sourced from:

- Emergency generator(s); and
- Natural gas-fired space heaters.

Indirect emissions for each alternative include onroad emissions of PM2.5/10, CO, NOx, and VOC sourced from:

- Onroad commuter tailpipe emissions sourced from construction workers traveling to and from the site each workday during construction; and
- Onroad commuter tailpipe emissions sourced from facility staff once construction has been completed and the AFRH-W is once again being used for regular operations.

Table 2-4 includes pre-project direct and indirect emissions from construction activities and emissions, both direct and indirect, resulting from the completed project during 2021, 2028, 2032, and 2037 estimated full build out year.

Table 2-4. Demonstration of General Conformity during and after the Construction Phase

Pollutant of Interest	$PM_{2.5/10}$	VOC	NOx	CO
Emission Limit for General Conformity in Other Ozone NAAs inside Ozone Transport Region[1] (tpy)	100	50	100	100
Construction and Worker Emissions, All Phases for Alternative 2	18.11	0.15	2.19	1.18
Construction and Worker Emissions, All Phases for Alternative 3 (Amendment 2)	18.11	0.15	2.19	1.18
Post- Construction Project Emissions for Selected Alternative 3 (Amendment 2) in 2028 (tpy)	29.27	1.37	29.27	21.42
Post- Construction Project Emissions for Selected Alternative 3 (Amendment 2) in 2032 (tpy)	29.27	1.37	29.27	21.42
Post- Construction Project Emissions for Selected Alternative 3 (Amendment 2) in 2037 (tpy)	29.27	1.33	29.27	21.18

[1]The project area is currently located in an area designated as Marginal Nonattainment, therefore general conformity was demonstrated via comparison to the limits in 40 CFR 93.153(b)(1) and (2).

2.5 GREENHOUSE GAS REPORTING

The White House Council on Environmental Quality (CEQ) provides guidance for federal agencies on consideration of greenhouse gas (GHG) emissions in NEPA reviews. CEQ provides a reference point of 25,000 metric tons of CO_2-equivalent ($MTCO_2e$) emissions on an annual basis (CEQ 2014). Below this number, GHG emissions quantitative analysis is generally not warranted unless quantification below that reference point is easily accomplished. The CEQ guidance was rescinded on March 28, 2017 by Executive Order, “Presidential Executive Order on Promoting Energy Independence and Economic Growth.” However, prior to CEQ promulgating the new regulations to guide the consideration of GHG emissions in NEPA reviews, that too was rescinded by Executive Order 13990, “Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis” on January 20, 2021. The rescission reverts back to the 2016 final guidance. It also states that the guidance will be reviewed for potential revision and updates. Lastly, the total amount of GHG emissions is expected to be approximately 25,000 $MTCO_2e$.

2.6 GREENHOUSE GAS EMISSION REDUCTION ACT

The state of Maryland passed the Greenhouse Gas Emission Reduction Act in 2009. The regulation, administered by MDE, requires the state to develop and implement a plan to reduce GHG emissions by 2020 to a point that is 25% below 2006 emissions. The plan, released in 2012 and updated in 2015, encourages reductions in GHG emissions through a variety of incentive programs targeting the public and private sector. These programs focus on increasing energy efficiency using existing technologies, identifying ways to transition to new energy sources, and stimulating further technological development to reduce GHG emissions.

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3.0 ENVIRONMENTAL CONSEQUENCES

New development associated with Amendment 2 to the AFRH-W Master Plan has the potential to affect air quality in four ways:

- Increased emissions from current stationary sources of pollutants such as generators and boilers throughout the AFRH-W;
- Minimal emission estimates for building natural gas heating units.
- Increased vehicular traffic to the site, which raises vehicle emission levels near the site, and possibly in the region; and
- Generation of airborne dust during construction.

The purpose of this evaluation is to identify and quantify the potential direct, indirect, and cumulative air quality impacts related to the proposed development and operation of the 2021 AFRH-W Proposed Action Alternative as well as the No-Action Alternative. For this analysis, the emission inventories of mobile and stationary sources for each alternative were evaluated for conformity with the Washington Metropolitan Region SIP.

The AFRH-W currently contains 398,000 gsf of existing building space and an additional 1,319,239 of institutional space. The first proposed alternative, Alternative 2, would add approximately 6,459,369 gsf to the existing square footage for a total of 6,835,848 gsf at buildout in 2037. Alternative 3, also referred to as “Amendment 2” would add 4,906,075 gsf for a total of 6,623,314 gsf at buildout. Alternative 3 (i.e. Amendment 2) is the selected alternative for implementation by the ARFH. A 2021 Traffic Study performed by Gorove Slade included detailed study of the existing, proposed action, and no action scenarios for the selected alternative, Amendment 2. All quantitative estimates of onroad emissions contributions included in this analysis are based on the data included in the Gorove Slade study.

3.1 NO-ACTION ALTERNATIVE & PROPOSED ACTION ALTERNATIVES

3.1.1 No-Action Alternative

Under the No Action Alternative, the action proposed in the Supplement Environmental Impact Statement (SEIS) would not be taken. AFRH-W would remain under federal ownership, with AFRH-W as the holding agency. No additional new construction would occur on AFRH-W, as proposed in the 2008 Master Plan, under this alternative. The site would continue to be underdeveloped, with scattered, unused, and mostly non-revenue producing buildings. The facility would remain fenced and guarded, with entry from Rock Creek Church Road restricted to those with business on site. The No Action Alternative does not support the intent of the National Defense Authorization Act for Fiscal Year 2010, which allows AFRH-W to sell or lease its land as a means to replenish the AFRH-W Trust Fund.

Under this Alternative, the opportunities to raise revenue for AFRH-W would be limited to the reuse of existing buildings with the addition of approximately 538 parking spaces that would be created to serve these buildings.

3.1.2 Action Alternative - Alternative 2 (*"Amendment 1"*)

Alternative 2 is comprised of the development proposed in the 2008 AFRH-W Master Plan and also includes the adaptive reuse of the Heating Plant in Zone A ("Project Site" in Figure 2). This alternative was partly studied in the 2007 Final EIS as Alternative 3A, which was selected for implementation in the 2008 Record of Decision (ROD). Within the 2008 AFRH-W Master Plan, proposed development was eliminated from areas between the golf course and Rock Creek Church Road to provide a buffer between the residential areas to the west and the new development on the southeastern portion of the site.

This amendment to the AFRH-W Master Plan changes the boundaries of the development zones to shift a three-acre Heating Plant parcel from the AFRH-W Zone to the Project Site (see Figure 2). Development in the AFRH-W Zone would take place as AFRH-W needs new facilities. The AFRH-W Zone is designated for institutional uses and new residential units compatible with AFRH-W operations. There would be moderate in-fill development within this zone. Development in the Project Site area would be undertaken by a private developer to generate income for the AFRH-W Trust Fund. The Project Site is designated for residential, office/research and development, retail, hotel, and medical uses.

A summary of the development proposed in Master Plan Amendment 1 is included below in Table 3-1.

Table 3-1: Proposed Development for Alternative 2 - *Master Plan Amendment 1*

LAND USE			
	Height (# of Feet)	**Gross Square Footage**	**Parking Spaces**
EXISTING & TO REMAIN		**1,319,239**	
Institutional		1,319,239	
AFRH-W Zone		**398,000**	
North-Northeast (Institutional)	55-85	350,000	**700**
Chapel Woods (Residential)	36	42,000	**42**
Golf Course		6,000	
Zone A (Development Zone)	45-120	**4,403,083 ***	**5,189**
Residential		2,280,477	
Commercial		1,191,391	
Medical		290,650	
Retail		214,086	
Asst. Living		214,000	
Hotel		126,391	
Heating Plant Area		36,088	
Potential Future Retail		50,000	
TOTAL NEW DEVELOPMENT		**4,801,083 ****	**5,931**
AFRH-W GRAND TOTAL		**6,120,322**	

* The breakout of land use square footages for the Development Area are approximations and subject to change in response to market conditions. The total number of parking spaces for the Development Area will depend upon the final square footages associated with each land use and the applicable parking ratios.

