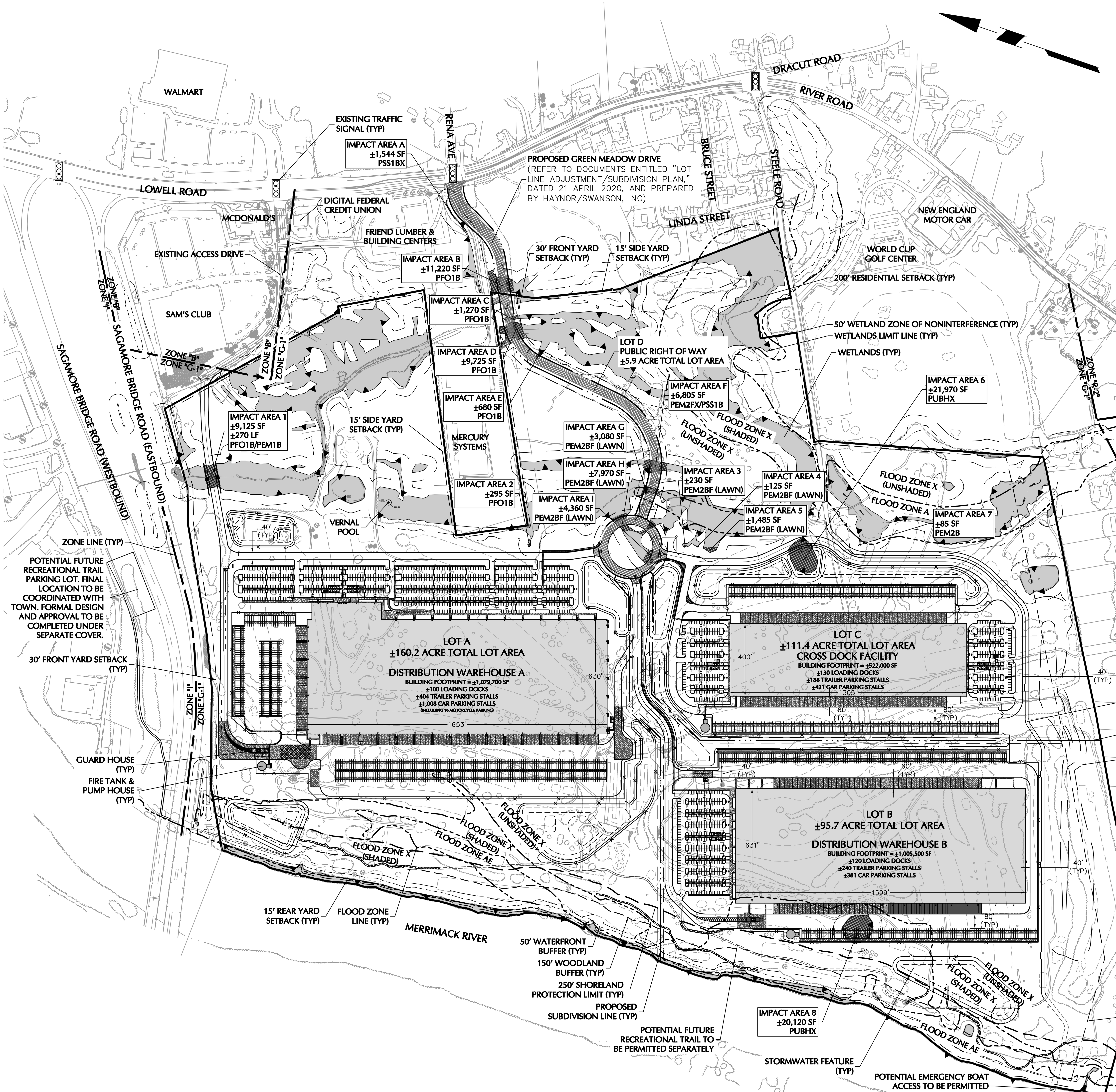


DIMENSIONAL REQUIREMENTS (LOT A)

REFERENCE: TOWN OF HUDSON ZONING ORDINANCE & LAND USE REGULATIONS (LAST REVISED 10/2015)

ZONE: GENERAL 1 (G–1) WITH GREEN MEADOW GOLF CLUB OVERLAY AND BUSINESS (B)
PROPOSED USE: DISTRIBUTION WAREHOUSE (PERMITTED)

ITEM	REQUIRED	PROPOSED	SECTION
LOT/BUILDING			
MINIMUM LOT AREA	2 AC	±160.2 AC	334 ATCH. 4
MINIMUM OPEN SPACE [1]	40%	±61%	276–11.1B(24)(b)
MAXIMUM BUILDING HEIGHT	50 FT	<50 FT	334–14.A
MINIMUM LOT FRONTAGE	200 LF	±2,150 LF	334 ATCH. 4
MINIMUM FRONT YARD SETBACK [2]	30 FT	±250 FT	334 ATCH. 4
MINIMUM SIDE YARD SETBACK [2]	15 FT	±120 FT	334 ATCH. 4
MINIMUM REAR YARD SETBACK [2]	15 FT	±730 FT	334 ATCH. 4
MINIMUM RESIDENTIAL ZONE SETBACK [2]	200 FT	N/A	276–11.1B(12)(a)
PARKING			
MINIMUM PARKING STALL COUNT	AS REQUIRED BY THE PLANNING BOARD	±1,008	275–8.C(2)
MINIMUM PARKING STALL DIMENSIONS [3]	10 FT X 20 FT	9 FT X 18 FT	275–8.C(4)
MINIMUM DRIVE AISLE WIDTH	24 FT	24 FT	275–8.C(5)(a)

DIMENSIONAL REQUIREMENTS (LOT B)

REFERENCE: TOWN OF HUDSON ZONING ORDINANCE & LAND USE REGULATIONS (LAST REVISED 10/2015)

ZONE: GENERAL 1 (G–1) WITH GREEN MEADOW GOLF CLUB OVERLAY
PROPOSED USE: DISTRIBUTION WAREHOUSE (PERMITTED)

ITEM	REQUIRED	PROPOSED	SECTION
LOT/BUILDING			
MINIMUM LOT AREA	2 AC	±95.7 AC	334 ATCH. 4
MINIMUM OPEN SPACE [1]	40%	±50%	276–11.1B(24)(b)
MAXIMUM BUILDING HEIGHT	50 FT	<50 FT	334–14.A
MINIMUM LOT FRONTAGE	200 LF	±200 LF	334 ATCH. 4
MINIMUM FRONT YARD SETBACK [2]	30 FT	±1,276 FT	334 ATCH. 4
MINIMUM SIDE YARD SETBACK [2]	15 FT	±410 FT	334 ATCH. 4
MINIMUM REAR YARD SETBACK [2]	15 FT	±400 FT	334 ATCH. 4
MINIMUM RESIDENTIAL ZONE SETBACK [2]	200 FT	±450 FT	276–11.1B(12)(a)
PARKING			
MINIMUM PARKING STALL COUNT	AS REQUIRED BY THE PLANNING BOARD	±381	275–8.C(2)
MINIMUM PARKING STALL DIMENSIONS [3]	10 FT X 20 FT	9 FT X 18 FT	275–8.C(4)
MINIMUM DRIVE AISLE WIDTH	24 FT	24 FT	275–8.C(5)(a)

DIMENSIONAL REQUIREMENTS (LOT C)

REFERENCE: TOWN OF HUDSON ZONING ORDINANCE & LAND USE REGULATIONS (LAST REVISED 10/2015)

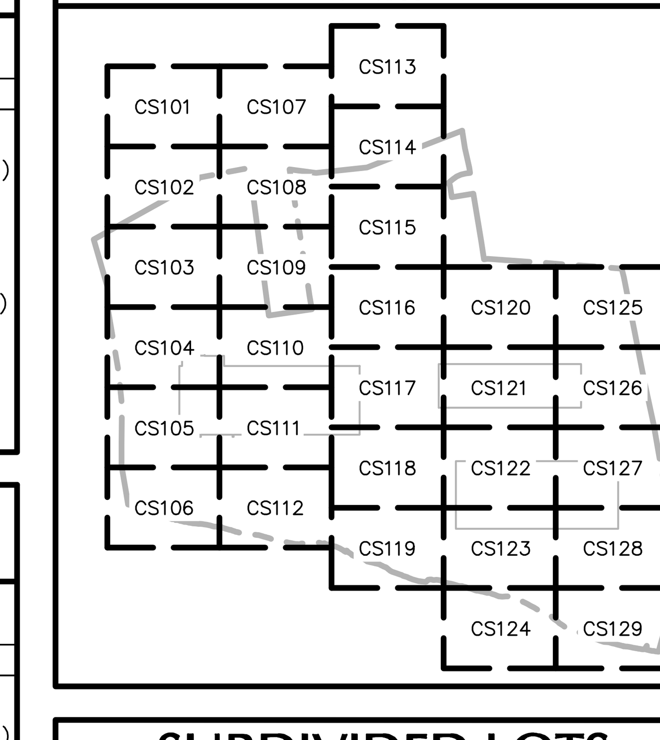
ZONE: GENERAL 1 (G–1) WITH GREEN MEADOW GOLF CLUB OVERLAY
PROPOSED USE: DISTRIBUTION WAREHOUSE (PERMITTED)