** Gross development square footage does not include above ground parking structures in Zone A; however, the EIS assesses the impacts of parking on the site.

3.1.3 Action Alternative - Alternative 3 *("Amendment 2")*

Alternative 3 - Master Plan Amendment 2 includes development in the AFRH-W Zone and Project Site, as identified in Master Plan Amendment 1, with the Heating Plant Area included in the Project Site. This alternative does not include changes to the development plan or design guidelines for the AFRH-W Zone, and all substantive changes are limited to the Project Site. The alternative accommodates minor changes to the parcel plan in Zone A, responds to changes in local planning strategies and priorities since 2008, and reflects a more objective-based and context-specific approach to design guidelines for new development in Zone A. The alternative also accommodates a small increase in density in Zone A, as well as more flexibility in use and product type while maintaining all previously approved guidelines related to height and view shed protection. Development in Zone A is based on the proposal by Madison I Urban, the selected developer, who will provide approximately 4.9 million gsf of mixed-use development consisting of residential, hospitality, office, and retail uses to generate income for the AFRH-W Trust Fund.

A summary of the development proposed in Master Plan Amendment 2 is included below in Table 3-2.

Table 3-2. Proposed Development for Alternative 3 - Master Plan Amendment 2

LAND USE			
	Height (# of Feet)	**Gross Square Footage**	**Parking Spaces**
EXISTING & TO REMAIN		**1,319,239**	
Institutional		1,319,239	
AFRH-W Zone		**398,000**	
North-Northeast (Institutional)	55-85	350,000	**700**
Chapel Woods (Residential)	36	42,000	**42**
Golf Course		6,000	
Zone A (Development Zone)	45-120	**4,906,075 ***	
Residential		3,175,177	
Commercial		732,846	
Medical		319,077	
Retail		217,209	
Asst. Living		309,678	
Hotel		116,000	
Heating Plant Area		36,088	
Potential Future Retail		TBD	
TOTAL NEW DEVELOPMENT		**5,304,075****	
AFRH-W GRAND TOTAL		**6,623,314**	

* The breakout of land use square footages for the Development Area are approximations and subject to change in response to market conditions. The total number of parking spaces for the Development Area will depend upon the final square footages associated with each land use and the applicable parking ratios.

** Gross development square footage does not include above ground parking structures in Zone A; however, the EIS assesses the impacts of parking on the site.

3.2 MOBILE SOURCE ANALYSIS

3.2.1 Carbon Monoxide Hot Spot Modeling

The emissions model used to generate fleet emission factors for CO was MOVE3, created for and supported by the EPA. The dispersion model used to predict CO concentrations for the traffic study area in this hot spot modeling analysis is the USEPA's CAL3QHC dispersion model Version 2.0.

The CAL3QHC dispersion model predicts CO (or other photochemically inert) pollutant concentrations from motor vehicles traveling near roadway intersections. The model requires fleet emissions and traffic data (such as volumes, level of service and signal timing) to estimate CO concentrations near air quality receptors near the roadway or intersection of concern. The CAL3QHC model focuses on CO concentrations at intersections because idling vehicles result in the highest localized CO concentrations. Intersections with the worst level of service, slowest average link speed and highest traffic volumes represent the worst-case air pollutant dispersion scenarios. For this analysis, eight discrete receptors were placed at the pedestrian crosswalk corners of the intersection along with an additional sidewalk receptor adjacent to the queue lanes for each vehicle approach direction.

The study area includes 14 intersections, as shown in Table 7 and Figure 3-1.

Table 3-3 Descriptions of intersections included in the 2021 Traffic Study.

1. Rock Creek Church Rd & North Capitol Street/ Hawaii Avenue & Allison Street	8. Irving Street & Future Signalized MIRV Access Northeast
2. North Capitol Street/ Hawaii Avenue & Allison Street	9. Irving Street & Michigan Avenue Northeast
3. North Capitol Street & Harewood Road	10. Park Place & Kenyon Street Northwest
4. Scale Gate Rd & North Capitol Street SB Ramp Northwest	11. Park Place & Irving Street Northwest
5. Scale Gate Road & North Capitol Street Northbound Ramp Northeast	12. Irving Street & Hobart Place Northwest
6. Irving Street & Future Site Access Northwest	13. Michigan Avenue & First Street Northwest
7. Irving Street & First Street/ Future Site Access Northwest	14. North Capitol St & Michigan Avenue Northwest/ Northeast

Within the project area, the levels of service were consistently lowest during all phases of each scenario examined at intersection 2 – North Capitol Street/ Hawaii Avenue & Allison Street. For each phase of the project, this intersection consistently experienced a LOS of E or F for north- and southbound lanes, with existing (2021) delays at the signalized intersection reaching a maximum of 161.9 seconds in the northbound lanes during the evening peak travel hour. During the project buildout year, 2037, the intersection is projected to experience LOS F for all approaches. This holds for the background traffic levels and the background + project build scenarios (e.g. "no-build" and "build" scenarios). Schematic representations of the selected intersection, along with anticipated traffic volumes is included as Figure 3-1.

Due to the combination of low pre- and post-project levels of service throughout all phases and excessive delays at intersection 2, this intersection was selected for this quantitative CO hot spot analysis. It can be reasonably assumed that if no violation of the CO NAAQS is predicted via dispersion modeling of the worst-case intersection within the project impact area, then no violation of the CO NAAQS will occur elsewhere within the project impact area.

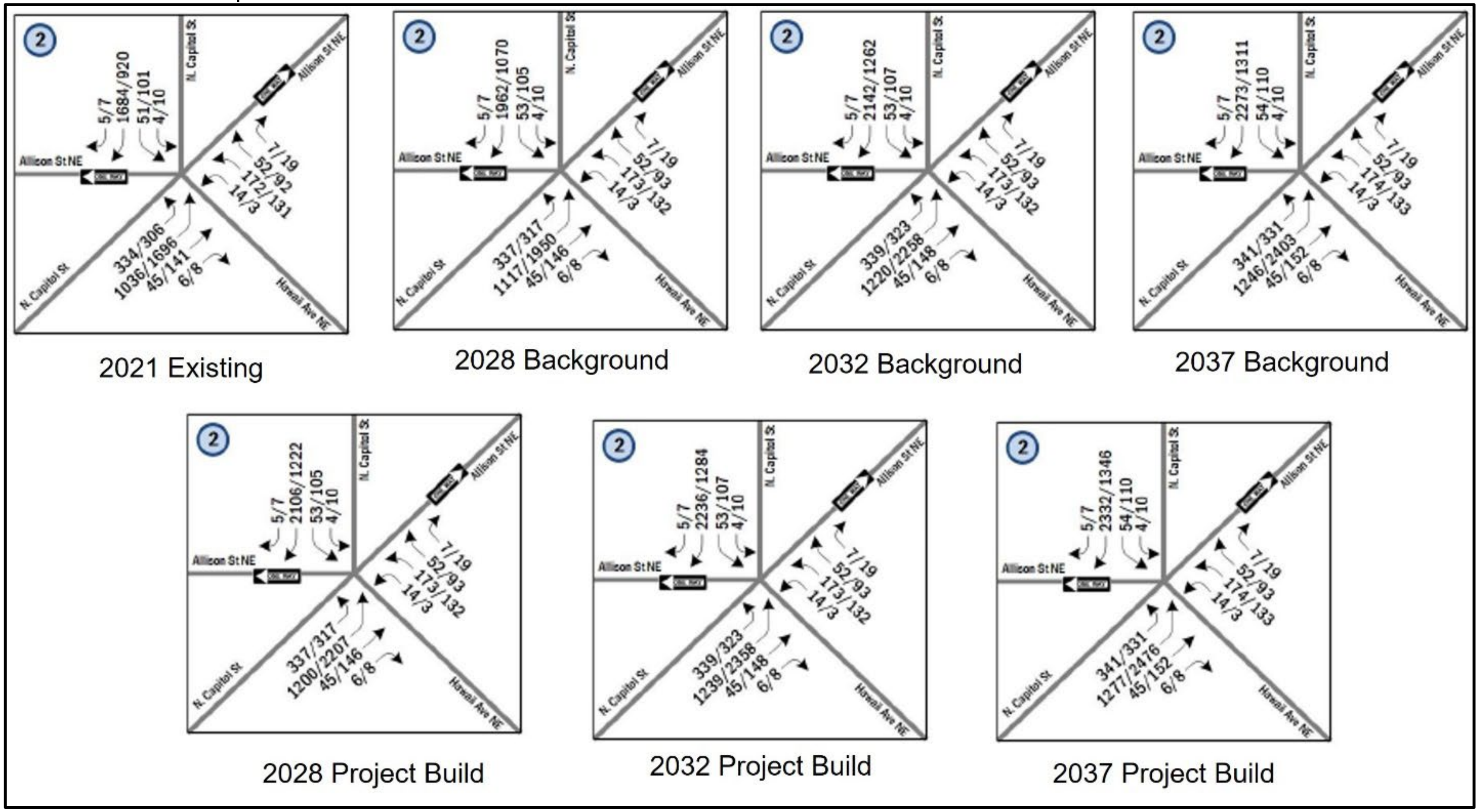

Figure 3-1 Schematic representations of the selected intersection showing anticipated traffic volumes during peak hour operations at the worst-case intersection in the project impact area.

Figure 3-2 Locations of each numbered intersection included in the traffic study.

Figure courtesy of Gorove Slade Transportation Partners and Engineers, "Comprehensive Transportation Review for the Armed Forces Retirement Home," October 19, 2021.

3.2.2 Traffic Data

Traffic data used in this analysis were obtained from the "Comprehensive Transportation Review for the Armed Forces Retirement Home" (Gorove Slade, 2021). The traffic study included morning and evening peak hour traffic simulation/ demand modeling for the 14 intersections described in Section 3.2.1. The study includes traffic and intersection configuration data presented in Tables 3-4 through 3-7 for the selected worst-case intersection number 2 at North Capitol Street/ Hawaii Avenue & Allison Street. The selection is a five-way intersection that has three approaches with two one-way legs of Allison Street exiting the intersection to the east and west.

Table 3-4 Worst Case Intersection - Existing 2021 Conditions

Peak Hour	Intersection	Lane Group	2021 Existing						
			Peak Hour Volume (vph)	V/C Ratio	Sat. Flowrate (vph)	Delay	LOS	50th Queue (ft)	95th Queue (ft)
AM	North Capitol Street/ Hawaii Avenue & Allison Street	NEB-LLT	334	1.69	198	103.7	F	512	692
		NEB-LT	1036	1.69	613	103.7	F	512	692
		NEB-Th	45	0.53	85	103.7	F	334	432
		NEB-RT	6	0.53	11	103.7	F	334	432
		NWB-RRT	7	0.91	8	95.1	F	193	366
		NWB-RT	52	0.91	57	95.1	F	193	366
		NWB-LT	172	0.91	189	95.1	F	193	366
		NWB-LLT	14	0.91	15	95.1	F	193	366
		SB-LLT	4	0.84	5	81.1	F	58	71
		SB-LT	51	0.84	61	81.1	F	58	71
		SB-RT	1684	1.11	1517	81.1	F	1034	1174
		SB-RRT	5	1.11	5	81.1	F	1034	1174
PM	North Capitol Street/ Hawaii Avenue & Allison Street	NEB-LLT	336	1.2	280	161.9	F	328	354
		NEB-LT	1696	1.2	1413	161.9	F	328	354
		NEB-Th	141	1.33	106	161.9	F	1793	1716
		NEB-RT	8	1.33	6	161.9	F	1793	1716
		NWB-RRT	92	0.82	112	74.5	E	185	335
		NWB-RT	131	0.82	160	74.5	E	185	335
		NWB-LT	3	0.82	4	74.5	E	185	335
		NWB-LLT	19	0.82	23	74.5	E	185	335
		SB-LLT	10	3.43	3	131.6	F	224	367
		SB-LT	101	3.43	29	131.6	F	224	367
		SB-RT	920	0.92	1000	131.6	F	640	782
		SB-RRT	7	0.92	8	131.6	F	640	782

Table 3-5. Worst Case Intersection 2028 No Action and Action Alternative Traffic Conditions

Peak Hour	Intersection	Lane Group	2028 No Action							2028 Action						
			Peak Hour Volume (vph)	V/C Ratio	Sat. Flowrate (vph)	Delay	LOS	50th Queue (ft)	95th Queue (ft)	Peak Hour Volume (vph)	V/C Ratio	Sat. Flowrate (vph)	Delay	LOS	50th Queue (ft)	95th Queue (ft)
AM	North Capitol Street/ Hawaii Avenue & Allison Street	NEB-LLT	337	1.71	197	101.6	F	517	698	337	1.71	197	97.9	F	517	693
		NEB-LT	1117	1.71	653	101.6	F	517	698	1200	1.71	702	97.9	F	517	693
		NEB-Th	45	0.57	79	101.6	F	401	502	45	0.61	74	97.9	F	472	565
		NEB-RT	6	0.57	11	101.6	F	401	502	6	0.61	10	97.9	F	472	565
		NWB-RRT	7	0.92	8	95.8	F	194	370	7	0.92	8	95.8	F	194	370
		NWB-RT	52	0.92	57	95.8	F	194	370	52	0.92	57	95.8	F	194	370
		NWB-LT	173	0.92	188	95.8	F	194	370	173	0.92	188	95.8	F	194	370
		NWB-LLT	14	0.92	15	95.8	F	194	370	14	0.92	15	95.8	F	194	370
		SB-LLT	4	0.94	4	160.1	F	56	65	4	1.02	4	201.7	F	59	62
		SB-LT	53	0.94	56	160.1	F	56	65	53	1.02	52	201.7	F	59	62
		SB-RT	1962	1.29	1521	160.1	F	1353	1471	2106	1.39	1515	201.7	F	1519	1497
		SB-RRT	5	1.29	4	160.1	F	1353	1471	5	1.39	4	201.7	F	1519	1497
PM	North Capitol Street/ Hawaii Avenue & Allison Street	NEB-LLT	317	0.96	330	51.6	D	188	140	317	1.08	294	108.1	F	257	153
		NEB-LT	1950	0.96	2031	51.6	D	188	140	2207	1.08	2044	108.1	F	257	153
		NEB-Th	146	1.1	133	51.6	D	1275	167	146	1.23	119	108.1	F	1561	155
		NEB-RT	8	1.1	7	51.6	D	1275	167	8	1.23	7	108.1	F	1561	155
		NWB-RRT	19	0.83	23	75.3	E	188	341	19	0.83	23	75.3	E	188	341
		NWB-RT	93	0.83	112	75.3	E	188	341	93	0.83	112	75.3	E	188	341
		NWB-LT	132	0.83	159	75.3	E	188	341	132	0.83	159	75.3	E	188	341
		NWB-LLT	3	0.83	4	75.3	E	188	341	3	0.83	4	75.3	E	188	341
		SB-LLT	10	3.3	3	130.4	F	215	356	10	3.3	3	117.4	F	215	356
		SB-LT	105	3.3	32	130.4	F	215	356	105	3.3	32	117.4	F	215	356
		SB-RT	1070	0.75	1427	130.4	F	447	476	1222	0.86	1421	117.4	F	561	566
		SB-RRT	7	0.75	9	130.4	F	447	476	7	0.86	8	117.4	F	561	566

Table 3-6. Worst Case Intersection 2032 No Action and Action Alternative Traffic Conditions.