ITEM	REQUIRED	PROPOSED	SECTION
LOT/BUILDING			
MINIMUM LOT AREA	2 AC	±111.4 AC	334 ATCH. 4
MINIMUM OPEN SPACE [1]	40%	±67%	276–11.1B(24)(b)
MAXIMUM BUILDING HEIGHT	50 FT	<50 FT	334–14.A
MINIMUM LOT FRONTAGE	200 LF	±2,000 LF	334 ATCH. 4
MINIMUM FRONT YARD SETBACK [2]	30 FT	±515 FT	334 ATCH. 4
MINIMUM SIDE YARD SETBACK [2]	15 FT	±275 FT	334 ATCH. 4
MINIMUM REAR YARD SETBACK [2]	15 FT	±590 FT	334 ATCH. 4
MINIMUM RESIDENTIAL ZONE SETBACK [2]	200 FT	±590 FT	276–11.1B(12)(a)
PARKING			
MINIMUM PARKING STALL COUNT	AS REQUIRED BY THE PLANNING BOARD	±421	275–8.C(2)
MINIMUM PARKING STALL DIMENSIONS [3]	10 FT X 20 FT	9 FT X 18 FT	275–8.C(4)
MINIMUM DRIVE AISLE WIDTH	24 FT	24 FT	275–8.C(5)(a)

NOTES:
1. PER SECT. 276–11.1B(24), OPEN SPACE IS DEFINED AS "GRASSED, TREED, LANDSCAPED, OR NATURAL GROWTH AREAS DESIGNATED FOR NO ACTIVITY ASSOCIATED WITH THE NONRESIDENTIAL USE PROPOSED; THERE MUST BE REASONABLE OPEN SPACE NEAR OR ADJACENT TO EACH BUILDING OR STRUCTURE, INCLUDING PAVEMENT, AS DETERMINED BY THE PLANNING BOARD."
2. PER SECT. 276–11.1B(12), NO BUILDINGS, PARKING, OR DISPLAY AREAS MAY BE LOCATED IN THE SETBACK.
3. PER SECT. 275–8.C(4), 9FT X 18 FT PARKING STALLS ALLOWED WITH PLANNING BOARD VOTE.

SHEET LEGEND

1"=1500'



SUBDIVIDED LOTS

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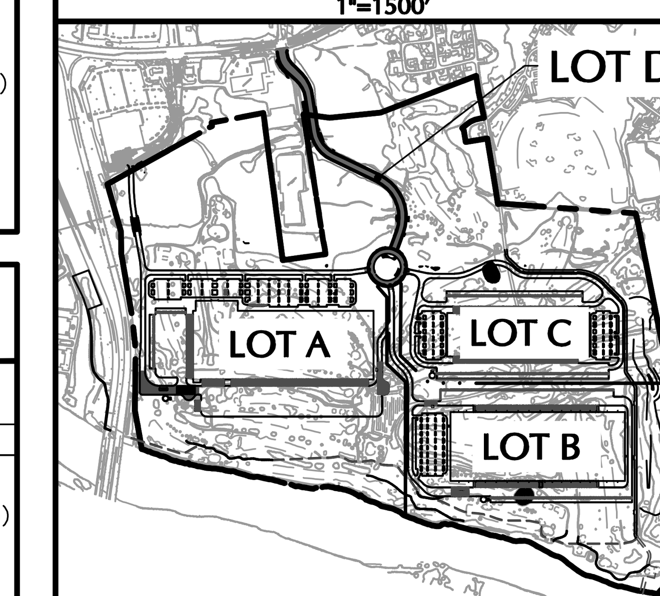

Date	Description	No.
07/13/20	COMMENT RESPONSE	1

Revisions

LANGAN

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Project

HUDSON LOGISTICS CENTER

MAP No. 239, LOT No. 1

HUDSON NEW HAMPSHIRE

Drawing Title

OVERALL SITE PLAN

Project No.	Drawing No.
151010101	CS100
Date: 04-21-2020	
Drawn By: CLR	
Checked By: NLK	Sheet 4 of 157

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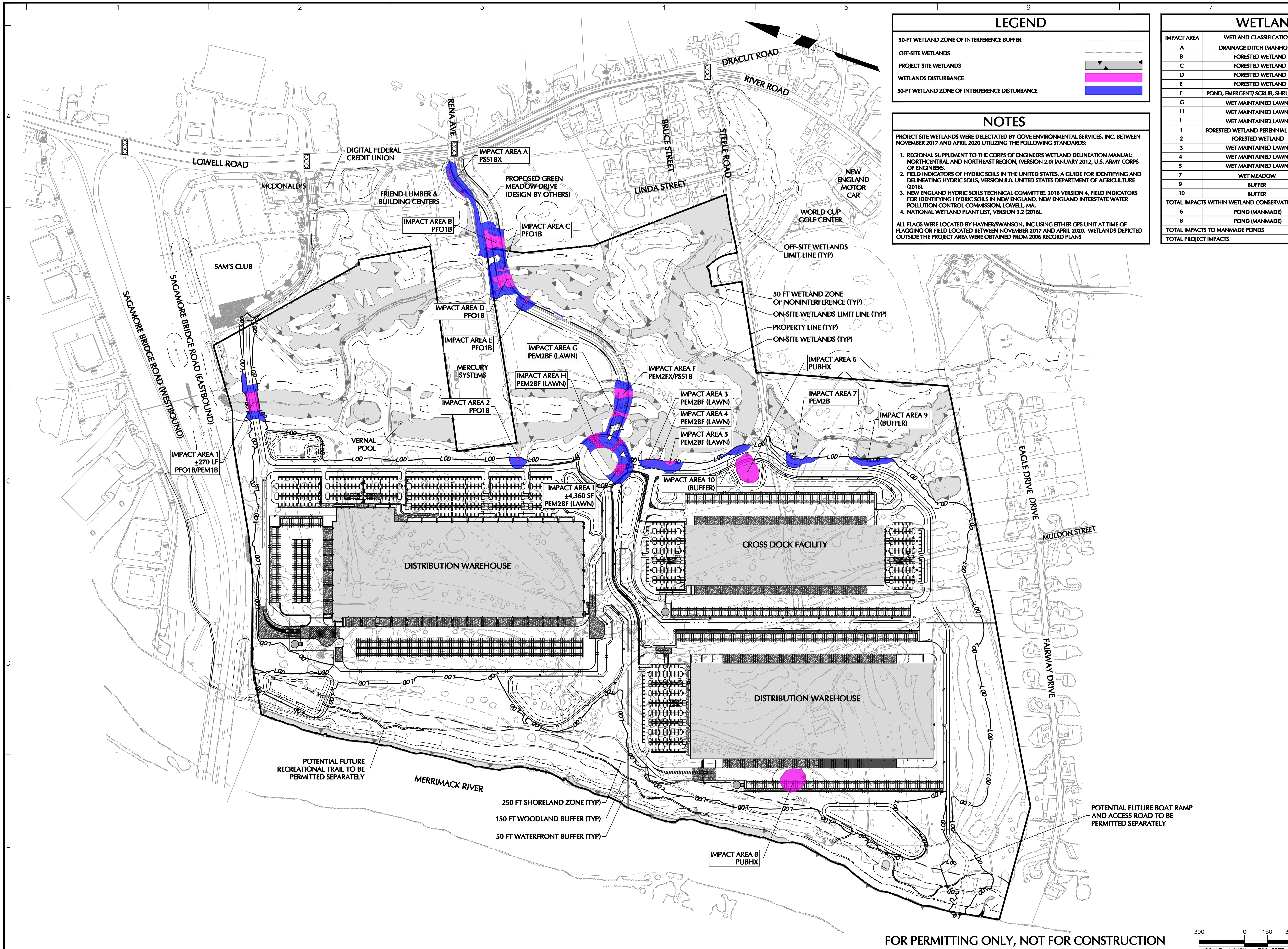
300 0 150 300
SCALE: 1 INCH = 300 FEET

LANGAN

Project No. 151010101



LEGEND

- 50-FT WETLAND ZONE OF INTERFERENCE BUFFER
- OFF-SITE WETLANDS
- PROJECT SITE WETLANDS
- WETLANDS DISTURBANCE
- 50-FT WETLAND ZONE OF INTERFERENCE DISTURBANCE

NOTES

PROJECT SITE WETLANDS WERE DELECTATED BY GOVE ENVIRONMENTAL SERVICES, INC. BETWEEN NOVEMBER 2017 AND APRIL 2020 UTILIZING THE FOLLOWING STANDARDS:

1. REGIONAL SUPPLEMENT TO THE CORPS OF ENGINEERS WETLAND DELINEATION MANUAL: NORTHCENTRAL AND NORTHEAST REGION, (VERSION 2.0) JANUARY 2012, U.S. ARMY CORPS OF ENGINEERS.
2. FIELD INDICATORS OF HYDRIC SOILS IN THE UNITED STATES, A GUIDE FOR IDENTIFYING AND DELINEATING HYDRIC SOILS, VERSION 8.0. UNITED STATES DEPARTMENT OF AGRICULTURE (2016).
3. NEW ENGLAND HYDRIC SOILS TECHNICAL COMMITTEE. 2018 VERSION 4, FIELD INDICATORS FOR IDENTIFYING HYDRIC SOILS IN NEW ENGLAND. NEW ENGLAND INTERSTATE WATER POLLUTION CONTROL COMMISSION, LOWELL, MA.
4. NATIONAL WETLAND PLANT LIST, VERSION 3.2 (2016).

ALL FLAGS WERE LOCATED BY HAYNER/SWANSON, INC USING EITHER GPS UNIT AT TIME OF FLAGGING OR FIELD LOCATED BETWEEN NOVEMBER 2017 AND APRIL 2020. WETLANDS DEPICTED OUTSIDE THE PROJECT AREA WERE OBTAINED FROM 2006 RECORD PLANS

WETLANDS DISTURBANCE

IMPACT AREA	WETLAND CLASSIFICATION	REASON FOR IMPACT	SIZE (SF)	50-FT BUFFER (SF)
A	DRAINAGE DITCH (MANHOLE)	MAIN ACCESS	1,544	81,140
B	FORESTED WETLAND	MAIN ACCESS	11,220	700
C	FORESTED WETLAND	MAIN ACCESS	1,270	5,560
D	FORESTED WETLAND	MAIN ACCESS	9,725	10,360
E	FORESTED WETLAND	MAIN ACCESS	680	17,920
F	POND, EMERGENT/ SCRUB, SHRUB EDGE	MAIN ACCESS	6,805	4,630
G	WET MAINTAINED LAWN	MAIN ACCESS	3,625	20,800
H	WET MAINTAINED LAWN	MAIN ACCESS	7,970	-
I	WET MAINTAINED LAWN	MAIN ACCESS	4,360	-
1	FORESTED WETLAND PERENNIAL STREAM	SECOND ACCESS	9,125	13,298
2	FORESTED WETLAND	LOT DEVELOPMENT	295	6,605
3	WET MAINTAINED LAWN	LOT DEVELOPMENT	230	15,000
4	WET MAINTAINED LAWN	LOT DEVELOPMENT	125	-
5	WET MAINTAINED LAWN	LOT DEVELOPMENT	1,485	-
7	WET MEADOW	LOT DEVELOPMENT	85	9,673
9	BUFFER	LOT DEVELOPMENT	-	10,325
10	BUFFER	LOT DEVELOPMENT	-	6,600
TOTAL IMPACTS WITHIN WETLAND CONSERVATION OVERLAY DISTRICT			58,544	202,611
6	POND (MANMADE)	LOT DEVELOPMENT	21,970	N/A
8	POND (MANMADE)	LOT DEVELOPMENT	20,120	N/A
TOTAL IMPACTS TO MANMADE PONDS			42,090	N/A
TOTAL PROJECT IMPACTS			100,634	202,611

Date	Description	No.
07/13/20	COMMENT RESPONSE	2
05/21/20	SUPPLEMENTAL P&Z SUBMISSION	1

Revisions

Signature Date

PROFESSIONAL
PROFESSIONAL LICENSE No. 0000000000

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Project

HUDSON LOGISTICS CENTER

MAP No. 239, LOT No. 1

HUDSON NEW HAMPSHIRE

Drawing Title

WETLAND IMPACT PLAN

Project No. 151010101

Date 04/15/2020

Drawn By CDR

Checked By NLK

Figure FG01

Sheet 1 of 1

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Project No. 151010101

Air Quality Impact Analysis

Hudson Logistics Center

Hudson, New Hampshire

Submitted to:

Town of Hudson New Hampshire
Planning Board
12 School Street
Hudson, NH 03051

Submitted by:

Langan Engineering
888 Boylston Street, Ste 510
Boston, MA 02199

Prepared by:

Epsilon Associates, Inc.
3 Mill & Main Place, Suite 250
Maynard, MA 01754

July 8, 2020

Epsilon
ASSOCIATES INC.

Table of Contents

TABLE OF CONTENTS

1.0	**INTRODUCTION**				**1-1**
	1.1	Project Description			1-1
	1.2	Purpose			1-1
2.0	**NATIONAL AMBIENT AIR QUALITY STANDARDS AND BACKGROUND CONCENTRATIONS**				**2-1**
	2.1	National Ambient Air Quality Standards			2-1
	2.2	Background Air Quality			2-2
	2.3	Hazardous Air Pollutants			2-3
3.0	**AIR QUALITY ANALYSIS**				**3-1**
	3.1	Selected Pollutants			3-1
	3.2	General Methodology			3-2
		3.2.1	Air Quality Model Selection		3-2
		3.2.2	Modeling Options		3-3
		3.2.3	NO_x to NO_2 Conversion		3-3
		3.2.4	Urban/Rural Determination		3-3
		3.2.5	Meteorological Data		3-4
		3.2.6	Terrain Effects		3-5
		3.2.6	Receptors		3-5
	3.3	Source Specific Data			3-5
		3.3.1	Stationary Sources		3-5
			3.3.1.1 Emissions and Source Parameters		3-6
			3.3.1.2 Building Downwash		3-9
		3.3.2	Mobile Sources		3-10
			3.3.2.1 Emissions and Source Parameters		3-10
				3.3.2.1.1 Roadways	3-11
				3.3.2.1.2 Intersections	3-12
				3.3.2.1.3 Property Parking Areas	3-12
			3.3.2.2 Building Downwash		3-13
			3.3.2.3 Temporal Variations		3-13
4.0	**RESULTS AND CONCLUSIONS**				**4-1**
	4.1	Criteria Pollutant Results			4-1
		4.1.1	Stationary Sources		4-1
		4.1.2	Mobile Sources		4-2
		4.1.3	Overall		4-2
	4.2	RTAP Results			4-3
		4.2.1	Stationary Sources		4-3
		4.2.2	Mobile Sources		4-3

TABLE OF CONTENTS (CONTINUED)

4.3 Mitigation 4-4
4.4 Air Quality Permits 4-4
4.5 Construction 4-5
4.6 Other Potential Impacts 4-6
4.6.1 Distance Between Proposed Project Buildings and Existing Residential Dwellings. 4-6
4.6.2 Diesel Emissions and Particulates. 4-6
4.6.3 Compliance With Air Quality Standards. 4-6
4.6.4 Truck Idling. 4-7
4.7 Conclusions 4-7

FIGURES

ATTACHMENT A

ATTACHMENT B

ATTACHMENT C

LIST OF TABLES

Table 2-1	National Ambient Air Quality Standards	2-1
Table 2-2	Observed Ambient Air Quality Concentrations and Selected Background Levels	2-3
Table 3-1	Modeled Source Descriptions	3-6
Table 3-2	Source Stack Physical Data	3-6
Table 3-3	Emission Rate Comparison	3-7
Table 3-4	Emergency Generator Criteria Pollutant Emission Rates	3-8
Table 3-5	Emergency Generator Hazardous Air Pollutant Emission Rates	3-8
Table 3-6	Modeled Roadway Links	3-11
Table 3-7	Modeled Intersections	3-12
Table 3-8	Modeled Parking Lots	3-13
Table 4-1	Stationary Source NAAQS Results	4-8
Table 4-2	Mobile Source NAAQS Results	4-9
Table 4-3	All Sources NAAQS Results	4-10
Table 4-4	Stationary Source HAP (RTAP) Results	4-11
Table 4-5	Mobile Source HAP (RTAP) Results	4-13

LIST OF FIGURES

Figure 1	Site Location
Figure 2	Urban/Rural 3km Radius
Figure 3	Wind Rose
Figure 4	Mobile Source Receptor Locations
Figure 5	Stationary Source and Building Locations
Figure 6	Mobile Source Locations

Section 1.0

Introduction

1.0 INTRODUCTION

1.1 Project Description

The Hudson Logistics Center (HLC) proposes three high-tech distribution facilities on the Green Meadow Golf Club property off Lowell Road (Route 3A) in Hudson, New Hampshire (the "Project"). In June 2018, the Nashua Regional Planning Commission conducted a study for the Town called the "Hudson Economic Development Assessment" which identified the area where the Project is located as perhaps the greatest opportunity for both commercial and industrial development in Hudson and in the overall region. The proposed redevelopment Project is projected to create 2,500 direct and indirect jobs for the local community. More than 230 of the site's 374 acres will remain as green space – including significant natural buffers between the Merrimack River, adjoining neighborhoods and the development.