Peak Hour	Intersection	Lane Group	2032 No Action							2032 Action						
			Peak Hour Volume (vph)	V/C Ratio	Sat. Flowrate (vph)	Delay (s)	LOS	50th Queue (ft)	95th Queue (ft)	Peak Hour Volume (vph)	V/C Ratio	Sat. Flowrate (vph)	Delay	LOS	50th Queue (ft)	95th Queue (ft)
AM	Laurel Bowie Rd & Muirkirk Rd	NEB-LLT	339	1.72	197	93.2	F	511	656	6	1.72	3	92.5	F	512	656
		NEB-LT	1220	1.72	709	93.2	F	511	656	45	1.72	26	92.5	F	512	656
		NEB-Th	45	0.62	73	93.2	F	484	472	1239	0.63	1967	92.5	F	498	479
		NEB-RT	6	0.62	10	93.2	F	484	472	339	0.63	538	92.5	F	498	479
		NWB-RRT	7	0.92	8	95.8	F	194	370	7	0.92	8	95.8	F	194	370
		NWB-RT	52	0.92	57	95.8	F	194	370	52	0.92	57	95.8	F	194	370
		NWB-LT	173	0.92	188	95.8	F	194	370	173	0.92	188	95.8	F	194	370
		NWB-LLT	14	0.92	15	95.8	F	194	370	14	0.92	15	95.8	F	194	370
		SB-LLT	4	1.05	4	212.3	F	62	62	4	1.07	4	238.5	F	63	58
		SB-LT	53	1.05	50	212.3	F	62	62	53	1.07	50	238.5	F	63	58
		SB-RT	2142	1.41	1519	212.3	F	1560	1498	2236	1.47	1521	238.5	F	1667	1514
		SB-RRT	5	1.41	4	212.3	F	1560	1498	5	1.47	3	238.5	F	1667	1514
PM	Laurel Bowie Rd & Muirkirk Rd	NEB-LLT	323	1.13	286	126.2	F	288	218	8	1.16	7	147.3	F	302	200
		NEB-LT	2258	1.13	1998	126.2	F	288	218	148	1.16	128	147.3	F	302	200
		NEB-Th	148	1.25	118	126.2	F	1632	1339	2358	1.3	1814	147.3	F	1743	1348
		NEB-RT	8	1.25	6	126.2	F	1632	1339	323	1.3	248	147.3	F	1743	1348
		NWB-RRT	19	0.83	23	75.3	E	188	341	19	0.83	23	75.3	E	188	341
		NWB-RT	93	0.83	112	75.3	E	188	341	93	0.83	112	75.3	E	188	341
		NWB-LT	132	0.83	159	75.3	E	188	341	132	0.83	159	75.3	E	188	341
		NWB-LLT	3	0.83	4	75.3	E	188	341	3	0.83	4	75.3	E	188	341
		SB-LLT	10	3.35	3	119.3	F	219	362	10	3.35	3	118.7	F	218	360
		SB-LT	107	3.35	32	119.3	F	219	362	107	3.35	32	118.7	F	218	360
		SB-RT	1262	0.89	1418	119.3	F	595	580	1284	0.9	1427	118.7	F	615	593
		SB-RRT	7	0.89	7.86516854	119.3	F	595	580	7	0.9	8	118.7	F	615	593

Table 3-7. Worst Case Intersection 2037 No Action and Action Alternative Traffic Conditions.

Peak Hour	Inter section	Lane Group	2037 No Action							2037 Action						
			Peak Hour Volume (vph)	V/C Ratio	Sat. Flowrate (vph)	Delay (s)	LOS	50th Queue (ft)	95th Queue (ft)	Peak Hour Volume (vph)	V/C Ratio	Sat. Flowrate (vph)	Delay	LOS	50th Queue (ft)	95th Queue (ft)
AM	Laurel Bowie Rd & Muirkirk Rd	NEB-LLT	6	1.73	3	93.4	F	515	660	6	1.73	3	92.2	F	516	663
		NEB-LT	45	1.73	26	93.4	F	515	660	45	1.73	26	92.2	F	516	663
		NEB-Th	1246	0.64	1947	93.4	F	503	480	1277	0.65	1965	92.2	F	527	484
		NEB-RT	341	0.64	533	93.4	F	503	480	341	0.65	525	92.2	F	527	484
		NWB-RRT	7	0.92	8	96.6	F	196	372	7	0.92	8	96.6	F	196	372
		NWB-RT	52	0.92	57	96.6	F	196	372	52	0.92	57	96.6	F	196	372
		NWB-LT	174	0.92	189	96.6	F	196	372	174	0.92	189	96.6	F	196	372
		NWB-LLT	14	0.92	15	96.6	F	196	372	14	0.92	15	96.6	F	196	372
		SB-LLT	4	1.09	4	249.3	F	67	60	4	1.13	4	266.6	F	67	60
		SB-LT	54	1.09	50	249.3	F	67	60	54	1.13	48	266.6	F	67	60
		SB-RT	2273	1.5	1515	249.3	F	1775	1524	2332	1.54	1514	266.6	F	1775	1524
		SB-RRT	5	1.5	3	249.3	F	1775	1524	5	1.54	3	266.6	F	1775	1524
PM	Laurel Bowie Rd & Muirkirk Rd	NEB-LLT	8	1.2	7	160	F	330	222	8	1.24	6	176.4	F	344	222
		NEB-LT	152	1.2	127	160	F	330	222	152	1.24	123	176.4	F	344	222
		NEB-Th	2403	1.33	1807	160	F	1798	1354	2476	1.37	1807	176.4	F	1880	1361
		NEB-RT	331	1.33	249	160	F	1798	1354	331	1.37	242	176.4	F	1880	1361
		NWB-RRT	19	0.83	23	75.7	E	189	343	19	0.83	23	75.7	E	189	343
		NWB-RT	93	0.83	112	75.7	E	189	343	93	0.83	112	75.7	E	189	343
		NWB-LT	133	0.83	160	75.7	E	189	343	133	0.83	160	75.7	E	189	343
		NWB-LLT	3	0.83	4	75.7	E	189	343	3	0.83	4	75.7	E	189	343
		SB-LLT	10	3.43	3	123	F	224	369	10	3.43	3	123.3	F	225	357
		SB-LT	110	3.43	32	123	F	224	369	110	3.43	32	123.3	F	225	357
		SB-RT	1311	0.92	1425	123	F	640	627	1346	0.94	1432	123.3	F	675	845
		SB-RRT	7	0.92	7.6086957	123	F	640	627	7	0.94	7	123.3	F	675	845

3.2.3 Emission Factors

The mobile source emission factors used in the CAL3QHC model for the prediction of ambient CO concentrations were estimated using the USEPA MOtor Vehicle Emission Simulator model version 3.0.3 (MOVES3.0.3) released by USEPA in 2021. Please note that NOx and VOC emission rates were generated via the same methodology for use in demonstrating General Project Conformity in Section 2.4 of this report.

MOVES calculates emission factors or emission inventories for both onroad and nonroad vehicles. In the modeling process, the vehicle types, time periods, geographical areas, pollutants, vehicle operating characteristics, and road types are specified. MOVES3.0.3 then uses this information to perform calculations reflecting the vehicle operating processes and ultimately estimate total emissions or emission rates per vehicle or unit of activity. MOVES3.0.3 contains a default database that summarizes the aforementioned relevant information for every county in the U.S. including the District of Columbia. The data contained in the MOVES default database for Washington, D.C. related to fleet characteristics and meteorology are based on recent historical data from sources including state-level environmental monitoring programs and vehicle registration databases. For this reason, the default MOVES input data employed in the generation of emissions factors for CO, NOx, VOC, and PM2.5/10 is considered appropriate for use at the project level in the absence of project-specific fleet information.

The assumptions and activity data used for this project were obtained from the national database for the District of Columbia, where the study area is located, for the existing conditions (2021), and project horizon years of 2028, 2032 and 2037 (buildout). MOVES3.0.3 was used to generate link-level grams-per-vehicle hour emission rates for CO, NOx, VOC and PM2.5/10 for the five-way intersection at North Capitol Street NW and Hawaii Avenue/ Allison Street for morning and evening peak hours. In addition, CO grams-per-vehicle-mile emission rates were generated for each free-flow departure link within the intersection of interest. MOVES3.0.3 emission rates used in each dispersion scenario are included in

Table 3-8. Link-Level CO Emission Rates for Worst Case Intersection at N. Capitol St NW & Allison St./ Hawaii Ave.