Logistics centers are hubs that play a vital role in America's supply chain. Logistics centers include buildings designed to efficiently store and distribute products around the region and ultimately to homes and businesses.

While a logistics center's operations include automation, the need for humans is essential to run the systems and assist with storing, sorting and distribution. The Hudson Logistics Center Project will include what is known to the industry as best-in-class buildings.

As part of the environmental analysis for this Project, air quality impacts from stationary sources located onsite, as well as potential impacts from Project-generated traffic, were evaluated.

This Air Quality Impacts Study report outlines the procedures that were used to evaluate potential air quality impacts and describes the results of projected air quality impacts analysis for the Project. The procedures and analysis used for this report follow U.S. Environmental Protection Agency (U.S. EPA) and New Hampshire Department of Environmental Services (NHDES) guidance where applicable.

1.2 Purpose

This analysis has been prepared at the request of the Hudson Planning Department on behalf of the Hudson Planning Board, and has also been prepared to demonstrate whether the potential air quality impacts meet certain air quality standards as prescribed by the Town of Hudson Site Plan Review Ordinance under Section 275-6 (General Requirements). One of these requirements is to show that that adequate provisions be made for a development to demonstrate that the Project will not contribute to a condition of air pollution, and to guard against such conditions which would subject the nearby properties to danger or injury to health or safety, and that no significant diminution in value of surrounding properties would be suffered. Additionally, the Project is required to reduce and/or eliminate elements of pollution, such as noise, smoke, soot, particulates or any other discharge, into the environment which might prove harmful to persons, structures or adjacent properties.[1]

To show that the Project will not cause any adverse air quality impacts, a detailed quantitative analysis has been performed. Pollutant emissions from onsite combustion sources, as well as from Project-generated traffic have been calculated and offsite concentrations have been estimated using U.S. EPA and NHDES regulatory approved methodology. Section 2 provides a description of the air quality standards used to show a project's regulatory compliance, as well as the existing air quality levels in the area. Section 3 details the analysis methodology, showing specific model and source inputs, describing the meteorological data, and presenting the analysis area. Section 4 presents the results of the analysis, other areas in which the Project will address air quality, and the final conclusions. Finally, the Attachments provide even more detail on the methodology used in the analysis.

This analysis demonstrates that any potential air pollution generated by the Project is well below applicable standards for health, safety, property and the environment, will not cause a condition of air pollution, and will not pose any danger of injury to health and safety or be harmful to persons, structures or y properties. Therefore, the Project complies with the specific provisions of the Chapter 275 regulations with respect to potential air quality impacts as described above.

[1] Town of Hudson (NH). Chapter 275. Site Plan Regulations. Sections 275-6(A) and (H).

Section 2.0

National Ambient Air Quality Standards and Background Concentrations

2.0 NATIONAL AMBIENT AIR QUALITY STANDARDS AND BACKGROUND CONCENTRATIONS

Background air quality concentrations and federal air quality standards were utilized to conduct the air quality impact analyses for the Project. Specifically, the projected emissions associated with the Project were added to monitored background values and then compared to the Federal National Ambient Air Quality Standards (NAAQS) to demonstrate compliance with these standards. These standards were developed by the U.S. Environmental Protection Agency (EPA) to protect human health against adverse health effects with a margin of safety. The modeling methodologies are developed in accordance with the latest NHDES modeling policies and Federal modeling guidelines.[2] The following sections outline the NAAQS and detail the sources of background air quality data.

2.1 National Ambient Air Quality Standards

The 1970 Clean Air Act was enacted by the U.S. Congress to protect the health and welfare of the public from the adverse effects of air pollution. As required by the Federal Clean Air Act, the EPA promulgated NAAQS for the following criteria pollutants: nitrogen dioxide (NO_2), sulfur dioxide (SO_2), particulate matter (PM) (PM_{10} and $PM_{2.5}$), carbon monoxide (CO), ozone (O_3), and lead (Pb). The NAAQS are listed in **Table 2-1**. New Hampshire Ambient Air Quality Standards (NHAAQS) are identical to NAAQS.[3] Such criteria pollutants are those which the EPA has determined to have the greatest potential for human health impacts and are the generally accepted pollutants of concern which are evaluated when conducting air quality impact studies of this nature.

NAAQS specify concentration levels for various averaging times and include both "primary" and "secondary" standards. Primary standards are intended to protect human health, whereas secondary standards are intended to protect public welfare from any known or anticipated adverse effects associated with the presence of air pollutants, such as damage to vegetation. The more stringent of the primary or secondary standards were applied when comparing to the modeling results for this Project.

Table 2-1 National Ambient Air Quality Standards

Pollutant	Averaging Period	NAAQS/NHAAQS ($\mu g/m^3$)	
		Primary	Secondary
NO_2	Annual (1)	100	Same
	1-hour (2)	188	None
SO_2	3-hour (3)	None	1300
	1-hour (4)	196	None

2 40 CFR 51 Appendix W, Guideline on Air Quality Models, 82 FR 5182, Jan. 17, 2017

3 NAAQS will reference NAAQS and NHAAQS throughout this document.

Table 2-1 National Ambient Air Quality Standards (Continued)

Pollutant	Averaging Period	NAAQS/NHAAQS (µg/m^3) Primary	Secondary
PM2.5	Annual (1)	12	15
	24-hour (5)	35	Same
PM10	24-hour (3)	150	Same
CO	8-hour (3)	10,000	Same
	1-hour (3)	40,000	Same
Ozone	8-hour (6)	147	Same
Pb	3-month (1)	1.5	Same

Source: http://www.epa.gov/ttn/naaqs/criteria.html and ENV-A 300
(1) Not to be exceeded.
(2) 98th percentile of one-hour daily maximum concentrations, averaged over three years.
(3) Not to be exceeded more than once per year.
(4) 99th percentile of one-hour daily maximum concentrations, averaged over three years.
(5) 98th percentile, averaged over three years.
(6) Annual fourth-highest daily maximum eight-hour concentration, averaged over three years.

Compliance with the primary NAAQS is designed to assure, with an adequate margin of safety, a lack of significant public health risks. Because the primary NAAQS are solely health-based, they are not adjusted for factors such as technological feasibility, or costs and benefits. By incorporating a margin of safety, the NAAQS are set to address both uncertainties in the state of the science and the possibility of additional harms that might be identified in the future. Furthermore, the NAAQS are intended to be protective of the health of sensitive subpopulations, such as people with pre-existing disease (*e.g.*, cardiovascular diseases or asthma), children, and older adults. Similarly, the NAAQS are established to be protective of both short-term health effects and long-term health effects by defining the averaging time for the standards.

2.2 Background Air Quality

Ambient background concentrations are added to the source impacts to obtain total concentrations, which, in turn, are compared to the NAAQS.

Background concentrations were determined from the closest available monitoring stations to the Project. The closest monitors are in Concord, Londonderry, Portsmouth, and Nashua, depending on pollutant. To estimate background pollutant levels representative of the area, the most recent air quality monitor data reported by the NHDES to U.S. EPA was obtained for 2016 to 2018. Data for these pollutant and averaging time combinations were obtained from NHDES staff and the U.S. EPA's AirData website. A summary of the background air quality concentrations is presented in **Table 2-2**.

Table 2-2 Observed Ambient Air Quality Concentrations and Selected Background Levels

POLLUTANT	AVG TIME	Form	2016	2017	2018	Background (µg/m³)	NAAQS	Percent of NAAQS
SO_2 (1)(5)	1-Hr (4)	99th %	43.0	31.7	38.3	37.6	196.0	19%
	3-Hr	H2H	30.7	28.8	32.5	32.5	1300.0	2%
PM10	24-Hr	H2H	24.0	31.0	31.0	31.0	150.0	21%
PM2.5	24-Hr (4)	98th %	11.3	11.6	12.3	11.7	35.0	34%
	Annual (4)	H	5.0	4.7	4.4	4.7	12.0	39%
NO_2 (3)	1-Hr (4)	98th %	45.7	43.8	36.5	42.0	188.0	22%
	Annual	H	5.6	5.0	4.8	5.6	100.0	6%
CO (2)	1-Hr	H2H	600.5	559.2	589.0	600.5	40000.0	2%
	8-Hr	H2H	458.4	573.0	458.4	573.0	10000.0	6%

Notes:
From 2016-2018 NHDES and U.S. EPA's AirData Website
(1) SO_2 reported ppb. Converted to µg/m³ using factor of 1 ppm = 2.62 µg/m³.
(2) CO reported in ppm. Converted to µg/m³ using factor of 1 ppm = 1146 µg/m³.
(3) NO_2 reported in ppb. Converted to µg/m³ using factor of 1 ppm = 1.88 µg/m³.
(4) Background level is the average concentration of the three years.
(5) The 24-hour and Annual standards were revoked by U.S. EPA on June 22, 2010, Federal Register 75-119, p. 35520.

2.3 Hazardous Air Pollutants

Hazardous Air Pollutants (HAPs, or "regulated toxic air pollutants", or RTAPs in NH) are regulated through Section 112 of the Federal Clean Air Act. These are pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects. These chemicals enter the body through inhalation, ingestion, or contact exposure. There are currently 187 Federally listed HAPS.[4]

In New Hampshire, the New Hampshire Code of Administrative Rules, Section Env-A 1400 Regulated Toxic Air Pollutants governs the analysis of RTAPs in the state. Table 1450-1 in Env-A 1450.01 lists the allowable maximum 24-hour and annual concentrations of RTAPs, and their de minimis allowable emission rates. To demonstrate compliance with the RTAPs, a source must show that they are either below de minimis, or compliant with the RTAP concentrations. The state also allows some in-stack testing to show compliance but that is not applicable here.

Local ambient air quality monitors rarely sample for HAPs. Thus, there are generally no available background concentrations like there are for criteria pollutants.

[4] 42 U.S.C. §7401 et seq. (1990)

Diesel exhaust particulate matter (PM), although not a regulated hazardous air pollutant, is often a pollutant of concern from larger commercial vehicles. There are no regulatory Federal or New Hampshire air quality standards for diesel exhaust PM such as the HAPs and RTAPs discussed above. There are also no exposure limits enacted through the Federal Occupational Safety and Health Administration (OSHA). However, EPA has established a Reference Concentration (RfC) of 5 $\mu g/m^3$ over an annual period for Diesel Particulate Matter.[5] The RfC is an estimate of inhalation exposure which humans may be exposed throughout their lifetime without being likely to experience adverse non-cancer respiratory effects and is the appropriate and relevant health based safe exposure level to compare to Project associated diesel exhaust PM impacts. Also, in general, compliance with the other air quality standards, namely NO_2, PM, and CO, indicates acceptable levels of diesel exhaust particulate from a public health, safety and environmental perspective.

5 U.S. EPA, "Health Assessment Document for Diesel Particulate Matter", EPA/600/8-90/057F, May 2002.

Section 3.0

Air Quality Analysis

3.0 AIR QUALITY ANALYSIS

As stated, an air quality impact analysis is performed to assess adverse pollutant impacts as a result of the Project.

The analysis was performed in two parts: assessment of impacts from stationary sources of air pollution onsite, and assessment of air pollutant emissions from Project-generated traffic both on-site and on local roadways.

3.1 Selected Pollutants

Air quality analyses generally consist of comparing Project impacts of air quality pollutants to applicable standards. Pollutants include the criteria pollutants, as described in Section 2.1, and toxic or hazardous air pollutants, as described in Section 2.3.

The sources included in the analysis consist of natural-gas fueled emergency generators and motor vehicles. Ambient air quality standards for CO are set at relatively high concentrations and in Epsilon's experience never exceeded by a project of this type. Natural gas fueled reciprocating internal combustion engines are relatively clean with respect to CO. Additionally, CO emissions from motor vehicles have dropped significantly over the past nearly 50 years, since the CO standards were enacted.

With the implementation of ultra-low sulfur diesel fuel in on-road vehicles, emissions of SO_2 from motor vehicles is practically non-existent. Likewise, with natural-gas fueled sources, the emissions of SO_2 are also extremely low and so do not need to be included in this analysis based on Epsilon's experience.

For these reasons, impacts of CO and SO_2 are expected to be extremely small and insignificant, and air quality modeling of these pollutants was not performed. It can also be seen in Section 2-2 above that background levels of these pollutants are fractions of the NAAQS so that the Project impacts added to background would still be small comparted to the NAAQS. Carbon Dioxide (CO_2), although considered a greenhouse gas, is not considered a pollutant of direct health impact, and as such, there are no CO_2 health-based standards. Therefore, CO_2 is also not included in this analysis.

The two criteria pollutants included in the analysis are Nitrogen Dioxide (NO_2) and Particulate Matter (PM) as both PM_{10} and PM $_{2.5}$, representative of the two size fractions of PM in microns.

Selection of hazardous air pollutants is based on both the published emissions of such pollutants from the sources included in the analysis, as well as available standards. If a HAP was emitted, but there is no NH RTAP, then it was not analyzed as there is no relevant standard and a wide range of similar compounds are being analyzed and are representative of the impacts for this type of source.

Diesel exhaust particulate is a pollutant of concern. Analysis of diesel exhaust is included in the RTAP analysis. Diesel exhaust particulate is a subset of total particulate emissions since it does not include particulate emissions from brake or tire wear, so our analysis is more inclusive as it includes diesel exhaust, as well as particulate emissions from brake or tire wear.

3.2 General Methodology

Both analyses share several common methodologies. Model selection, several model control inputs, meteorological data are common between the two analyses. These common elements are discussed in this section for brevity.

3.2.1 Air Quality Model Selection

The U.S. EPA's AERMOD model (Version 19091) is used to predict concentrations from the stationary source related to the Project. AERMOD is the U.S. EPA's preferred model for regulatory applications. The use of AERMOD provides the benefits of using the most current algorithms available for steady state dispersion modeling.

The AERMOD View graphical user interface (GUI) Version 9.9.0, created by Lakes Environmental, was used to facilitate model setup and post-processing of data. The AERMOD model is selected for this analysis because it:

- is the required U.S. EPA model for all refined regulatory analyses for receptors within 50 km of a source;
- is a refined model for facilities with multiple sources, source types, and building-induced downwash;
- uses actual representative hourly meteorological data;
- incorporates direction-specific building parameters which can be used to predict impacts within the wake region of nearby structures;
- allows the modeling of multiple sources together to predict cumulative downwind impacts, if needed;
- provides for variable emission rates (though not applicable for this evaluation);
- provides options to select multiple averaging periods between one-hour and one year (scaling factors can be applied to adjust the one-hour impact to a peak impact less than one-hour); and,
- allows the use of large Cartesian and polar receptor grids, as well as discrete receptor locations.

3.2.2 Modeling Options

Modeling was performed with all regulatory options set. Regulatory default options adopted for the model include:

- *Use stack-tip downwash (except for building downwash)*. Stack-tip downwash is an adjustment of the actual stack release height for conditions when the gas exit velocity is less than 1.5 times the wind speed. For these conditions, the effective release height is reduced a bit, based on the diameter of the stack and the wind and gas exit velocity. This option applies to point sources only, such as emergency generators.

- *Use the missing data and calms processing routines*. The model treats missing meteorological data in the same way as the calms processing routine, i.e., it sets the concentration values to zero for that hour, and calculates the short term averages according to U.S. EPA's calms policy, as set forth in the Guideline on Air Quality Models (Appendix W to 40 CFR 51).