Link Number	Link Type	Link Description	Emission Factor Units	2021 AM Existing	2021 PM Existing	2028 AM Action	2028 AM No Action	2028 PM Action	2028 PM No Action	2032 AM Action	2032 AM No Action	2032 PM Action	2032 PM No Action	2037 AM Action	2037 AM No Action
1	Queue	NEB-LT	g/veh-hr	3.93E+01	3.93E+01	2.16E+01	2.16E+01	2.16E+01	2.16E+01	2.03E+01	2.03E+01	2.03E+01	2.03E+01	1.96E+01	1.96E+01
2	Queue	NEB-RT	g/veh-hr	3.93E+01	3.93E+01	2.16E+01	2.16E+01	2.16E+01	2.16E+01	2.03E+01	2.03E+01	2.03E+01	2.03E+01	1.96E+01	1.96E+01
3	Queue	NWB-RRT	g/veh-hr	3.93E+01	3.93E+01	2.16E+01	2.16E+01	2.16E+01	2.16E+01	2.03E+01	2.03E+01	2.03E+01	2.03E+01	1.96E+01	1.96E+01
4	Queue	NWB-LT	g/veh-hr	3.93E+01	3.93E+01	2.16E+01	2.16E+01	2.16E+01	2.16E+01	2.03E+01	2.03E+01	2.03E+01	2.03E+01	1.96E+01	1.96E+01
5	Queue	SB-RT	g/veh-hr	3.93E+01	3.93E+01	2.16E+01	2.16E+01	2.16E+01	2.16E+01	2.03E+01	2.03E+01	2.03E+01	2.03E+01	1.96E+01	1.96E+01
6	Free-flow	SB-Th (arr.)	g/mi	1.21E+01	1.21E+01	5.85E+00	5.85E+00	5.85E+00	5.85E+00	4.88E+00	4.88E+00	4.88E+00	4.88E+00	4.75E+00	4.75E+00
7	Free-flow	SB-Th (dep)	g/mi	1.21E+01	1.21E+01	5.85E+00	5.85E+00	5.85E+00	5.85E+00	4.88E+00	4.88E+00	4.88E+00	4.88E+00	4.75E+00	4.75E+00
8	Free-flow	NWB-RT	g/mi	1.21E+01	1.21E+01	5.85E+00	5.85E+00	5.85E+00	5.85E+00	4.88E+00	4.88E+00	4.88E+00	4.88E+00	4.75E+00	4.75E+00
9	Free-flow	NB-Th	g/mi	1.21E+01	1.21E+01	5.85E+00	5.85E+00	5.85E+00	5.85E+00	4.88E+00	4.88E+00	4.88E+00	4.88E+00	4.75E+00	4.75E+00
10	Free-flow	NEB-Th	g/mi	1.21E+01	1.21E+01	5.85E+00	5.85E+00	5.85E+00	5.85E+00	4.88E+00	4.88E+00	4.88E+00	4.88E+00	4.75E+00	4.75E+00

3.2.4 CAL3QHC Analysis

The CAL3QHC program requires modeling roadways as segments known as links. Links can be either free-flow links for vehicles moving at a constant speed or queue links for idling vehicles. Each can be one of four types of links based on the roadway geometry – at-grade, fill, bridge, or depressed. A free-flow link is defined as a straight segment of roadway having a constant width, height, traffic volume, travel speed, and vehicle emission factor. The required inputs for free-flow links are the endpoints, traffic volume, the emission factor, source height, and mixing zone width. A queue link is defined as a straight segment of roadway with a constant width and emission source strength, where vehicles are idling for a specified time period. Required inputs for queue links are the endpoints, approach traffic volume, emission factor, average cycle length, average red time length, number of travel lanes (i.e. source width), clearance lost time, source height, signal type (pre-timed, actuated, or semi-actuated), and arrival rate. CAL3QHC receptor descriptions and model inputs are summarized in Tables 3-9 and 3-10, respectively.

Table 3-9. CAL3QHC Receptor Descriptions and Locations

Receptor Number	Receptor Type	Description	Easting X (m)	Northing Y (m)	Height[1] (m)	Zone
1	Discrete	Immediately NW of Intersection at Pedestrian Stop between Southbound North Capitol Street and Allison Street.	326001	4312740	1.8	18S
2	Discrete	West of West Capitol Street, North of Intersection.	325976	4312767	1.8	18S
3	Discrete	Immediately East of Capitol Street, North of the Intersection.	325996	4312784	1.8	18S
4	Discrete	Immediately NE of Intersection at Pedestrian Stop between Northbound Capitol Street and Allison Street.	326031	4312752	1.8	18S
5	Discrete	Immediately W of Intersection at Ped Stop between Allison Street and Hawaii Avenue.	326045	4312738	1.8	18S
6	Discrete	East of NB Hawaii Avenue, Southeast of Intersection.	326092	4312695	1.8	18S
7	Discrete	Immediately S of Intersection at Ped Stop between Northbound North Capitol Street and Southbound Hawaii Street.	326037	4312719	1.8	18S
8	Discrete	East of Northbound Capitol Street, South of Intersection.	326035	4312668	1.8	18S

Receptor Number	Receptor Type	Description	Easting X (m)	Northing Y (m)	Height[1] (m)	Zone
9	Discrete	Immediately SW of Intersection at Pedestrian Stop, between Allison Street and Southbound North Capitol Street.	326008	4312723	1.8	18S
10	Discrete	South of Allison Street, West of the Intersection.	325979	4312706	1.8	18S
11	Discrete	North of Allison Street, West of the Intersection.	325971	4312729	1.8	18S
12	Discrete	South of Allison Street, East of the Intersection.	326080	4312755	1.8	18S
13	Discrete	North of Allison Street, East of the Intersection.	326073	4312769	1.8	18S

[1] Receptor heights set to 1.8 meters to simulate the approximate point of entry to the human respiratory tract with respect to ground level i.e., average human height.

Table 3-10. CAL3QHC Input Assumption Summary, N. Capitol Street, NW & Hawaii Ave./ Allison St. Intersection Approaches

Input Variable	NB North Capitol Street	NB Hawaii Avenue	SB North Capitol Street
Averaging Time	60 minutes		
1-Hour CO Background	1.70 ppm		
8-Hour CO Background	1.53 ppm		
Surface Roughness	0.001 meters		
Settling & Deposition Velocity	0.0 m/s		
Source Height (tailpipe release point)	0.25 meters		
Signal Type	Pretimed (“3” in CAL3QHC Input File)	Pretimed (“3” in CAL3QHC Input File)	Pretimed (“3” in CAL3QHC Input File)
Average Cycle Length2021	150 seconds		
Average Red Phase Length – AM Peak	123 seconds	71 seconds	71 seconds
Average Red Phase Length – PM Peak	119 seconds	77 seconds	77 seconds

Input Variable	NB North Capitol Street	NB Hawaii Avenue	SB North Capitol Street
Lost Time for Clearance of Intersection	1.5 seconds		
Arrival Rate	Average ("3" in CAL3QHC Input File)		
Wind Speed	1.0 m/s		
Atmospheric Stability Class	D ("4" in CAL3QHC Input File)		
Mixing Height	1000 meters		
Multiple Wind Directions Employed?	Yes		
Wind Direction Increment Angle	10°		

3.2.5 Analysis Results

Table 3-7 presents the results of the 1-hour and 8-hour CO analysis at the "worst case" intersection of North Capitol St., NW, and Hawaii Ave./ Allison St. The table presents the receptor number and location where the predicted maximum CO concentrations occurred for each of the ten scenarios examined: Morning and evening peak hours for 2021 (existing conditions), 2028, 2032 and 2040 Action Alternatives. The CAL3QHC modeling results indicate that the predicted maximum CO concentrations for the Action Alternative would result in no exceedances of the NAAQS for CO, which is 35 ppm for the 1-hour standard and 9.0 ppm for the 8-hour standard. Under the Action Alternatives examined, there would be no exceedances of the CO 1-hour and 8-hour NAAQS.

Table 3-11. CAL3QHC Analysis Results for Each Modeled Scenario

Model Scenario	Receptor Location Description	Location of Highest Receptor		Receptor CO Concentration (ppm)	1 Hr CO Background (ppm)	CO 1 Hour NAAQS (ppm)	In Compliance with 1 Hour CO NAAQS?	8 Hr CO Background (ppm)	CO 8 Hour NAAQS (ppm)	In Compliance with 8 Hour CO NAAQS[1]
		Easting X (m)	Northing Y (m)							
2021 Existing AM Peak	Immediately NW of Intersection at Ped Stop between Southbound North Capitol Street and Allison Street.	326031	4312752	0.9	1.7	35	Yes	1.53	9.0	Yes
2021 Existing PM Peak	West of West Capitol Street, North of Intersection.	326031	4312752	0.9	1.7	35	Yes	1.53	9.0	Yes
2028 No Action AM	Immediately East of Capitol Street, North of the Intersection.	326037	4312719	0.5	1.7	35	Yes	1.53	9.0	Yes
2028 No Action PM	Immediately NE of Intersection at Ped Stop between Northbound Capitol Street and Allison Street.	326037	4312719	0.5	1.7	35	Yes	1.53	9.0	Yes
2028 Action AM	Immediately W of Intersection at Ped Stop between Allison Street and Hawaii Avenue.	326037	4312719	0.5	1.7	35	Yes	1.53	9.0	Yes
2028 Action PM	East of NB Hawaii Avenue, Southeast of Intersection.	326037	4312719	0.5	1.7	35	Yes	1.53	9.0	Yes
2032 No Action AM	Immediately S of Intersection at Ped Stop between Northbound North Capitol Street and Southbound Hawaii Street.	326037	4312719	0.5	1.7	35	Yes	1.53	9.0	Yes
2032 No Action PM	East of Northbound Capitol Street, South of Intersection.	326037	4312719	0.5	1.7	35	Yes	1.53	9.0	Yes
2032 Action AM	Immediately SW of Intersection at Ped Stop, between Allison Street and Southbound North Capitol Street.	326035	4312668	1	1.7	35	Yes	1.53	9.0	Yes
2032 Action PM	South of Allison Street, West of the Intersection.	326035	4312668	0.7	1.7	35	Yes	1.53	9.0	Yes
2037 No Action AM	North of Allison Street, West of the Intersection.	326035	4312668	0.5	1.7	35	Yes	1.53	9.0	Yes
2037 No Action PM	South of Allison Street, East of the Intersection.	326035	4312668	0.7	1.7	35	Yes	1.53	9.0	Yes
2037 Action AM	North of Allison Street, East of the Intersection.	326035	4312668	0.5	1.7	35	Yes	1.53	9.0	Yes
2370 Action PM	Immediately NW of Intersection at Ped Stop between Southbound North Capitol Street and Allison Street.	325996	4312784	0.8	1.7	35	Yes	1.53	9.0	Yes

[1] Assumed persistence factor of 0.7 as per FHWA default.

3.2.6 Fine Particulate Matter (PM2.5)

The Washington DC-MD-VA Region is currently in attainment of the NAAQS for PM2.5. A maintenance plan was prepared in May 2013, and a project hot spot analysis is required for all qualifying projects located within non-attainment and maintenance areas. Projects that require hot spot analysis for $PM_{2.5}$ (i.e., qualifying projects) are those projects that are Projects of Air Quality Concern as defined in 40 CFR 93.123(b)(1) and restated below:

- New or expanded highway projects that have a significant number of or significant increase in diesel-fueled traffic;
- Projects affecting intersections that are at Level-of-Service D, E, or F with a significant number of diesel vehicles, or those that will change to Level-of-Service D, E, or F because of increased traffic volumes from a significant number of diesel vehicles related to the project;
- New bus and rail terminals and transfer points that have a significant number of diesel vehicles congregating at a single location;
- Expanded bus and rail terminals and transfer points that significantly increase the number of diesel vehicles congregating at a single location; and
- Projects in or affecting locations, areas, or categories of sites which are identified in the PM_{10} or $PM_{2.5}$ applicable implementation plan or implementation plan submission, as appropriate, as sites of violation or possible violation.

The following analysis concerning $PM_{2.5}$ has been developed for the Proposed Action:

- The Proposed Action does not meet the criteria set forth in 40 CFR 93.123(b)(1) as amended to be considered a Project of Air Quality Concern primarily because the Proposed Action does not include improvements to project area roadways or highways, and vehicles added to area roadways would primarily be commuter-style gasoline-fueled vehicles rather than diesel powered vehicles.
- The Proposed Action does not have a significant increase in diesel vehicles due to construction of the project. In accordance with FHWA guidance, "*40 CFR 93.123(b)(1)(i) should be interpreted as applying only to projects that would involve a significant increase in the number of diesel transit busses and diesel trucks on the facility*". The percent of trucks is not expected to change between any of the Master Plan Alternatives.

Based on the preceding review and analysis, the Proposed Action fulfills the requirements of the CAA and 40 CFR 93.109. These requirements are met for particulate matter without a project level hot-spot analysis since the project has not been found to be a Project of Air Quality Concern as defined by 40 CFR 93.123(b)(1). Since the project meets the CAA and 40 CFR 93.109 requirements, the project will not cause or contribute to a new violation of the PM2.5 NAAQS or increase the frequency or severity of a violation.

3.2.7 Mobile Source Air Toxic (MSAT) Analysis

The Federal Highway Administration (FHWA) Interim Guidance on Air Toxic Analysis in NEPA Documents requires analysis of MSATs under specific conditions (FHWA, 2016). The following language is taken from this guidance. The USEPA has designated nine prioritized MSATs, which are known or probable carcinogens or can cause chronic respiratory effects. These prioritized MSATs are: *1,3-butadiene, acetaldehyde, acrolein, benzene, diesel particulate matter (diesel PM), ethylbenzene, formaldehyde, naphthalene, and polycyclic organic matter*. The Proposed Action would slightly increase capacity on local roadways, but is not likely to meaningfully increase emissions of air pollutants. Therefore, the project would be considered a Project with Low Potential MSAT Effects as defined by the FHWA.

This qualitative assessment was prepared in accordance with the FHWA Updated Interim Guidance on Mobile Source Air Toxic Analysis (FHWA, 2021). FHWA guidance provides specific language to use for Projects with Low Potential MSAT effects which is used here, amended with project specific data.

A qualitative analysis provides a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the various project alternatives. The qualitative assessment presented herein is derived, in part, from a study conducted by FHWA entitled A Methodology for Evaluating Mobile Source Air Toxic Emissions Among Transportation Project Alternatives (FHWA, 2021a).

3.2.7.1 MSAT Exposure Levels and Health Effects

Shortcomings in current techniques for exposure assessment and risk analysis preclude reaching meaningful conclusions about project-specific health impacts. Exposure assessments are difficult because it is difficult to accurately calculate annual concentrations of MSATs near roadways, and to determine the portion of a year that people are actually exposed to those concentrations at any specific location.

These difficulties are magnified for 70-year cancer assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affect emissions rates) over a 70-year period. There are also considerable uncertainties associated with the existing estimates of toxicity of the various MSATs, because of factors such as low-dose extrapolation and translation of occupational exposure data to the general population. Because of these shortcomings, any calculated difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with calculating the impacts. Consequently, the results of such assessments would not be useful to decision-makers, who would need to weigh this information against other project impacts that are better suited for quantitative analysis.

Research into the health impacts of MSAT is ongoing. For the different MSAT emission types, there are a variety of studies that show that some either are statistically associated with adverse health outcomes through epidemiological studies (frequently based on emissions levels found in occupational settings) or that animals demonstrate adverse health outcomes when exposed to large doses. Exposure to toxics has been a focus of a number of USEPA efforts. Most notably, the agency conducted the National Air Toxics Assessment (NATA) in 2014 to evaluate modeled estimates of human exposure applicable to the county level. While not intended for use as a measure of or benchmark for local exposure, the modeled estimates in the NATA database best illustrate the levels of various toxics when aggregated to a national or state level. The USEPA is engaged in ongoing research into the risks of various kinds of exposures to these pollutants.