A complete description of the AERMOD dispersion model may be found in the AERMOD User's guide[6] and the AERMOD model implementation guide.[7]

3.2.3 NO_x to NO_2 Conversion

Though the NAAQS are based on NO_2 concentrations, the majority of nitrogen oxides (NO_x) emissions are in the form of nitric oxide (NO) rather than NO_2. NO_x undergoes chemical conversion with atmospheric ozone to form NO_2. U.S. EPA allows the use of the Ambient Ratio Method (ARM2).. For this analysis, the ARM2 method was used with default input ratios (0.5/0.9)

3.2.4 Urban/Rural Determination

The AERMOD model is able to assign sources to a rural or urban category to allow specified urban sources to use the effects of increased surface heating under stable atmospheric conditions. The rural dispersion classification was appropriately selected based on a visual inspection of the area within a three-kilometer radius of the Project site. The area within 3 km of the site is shown in **Figure 2.**

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6 U.S. EPA, 2018: User's Guide for the AMS/EPA Regulatory Model – AERMOD. EPA-454/B-18-001. U.S. Environmental Protection Agency, Research Triangle Park, NC 27711.

7 U.S. EPA, 2018: AERMOD Implementation Guide. EPA-454/B-18-003. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

3.2.5 Meteorological Data

Surface meteorological data is automatically sampled at various locations, primarily at airports. The data includes measurements of temperature, moisture, wind speed and direction, and other parameters all measured once every minute. Surface winds are measured at a height of generally 10 meters. The National Weather Service (NWS) operates more than 900 Automated Surface Observing System (ASOS) stations in the Unites States, while hundreds more surface observation locations are located throughout the world.

Upper air data is sampled at far fewer locations. These data are sampled using a measurement apparatus (radiosonde) tethered to a large balloon and radioed back to the ground observer. As the balloon rises, the radiosonde samples temperature and moisture. It's location in time indicates the wind speed and direction aloft. There are only 92 upper air monitoring locations in North America. Those nearest to the site are Gray, ME, Albany, NY, and Chatham, MA.

AERMOD-ready meteorological data files are provided by NHDES. NHDES dictates which meteorological data set is to be used based on the location of the Project and are used for both State-level and Federal-level air quality permitting. NHDES has processed and made these files available for consistency for all air quality modeling analyses conducted in the state. The files are a processed combination of surface and upper air meteorological data. Based on terrain, land use, and proximity, NHDES has determined which files are appropriate for air quality analyses at locations throughout the state.[8] For modeling in Hudson, NHDES requires the use of the Concord/Gray meteorological set they provide.

The meteorological data required to run AERMOD includes five years (2014-2018) of representative surface and upper air observations. The regional meteorology in Hudson is approximated with meteorological data collected at Concord Municipal Airport. The station is located roughly 34 miles north of the Project site and is representative of the site by NHDES. A wind rose showing the distribution of wind speed and direction is presented in **Figure 3,** Winds are generally out of the northwest and southeast, following the orientation of the Merrimack River valley in the Concord and Hudson NH areas. Over 40,000 hours of actual wind data from all directions and wind speeds were thus analyzed in the air modeling analysis and thus all meteorological conditions that any receptor in the study area may experience are included. Hourly surface data from the Concord Municipal Airport, with twice-daily upper air soundings from Gray, ME were used.

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[8] New Hampshire Meteorological Zone Map 2006-2010
https://www.des.nh.gov/organization/divisions/air/pehb/apps/aqm/documents/nh-met-data-06-10.pdf

Surface data and upper air sounding data have been processed into AERMOD-ready input files using version 19091 of AERMET. Based on a review of the files, the U-star adjustment was used. Raw 1-minute data were included to reduce the incidence of "calm" winds. A 0.5 m/s threshold was input.

A base elevation of 339 feet was input, representative of the Concord ASOS station site. The base elevation input adjusts the wind speeds at the meteorological site to the elevation of the Project site within the AERMOD model.

Testing of this data found that the five-year period of 43,824 total hours, 245 calm hours (0.55%) were identified, and 399 (0.91%) missing hours were identified. Thus, these data should be deemed complete and representative for air quality modeling of the Project site.

3.2.6 Terrain Effects

Source and receptor terrain elevations were included in the analysis, as is required for regulatory refined modeling. One-third arc-second terrain data were obtained from the U.S.G.S. National Map Seamless Server according to guidance set forth by U.S. EPA.[9] Source, building, and receptor elevations were processed using the AERMAP (version 18081) processor by way of the Lakes AERMOD View interface.

3.2.6 Receptors

A total of 1,711 receptors were modeled in the mobile source analysis. A uniform cartesian grid encompassing 15 square kilometers and extending 3 kilometers east and west and 5 km north and south was overlaid on the area. Receptors are spaced 100 meters apart and extend well into the residential areas closest to the main arterial roadways. There are 144 receptors placed at individual homes located to the south and east of the facility. Receptors were placed along the property boundary spaced at 50-meter intervals and receptors within the property were removed. Since vehicle exhaust is relatively low temperature, and has no initial vertical momentum, the highest impacts are expected close to the roadways. Receptor locations used in the mobile source analysis are shown in **Figure 4.**

3.3 Source Specific Data

3.3.1 Stationary Sources

Stationary sources of air pollutant emissions at the facility include only 3 natural gas-fired emergency generators, including one generator serving each of the three proposed buildings. There are no other significant fossil-fuel combusting sources to be located there. In this section,

[9] U.S. EPA, 2018: AERMOD Implementation Guide. EPA-454/B-18-003. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711.

the inputs to the air dispersion model are provided. Each emergency generator engine has a stack from which emissions are exhausted and those emissions are quantified and the stack parameters such as diameter, height, exhaust velocity and temperature are determined as inputs to the model. The model then disperses the emissions based on the stack plume rise as it gets moved by the wind. The emission rates are determined based on emission limits established by USEPA or by emission factors for gas fired engines provided by USEPA.

3.3.1.1 Emissions and Source Parameters

The emergency generators are rated at 625 kW electrical output at full standby load. Each generator will be a Generac SG625 turbocharged V-12, 4-stroke-cycle lean-burn engine rated at 941 horsepower at full standby and certified to meet U.S. EPA's New Source Performance Standards for Stationary Spark Ignition Internal Combustion Engines (40 CFR 60, Subpart JJJJ). These engines are limited to 4 g/bhp-hr of carbon monoxide (CO), 2.0 g/bhp-hr of oxides of nitrogen (NO_X), and 1.0 g/bhp-hr of volatile organic compounds (VOC).

The modeled ID corresponding to the source is shown in **Table 3-1**. Physical stack height and diameter were obtained via discussions with the client and are presented in **Table 3-2**.

Table 3-1 Modeled Source Descriptions

ID	Description	Output Power Rating
STCK1-STCK3	Generac SG625	625 ekW

Table 3-2 Source Stack Physical Data

Source ID	UTME [m]	UTMN [m]	Base Elevation [m]	Release Height [m]	Gas Exit Temperature [K]	Gas Exit Velocity [m/s]	Inside Diameter [m]
STCK1	300665	4732073	41.51	3.98	875.4	59.231	0.203
STCK2	300703	4732832	39.81	3.98	875.4	59.231	0.203
STCK3	300780	4732206	45.02	3.98	875.4	59.231	0.203

Emissions data were obtained from manufacturer data sheets, emission limits, and U.S. EPA's Compilation of Air Pollutant Emission Factors (AP-42). A summary of source parameter calculations including modeled emission rates is included in Attachment A.

A comparison of the manufacturer published and NSPS emission rates is presented in **Table 3-3**.

Table 3-3 Emission Rate Comparison

Pollutant	Manufacturer Emission Rate[1] (g/hp-hr)	NSPS Emission Rate[2] (g/hp-hr)
NO_x	0.01	2.0
CO	0.22	4.0
$PM_{10}/PM_{2.5}$	N/A	N/A
[1] Generac Power Systems Part No. A0000527588 [2] 40 CFR 60, Subpart JJJJ		

As shown above, the manufacturer emission rate is significantly lower that the allowed NSPS emission rate. In this case, to be conservative, the higher of the regulatory value or the manufacturer value was used.

Emergency engines are limited to 500 hours per year, with up to 100 of those hours for non-maintenance and readiness testing.

For modeling purposes, the limit of 500 hours can be used to account for the intermittent operation of these units. A factor of 0.0571 (500/8760) was used in the calculation of an annual average emission rate to account for this limitation. U.S. EPA also allows the use of this factor in the calculation of the 1-hour NO_2 concentration, considering the probabilistic form of the 1-hour NO_2 standard, and the intermittent nature of emergency generator operation. In its March 1, 2011 memo, U.S. EPA states:[10]

> "Another approach that may be considered in cases where there is more uncertainty regarding the applicability of this guidance would be to model impacts from intermittent emissions based on an average hourly rate, rather than the maximum hourly emission. For example, if a proposed permit includes a limit of 500 hours/year or less for an emergency generator, a modeling analysis could be based on assuming continuous operation at the average hourly rate, i.e., the maximum hourly rate times 500/8760. This approach would account for potential worst-case meteorological conditions associated with emergency generator emissions by assuming continuous operation, while use of the average hourly emission represents a simple approach to account for the probability of the emergency generator actually operating for a given hour. Also note that the contribution of intermittent emissions to annual impacts should continue to be addressed as in the past to demonstrate compliance with the annual NO_2 standard."