The USEPA Integrated Risk Information System (IRIS) is a database of human health effects that may result from exposure to various substances found in the environment (USEPA, 2021a). The following toxicity information for the nine prioritized MSATs was taken from the IRIS toxic chemical assessment database. This information represents the Agency's most current evaluations of the potential hazards and toxicology of these chemicals or mixtures.

- **1,3-butadiene** is characterized as carcinogenic to humans by inhalation.
- **Acetaldehyde** is a probable human carcinogen based on sufficient evidence of carcinogenicity in animals.
- **Benzene** is characterized as a known human carcinogen.
- The potential carcinogenicity of **acrolein** cannot be confidently determined because the existing data are inadequate for an assessment of human carcinogenic potential for either the oral or inhalation route of exposure.
- **Diesel exhaust (DE)** is likely to be carcinogenic to humans by inhalation from environmental exposures. Diesel exhaust as reviewed in this document is defined as the diesel tailpipe organic gases from crankcase and running exhaust. Diesel exhaust is also a suspected contributor to chronic respiratory effects, possibly the primary noncancer hazard from MSATs. Prolonged exposures may impair pulmonary function and could produce symptoms, such as cough, phlegm, and chronic bronchitis. Exposure relationships have not been developed from these studies.
- The potential carcinogenicity of **ethylbenzene** cannot be confidently determined at this time as USEPA suspended assessment of this pollutant in December 2018 prior to obtaining adequate data for assessment.
- **Formaldehyde** is a possible human carcinogen, based on limited evidence in humans and animals.
- **Naphthalene** is a probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals.
- The potential carcinogenicity of **polycyclic organic matter (POM)** cannot be confidently determined at this time as USEPA suspended assessment of this pollutant in December 2018 prior to obtaining adequate data for assessment.

There have been other studies that address MSAT health impacts in proximity to roadways. The Health Effects Institute, a non-profit organization funded by USEPA, FHWA, and industry, has undertaken a major series of studies to research near-roadway MSAT hot spots, the health implications of the entire mix of mobile source pollutants, and other topics. The final summary of the series is not expected for several years at the time of this writing. Some recent studies have reported that proximity to roadways is related to adverse health outcomes -- particularly respiratory problems. Much of this research is not specific to MSATs, instead surveying the full spectrum of both criteria and toxic/ potentially toxic pollutants. The FHWA cannot evaluate the validity of these studies, but more importantly, they do not provide information that would be useful to alleviate the uncertainties listed above and enable us to perform a more comprehensive evaluation of the health impacts specific to this project.

3.2.7.2 Incomplete or Unavailable Information for Project-Specific MSAT Health Impact Analysis

In FHWA's view, information is incomplete or unavailable to credibly predict the project-specific health impacts due to changes in mobile source air toxic MSAT emissions associated with a proposed set of project alternatives. The outcome of such an assessment, adverse or not, would be influenced more by the uncertainty introduced into the process through assumption and speculation rather than any genuine insight into the actual health impacts directly attributable to MSAT exposure associated with a proposed action.

The USEPA is responsible for protecting the public health and welfare from any known or anticipated effect of an air pollutant. They are the lead authority for administering the Clean Air Act and its amendments and have specific statutory obligations with respect to hazardous air pollutants and MSAT. The USEPA is in the continual process of assessing human health effects, exposures, and risks posed by air pollutants. As previously discussed, USEPA maintains the IRIS, which is "a compilation of electronic reports on specific substances found in the environment and their potential to cause human health effects" (USEPA, Integrated Risk Information System). Each report contains assessments of non-cancerous and cancerous effects for individual compounds and quantitative estimates of risk levels from lifetime oral and inhalation exposures with uncertainty spanning perhaps an order of magnitude.

Other organizations are also active in the research and analyses of the human health effects of MSAT, including the Health Effects Institute (HEI). A number of HEI studies are summarized in Appendix D of FHWA's Updated Interim Guidance on Mobile Source Air Toxic Analysis in NEPA Documents. Among the adverse health effects linked to MSAT compounds at high exposures are: cancer in humans in occupational settings; cancer in animals; and irritation to the respiratory tract, including the exacerbation of asthma. Less obvious is the adverse human health effects of MSAT compounds at current environmental concentrations (*HEI Special Report 16, Mobile-Source Air Toxics: A Critical Review of the Literature on Exposure and Health Effects*) or in the future as vehicle emissions substantially decrease.

The methodologies for forecasting health impacts include emissions modeling; dispersion modeling; exposure modeling; and then final determination of health impacts – each step in the process building on the model predictions obtained in the previous step. All are encumbered by technical shortcomings or uncertain science that prevents a more complete differentiation of the MSAT health impacts among a set of project alternatives. As previously mentioned, these difficulties are magnified for lifetime (i.e., 70 year) assessments, particularly because unsupportable assumptions would have to be made regarding changes in travel patterns and vehicle technology (which affects emissions rates) over that time frame, since such information is unavailable. It is particularly difficult to reliably forecast 70-year lifetime MSAT concentrations and exposure near roadways; to determine the portion of time that people are actually exposed at a specific location; and to establish the extent attributable to a proposed action, especially given that some of the information needed is unavailable.

There is also lack of a national consensus on an acceptable level of risk. The current context is the process used by the USEPA as allowed by the Clean Air Act and its Amendments in 1990 to determine whether more stringent controls are required in order to provide an ample margin of safety to protect public health or to prevent an adverse environmental effect for industrial sources subject to the maximum achievable control technology standards, such as benzene emissions from refineries. The decision framework is a two-step process. The first step requires USEPA to determine an “acceptable” level of risk due to emissions from a source, which is generally no greater than approximately 100 in a million. Additional factors are considered in the second step, the goal of which is to maximize the number of people with risks less than 1 in a million due to emissions from a source. The results of this statutory two-step process do not guarantee that cancer risks from exposure to air toxics are less than 1 in a million; in some cases, the residual risk determination could result in maximum individual cancer risks that are as high as approximately 100 in a million. In a June 2008 decision, the U.S. Court of Appeals for the District of Columbia Circuit upheld USEPA’s approach to addressing risk in its two-step decision framework. Information required to establish that even the largest of highway projects would result in levels of risk greater than deemed acceptable is incomplete or unavailable (Source: Integrated Risk Information System - Diesel engine exhaust).

Because of the limitations in the methodologies for forecasting health impacts described, any predicted difference in health impacts between alternatives is likely to be much smaller than the uncertainties associated with predicting the impacts. Consequently, the results of such assessments would not be useful to decision makers, who would need to weigh this information against project benefits, such as reducing traffic congestion, accident rates, and fatalities plus improved access for emergency response, that are better suited for quantitative analysis.

3.2.7.3 Relevance of Unavailable or Incomplete Information to Evaluating Reasonably Foreseeable Significant Adverse Impacts on the Environment, and Evaluation of Impacts Based Upon Theoretical Approaches or Research Methods Generally Accepted in the Scientific Community

Because of the uncertainties outlined in Section 3.2.7.2, a quantitative assessment of the effects of air toxic emissions impacts on human health cannot be made at the project level. While available tools do allow us to reasonably predict relative emissions changes between alternatives for larger projects, the amount of MSAT emissions from each of the project alternatives and MSAT concentrations or exposures created by each of the project alternatives cannot be predicted with enough accuracy to be useful in estimating health impacts. (As noted above, the current emissions model is not capable of serving as a meaningful emissions analysis tool for smaller projects.) Therefore, the relevance of the unavailable or incomplete information is that it is not possible to decide whether any of the alternatives would have "significant adverse impacts on the human environment."

3.2.7.4 Project Specific MSAT Discussion

As discussed above, technical shortcomings of emissions and dispersion models and uncertain science with respect to health effects prevent meaningful or reliable estimates of MSAT emissions and effects of this project. However, even though reliable methods do not exist to accurately estimate the health impacts of MSAT at the project level, it is possible to qualitatively assess the levels of future MSAT emissions under the project. Although a qualitative analysis cannot identify and measure health impacts from MSAT, it can give a basis for identifying and comparing the potential differences among MSAT emissions, if any, from the proposed Action Alternatives.