10 EPA Clarification Memo, Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-hour NO_2 ,National Ambient Air Quality Standard, March 1, 2011

Given U.S. EPA's stance on modeling intermittent sources with respect to the 1-hour NO_2 standard and the example provided by U.S. EPA specifically citing emergency generators, the use of the annual average hourly emission rate based on the Federal limit of 500 hours per year is applicable for this Project and is used in the modeling analysis.

The modeled criteria pollutant emission rates are presented in **Table 3-4**.

Table 3-4 Emergency Generator Criteria Pollutant Emission Rates

Source ID	STCK1-STCK3 (each)	
Pollutant	Short Term (g/s)	Annual (g/s)
NOx (as NO_2)	0.0298	0.0298
CO	1.0456	N/A
PM10/PM2.5	1.37E-07	7.83E-09
SO_2	1.05E-06	N/A
Source: 40 CFR 60 Subpart IIII, and AP-42		

The modeled hazardous air pollutant emission rates are presented in **Table 3-5**.

Table 3-5 Emergency Generator Hazardous Air Pollutant Emission Rates

Source ID	STCK1-STCK3 (each)	
Pollutant	Short Term (g/s)	Annual (g/s)
1,1,2,2-Tetrachloroethane	3.23E-05	1.84E-06
1,1,2-Trichloroethane	2.57E-05	1.47E-06
1,3-Butadiene	2.16E-04	1.23E-05
1,3-Dichloropropene	2.13E-05	1.22E-06
2-Methylnaphthalene	2.68E-05	1.53E-06
2,2,4-Trimethylpentane	2.02E-04	1.15E-05
Acenaphthene	1.01E-06	5.76E-08
Acenaphthylene	4.46E-06	2.55E-07
Acetaldehyde	6.75E-03	3.85E-04
Acrolein	4.15E-03	2.37E-04
Benzene	3.55E-04	2.03E-05
Benzo(b)fluoranthene	1.34E-07	7.65E-09
Benzo(e)pyrene	3.35E-07	1.91E-08
Benzo(g,h,i)perylene	3.34E-07	1.91E-08
Biphenyl	1.71E-04	9.77E-06
Carbon Tetrachloride	2.96E-05	1.69E-06

Table 3-5 Emergency Generator Hazardous Air Pollutant Emission Rates (Continued)

Source ID	STCK1-STCK3 (each)	
Pollutant	Short Term (g/s)	Annual (g/s)
Chlorobenzene	2.45E-05	1.40E-06
Chloroform	2.30E-05	1.31E-06
Chrysene	5.59E-07	3.19E-08
Ethylbenzene	3.21E-05	1.83E-06
Ethylene Dibromide	3.58E-05	2.04E-06
Fluoranthene	8.96E-07	5.12E-08
Fluorene	4.58E-06	2.61E-07
Formaldehyde (a)	3.96E-04	2.26E-05
Methanol	2.02E-03	1.15E-04
Methylene Chloride	1.61E-05	9.22E-07
n-Hexane	8.96E-04	5.12E-05
Naphthalene	6.01E-05	3.43E-06
PAH	2.17E-05	1.24E-06
Phenanthrene	8.40E-06	4.79E-07
Phenol	1.94E-05	1.11E-06
Pyrene	1.10E-06	6.27E-08
Styrene	1.91E-05	1.09E-06
Tetrachloroethane	2.00E-06	1.14E-07
Toluene	3.29E-04	1.88E-05
Vinyl Chloride	1.20E-05	6.87E-07
Xylene	1.49E-04	8.48E-06

(a) California Air Toxics Emission Factor (CATEF) Internal Combustion Engine - Natural gas -SCC 20100202, with NSCR 4S/Rich/<650Hp

Source: AP-42

Figure 5 presents the source and receptor locations, as well as the buildings used in the GEP stack height/downwash analysis described below.

3.3.1.2 Building Downwash

AERMOD requires direction specific building parameters to adequately incorporate the aerodynamic effects of buildings on pollutant plume dispersion. The most recent version (04274) of the Building Profile Input Program with the Prime downwash algorithms (BPIP-Prime) is used to calculate these parameters. BPIP-Prime uses the stack information, as well as the height information of nearby buildings to calculate the required heights, widths, and setbacks required to account for building downwash.

The facility consists of several buildings. Given the location of the stacks, it is probable to be subject to aerodynamic influences that would affect the dispersion of the stack exhaust. Thus, nearby buildings and the engine stack are input into the BPIP Prime program to create direction-specific dimension inputs for the AERMOD model. Building tiers are shown in **Figure 5**.

3.3.2 Mobile Sources

Mobile sources of air pollutant emissions at the facility include tractor trailer and box delivery trucks, as well as employee vehicles. There are no other mobile sources servicing the facility.

Vehicle data were obtained from the Traffic Impact Study.[11] Data included Project-generated vehicle forecasts on local area roadways, vehicle mix data (cars, trucks), intersection analyses, and hourly and monthly variability data.

Using the U.S. EPA's Motor Vehicle Emissions Simulator (MOVES) model to estimate vehicle-generated emissions and the AERMOD model for dispersion, pollutant concentrations from Project-generated traffic in the local area are predicted.

3.3.2.1 Emissions and Source Parameters

The EPA MOVES2014b computer program was used to estimate motor vehicle emission factors on the roadway network. Emission factors calculated by the MOVES model are based on motor vehicle operations typical of daily periods. New Hampshire's statewide annual Inspection and Maintenance (I&M) program was included, as well as the county-specific vehicle age registration distribution, meteorology, and other inputs. The inputs for MOVES for 2022 were provided by NHDES. Use of the year 2022 for mobile source emissions is relatively conservative, as vehicle emission rates tend to decrease in future years as vehicle engines become progressively cleaner.

MOVES produces emission rates of a large number of pollutants including both criteria and hazardous air pollutants. For particulates, MOVES calculates emission rates of exhaust, tire wear, and brake wear separately. In this analysis, diesel exhaust particulate is analyzed separately from total PM10 or PM2.5 as the particulate attributable exhaust is of more health concern than that of tire and brake wear. Exhaust particulate is often comprised of other chemical compounds, in addition to the actual soot particles, to which these compounds adhere. These compounds are analyzed separately as well and compared to their applicable RTAP thresholds.

Individual roadway link and intersection emissions are presented as Attachment B.

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[11] Langan Engineering and Environmental Services, Inc., Traffic Impact Study for Hudson Logistics Center, 43 Steele Road, Hudson, NH., April 2020

3.3.2.1.1 Roadways

Roadway emissions were broken down by link. The traffic study also included links on which there would be local traffic, but no Project-generated traffic. To identify only traffic impacts associated with the Project, links without Project traffic were removed from the analysis. **Table 3-6** presents the roadway links included in the traffic analysis. Those 17 links found to have Project-generated traffic are denoted.

Table 3-6 Modeled Roadway Links

Link Number	Link Description	Project Traffic?
L1	River Rd., S. of Dracut/Steele	Y
L2	Steele Rd.	N
L3	Dracut Road, (River to Stuart)	Y
L4	Lowell Rd., Dracut to Rena Ave/Site Drive	Y
L5	Rena Ave.	N
L6	Site Driveway	Y
L7	Lowell Road, Rena/Site to Walmart/Sam's Driveway	Y
L8	Sam's Driveway	Y
L9	Walmart Driveway	N
L10	Lowell Rd, Walmart/Sam's to Sagamore Bridge Rd.	Y
L11	Sagamore Bridge Rd. WB	Y
L12	Sagamore Bridge Rd. EB	Y
L13	Lowell Rd., Sagamore Bridge Rd. to Flagstone/Wason	Y
L14	Flagstone Dr.	N
L15	Watson Rd.	N
L16	Lowell Rd., Wason/Flagstone to Oblate/Hampshire	Y
L17	Hampshire Dr.	N
L18	Oblate Dr.	N
L19	Lowell Rd., Oblate/Hampshire to Executive Dr.	Y
L20	Executive Dr., W. of Lowell	N
L21	Executive Dr., E. of Lowell	N
L22	Lowell Rd., Executive to Nottingham Sq., Fox Hollow	Y
L23	Fox Hollow	N
L24	Nottingham Sq.	N
L25	Lowell Rd, Fox/Nottingham to Pelham Rd.	Y
L26	Pelham Rd.	N
L27	Lowell Rd, N. of Pelham Rd.	N
L28	Lot A Road	Y
L29	Lot B Road	Y
L30	Lot C Road	Y

For each link, the link length, peak hour vehicles, and vehicle speed are needed in MOVES to estimate total vehicle emissions for various pollutants along the roadway.