This AFRH-W project falls into the category of a project that facilitates new development that may generate additional MSAT emissions from new trips, truck deliveries, and parked vehicles. Many of these activities will be attracted from elsewhere in the Washington, D.C. metropolitan region. Thus, on a regional scale, there will be a minimal net change in emissions. Moreover, USEPA regulations for vehicle engines and fuels will cause overall MSATs to decline significantly by this project’s 2037 buildout year.

Based on regulations that, at the time of this report, have been promulgated at the federal level, an analysis of national trends with USEPA’s MOVES2014a model (previous MOVES model version) forecasts a combined reduction of over 90 percent in the total combined annual emissions rate for the priority MSAT between 2010 and 2050 while vehicle-miles of travel are projected to increase by over 45 percent during the same time period. This will both reduce the background level of MSAT as well as the possibility of even slightly elevated MSAT emissions from this project in the near-term.

3.3 STATIONARY SOURCE ANALYSIS

Development of the AFRH-W under the three Alternatives (Existing, Alternative 2 and Alternative 3) would increase air pollutant emissions and other on-site facilities to accommodate projected demands. Currently, AFRH-W includes 1,717,239 gsf of building space housing institutional and residential facilities. Under Action Alternative 2, the AFRH-W would be developed to include approximately 4,801,083 gsf in additional building space. Alternative 3, the preferred alternative, would add approximately 5,304,075 gsf of residential, retail, and institutional space.

Based on the projected square footage of the proposed buildings for each alternative, the climate zone of Maryland and assumed new insulation/windows, the estimated heating capacity was calculated.

The stationary source analyses also include a New Source Review Applicability, potential greenhouses gas emissions and construction impacts. The analyses considered current emissions from point sources on the AFRH-W, such as boilers, generators, and natural gas-fired space heaters. New sources include additional natural gas heaters for the new buildings and fugitive dust emissions from the construction.

3.3.1 Emissions Calculations

Current stationary emissions are sourced from several engines permitted by the AFRH-W Title V Air Permit Number 017-R3-A1. A detailed description of each engine is included in Table 17. All generators are used for backup power and are assumed to operate no more than 100 hour/year each. All permitted generators range in age from model/ manufacture year 1998 to 2018 and were all installed within one year of the date of manufacture.

Proposed new air emission sources are the expected natural gas usage for heating in the newly constructed buildings and the worst-case construction related fugitive dust emissions amongst the three alternatives discussed above. The table below outlines the total emissions of existing site conditions and both Alternatives. It should also be noted that dispersion modeling of the proposed stationary sources was not conducted because the new natural gas heaters emissions are minimal and are not expected to cause a NAAQS exceedance.

Table 3-12. Stationary Source Emissions

Pollutants	Existing Conditions 2021 Ton/yr*	Alternative 2 Ton/yr**	Alternative 3 (Preferred) Ton/yr
NO_x	23.2	82.79	14.35
VOC	1.28	4.55	0.59
$PM_{2.5/10}$	1.77	6.29	0.76
Fugitive $PM_{2.5}$	N/A	18.11	18.11
Fugitive PM_{10}	N/A	18.11	18.11
CO	19.51	69.54	75.26
SO_2	0.15	0.50	0.54
GHG	25,122	89,520	96,877

* Note that the greenhouse gas value is in metric tons per year.

** The total natural fuel consumption is based on the assumed square footage for each alternative. This provides a conservative, worst case scenario, the heaters are assumed to operate during three seasons i.e. nine months per year. Fugitive construction emissions are based on the worst case disturbed area of 77.0 acres and 75% control via water sprays.

3.3.2 New Source Review Applicability

The purpose of New Source Review (NSR) Analysis is to determine whether any of the Action Alternatives would be considered a new source of emissions. The proposed emission sources of fugitive dust are not beholden to any NSR requirements. Secondly, the proposed natural gas heaters are operated in a manner similar to boilers. Therefore, 40 CFR Part 60, Subparts Db and Dc were reviewed. As illustrated above, the expected maximum heat rating of *all* potential heaters combined would be approximately 77.28 MMBtu/hr. Therefore, subpart Db does not apply because units of greater than 100 MMBtu/hr are subject. Secondly, the likelihood of one unit being greater than 10 MMBtu/hr is very minimal because there will be dozens of buildings constructed during each phase of the project. Therefore, it is expected that none of the proposed heaters will be greater than 10 MMBtu/hr. As a result, Subpart Dc is not applicable either.

It should be noted that all current and proposed generators are subject to 40 CFR Part 60, Subpart IIII or 40 CFR Part 63, Subpart ZZZZ, where applicable. Detailed descriptions of emergency and non-emergency generators that are included in AFRH-W Title V Permit 017-R3-A1 are provided in Table 17. The current Title V Permit was issued by the USEPA on September 9, 2021.

Table 3-13 Significant Emission Units included in AFRH-W Title V Air Permit

Significant Emission Units Permitted by AFRH W Title V Permit 017 R3 A1				
Emission Unit ID	**Stack ID**	**Emission Unit Name**	**Description**	**Applicable Regulations**
B5	BB5	Building – Sheridan	500 kWe Katolight emergency generator set powered by a 750 hp diesel-fired engine, Model D500FRX4 (manf. Dec. 1998, inst. 1999)	40 CFR 63 Subpart ZZZZ, DCMR 500.2
B13	BB13	Scott Generator #1	725 kWe emergency generator set powered by an 895 kWm/1200 hp natural gas-fired engine (manf. June 2012, inst. 2013)	40 CFR 60 Subpart JJJJ, 20 DCMR 201
B14	BB14	Scott Generator #2	725 kWe emergency generator set powered by an 895 kWm/1200 hp natural gas-fired engine (manf. June 2012, inst. 2013)	40 CFR 60 Subpart JJJJ, 20 DCMR 201
B15	B15	Eagle Gate	10 kWe emergency generator set powered by a 15 hp natural gas-fired engine (inst. 2018)	40 CFR 60 Subpart JJJJ, DCMR: 201, 501, 502.1, 606.1, 903.1, 805.1,

B11	BB11	Building – Sherman	50 kWe Kohler emergency generator set powered by an 80 kWm/107 hp diesel-fired engine, Model 50RE0ZJC (manf. Nov 2001, inst. 2007)	40 CFR 63 Subpart ZZZZ, DCMR 500.2
B12	BB12	Building - Security	25 kWe Katolight emergency generator set powered by a 45 kWm/60 hp diesel-fired engine, Model D25FPP4 (manf. July 1997, inst. 1997)	40 CFR 63 Subpart ZZZZ, DCMR 500.2
C24	-	-	One 300-gallon gasoline storage tank subject to Stage I vapor recovery requirements	40 CFR 63 CCCCCC, 20 DCMR: 201, 704 and 1408.1

3.3.3 Construction Impacts

Air quality may be temporarily impacted by construction activities during Phases 1 through 4 of the selected Alternative, Amendment 2. In each Phase, Fugitive dust would be generated during site grading, construction, wind erosion, and vehicular activities. Emissions from construction equipment including earth-moving equipment, demolition equipment, and paving equipment, would generate criteria pollutants and hazardous pollutants. The intensity, duration, location, and type of construction activity would vary over time. These impacts could be considered significant, even on a temporary basis, if the local construction regulations and best management practice (BMP) control measures are not implemented. AFRH-W would comply with BMPs outlined in the District regulations during construction, ensuring that there would be minimal temporary construction-related impacts.

3.3.4 Indirect and Cumulative Impacts

Air pollutant emissions associated with the development on the AFRH-W are not anticipated to affect the overall health, welfare, or financial base of the communities within the vicinity of the campus. Therefore, no indirect impacts to air quality would occur under the development alternatives.

Past, present, and future development within the Washington, DC metropolitan region would continue to produce additional traffic and new emission sources, which would cumulatively affect air quality. Development of any of the Proposed Action Alternatives would result in additional emissions. However, newer vehicles and building mechanical equipment operate with cleaner systems reducing overall emissions and the potential effect new sources of emissions would have on air quality.

4.0 REFERENCES

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