In AERMOD, roadway sources were modeled as a series of volume sources. The use of volume sources allows the characterization of vehicular emissions to account for the initial turbulence created by moving vehicles. This initial plume spread is directly input into the AERMOD model.

3.3.2.1.2 Intersections

The traffic analysis included analysis of 9 local intersections. All 9 contained Project-related traffic and were included in the air quality impact analysis. **Table 3-7** presents the intersections included in the transportation analysis and analyzed for air quality impacts.

Table 3-7 Modeled Intersections

Source ID	Intersection
VOL1	1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road
VOL2	2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue
VOL3	3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway
VOL4	4: Lowell Road (Route 3A) & Sagamore Bridge Road
VOL5	5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road
VOL6	6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive
VOL7	7: Lowell Road (Route 3A) & Executive Drive
VOL8	8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway
VOL9	9: Lowell Road (Route 3A) & Pelham Road

Emissions from vehicles idling at intersections are calculated using 0 mph emission factors obtained from MOVES. The factors, along with the vehicle volumes and average delay times provide the basis of the emissions calculation at each intersection.

3.3.2.1.3 Property Parking Areas

Each of the three onsite lots (Lots A, B, and C) were included in the analysis to account for exhaust from idling trucks. Emissions were calculated based on projected hourly truck movements in each area. New Hampshire has regulations pertaining to vehicle idling which allow for a certain idling time based on ambient temperature, limited to 5 minutes when the ambient is above 32°F and 15 minutes down to -10°F. It’s conservatively assumed that each vehicle idles for approximate 15 minutes (900 seconds) within a lot, regardless of ambient temperature.

These sources were modeled as area sources, given their general shape and orientation.

Table 3-8 Modeled Parking Lots

Source ID	Lot	Lot Area (m^2)	Average Peak Delay time (s/veh)	Peak Truck Traffic Volume (vph)
LOTA	Lot A	60875.8	900.00	60
LOTB	Lot B	34974.2	900.00	30
LOTC	Lot C	54773.4	900.00	14

U.S. EPA has provided guidance on using AERMOD when modeling roadway sources.[12] The methods shown in this guidance were used in the calculation of initial plume heights, initial plume widths, and release heights. For intersections, the initial widths were estimated from the estimated size of the intersections.

Mobile sources as represented in the model are shown in **Figure 6**. Specific model inputs for mobile sources can be found in Attachment B.

3.3.2.2 Building Downwash

Volume sources are not subject to building downwash in AERMOD. Additionally, the motion of vehicles creating their own turbulent wake precludes the use of point sources (which are the only source type subject to building downwash in AERMOD) in the analysis. Therefore, building influences on mobile source emissions are not included.

3.3.2.3 Temporal Variations

Based on the traffic analysis, it is expected that the peak month will be January and the peak hour will be 11AM. All roadway traffic is adjusted based on a monthly and hourly factor to account for variability from the peak values provided.

Onsite lot use data was also provided. Using the same methodology, factors for these sources were also calculated to account for the variability from the peak values.

The factors are presented in Attachment C.

[12] U.S. EPA, Transportation Conformity Guidance for Quantitative Hot-spot Analyses in PM2.5 and PM10 Nonattainment and Maintenance Areas., EPA-420-B-15-084, November 2015

Section 4.0

Results and Conclusions

4.0 RESULTS AND CONCLUSIONS

Determining the impact of a project on air quality in the area is usually determined by comparing modeled pollutant concentrations to applicable standards.

4.1 Criteria Pollutant Results

4.1.1 Stationary Sources

The results of the stationary source modeling using AERMOD are presented in **Table 4-1**.

The results conclude that the highest concentration (as a percentage of applicable NAAQS) is for annual PM2.5 at 39% of the allowable standard for the Project. The appropriate form of the annual $PM_{2.5}$ standard is annual mean averaged over 3 years. U.S. EPA guidance dictates the use of a single 5-year concurrent meteorological file in lieu of using three rolling 3-year files. The highest modeled annual concentration averaged over 5 years is added to the 3-year average of the annual background concentrations.[13]

The modeled annual $PM_{2.5}$ value in the required form is less than 0.00001 μg/m³. With a background value of 4.7 μg/m³ added, a total concentration of 4.7 μg/m³ is obtained for the Project, well below the annual $PM_{2.5}$ NAAQS of 12 μg/m³ and completely attributable to the ambient background concentration.

The second highest concentration (as a percentage of applicable NAAQS) is for 24-hour $PM_{2.5}$ at 34% of the allowable standard for the Project. The appropriate form of the 24-hour $PM_{2.5}$ standard is the 3-year average of the 98th percentile 24-hour average concentrations. U.S. EPA guidance dictates the use of a single 5-year concurrent meteorological file in lieu of using three rolling 3-year files. The highest modeled 24-hour concentration averaged over 5 years is added to the 3-year average of the 98th percentile 24-hour background concentrations.[14]

The modeled 24-hour $PM_{2.5}$ value in the required form is 0.00001 μg/m³. With a background value of 11.7 μg/m³ added, a total concentration of 11.7 μg/m³ is obtained for the Project, well below the 24-hour $PM_{2.5}$ NAAQS of 35 μg/m³. The Project's contribution to this value is essentially zero, whereby the entire value is attributable to the monitored ambient background concentration.

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13 U.S. EPA, 2010; Memorandum - Modeling Procedures for Demonstrating Compliance with PM2.5 NAAQS. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. March 23, 2010.

14 U.S. EPA, 2010; Memorandum - Modeling Procedures for Demonstrating Compliance with PM2.5 NAAQS. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. March 23, 2010.

The third highest concentration (as a percentage of applicable NAAQS) is for 1-hour NO_2 at 26% of the standard for the Project. The appropriate form of the 1-hour NO_2 standard is the 3-year average of the 98th percentile of the annual distribution of daily maximum 1-hour average concentrations. U.S. EPA guidance dictates the use of a single 5-year concurrent meteorological file in lieu of using three rolling 3-year files. The highest-eighth-highest modeled maximum daily 1-hour concentration averaged over 5 years is added to the highest background concentration over the most recent 3 years to show compliance with the standard.[15]

The modeled 1-hour NO_2 value in the required form is 7.1 µg/m³. With a background value of 42.0 µg/m³ added, a total concentration of 49.1 µg/m³ is obtained for the Project, well below the 1-hour NO_2 NAAQS of 188 µg/m³.

4.1.2 Mobile Sources

The results of the mobile source criteria pollutant impact analysis using AERMOD are presented in **Table 4-2**.

The highest concentration (as a percentage of applicable NAAQS) is for 1-hour NO_2 at 39% of the standard. The modeled 1-hour NO_2 value in the required form is 31.5 µg/m³. With a background value of 42.0 µg/m³ added, a total concentration of 73.5 µg/m³ is obtained for the Project, well below the 1-hour NO_2 NAAQS of 188 µg/m³.

The second highest concentration (as a percentage of applicable NAAQS) is for 24-hour $PM_{2.5}$ at 34% of the standard. The modeled 24-hour $PM_{2.5}$ value in the required form is 0.30 µg/m³. With a background value of 11.7 µg/m³ added, a total concentration of 12.0 µg/m³ is obtained for the Project, well below the 24-hour $PM_{2.5}$ NAAQS of 35 µg/m³ and mostly completely attributable to the ambient background concentration.

The highest concentrations are generally found immediately along the roads and tend to decrease rapidly with distance from the roadways. Thus, concentrations at nearby residential areas are well under the standards. All other pollutant concentrations are below applicable NAAQS as well.

4.1.3 Overall

The overall results of the criteria pollutants are not significantly different than those for the stationary or mobile sources, as the two sources do not really interact all that much. That is, the highest impacts from the mobile sources are typically not in areas where the highest impacts from the stationary sources are found.

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15 U.S. EPA, 2011; Memorandum - Additional Clarification Regarding Application of Appendix W Modeling Guidance for the NO_2 National Ambient Air Quality Standard. U.S. Environmental Protection Agency, Research Triangle Park, North Carolina 27711. March 1, 2011.

For all sources, the highest concentration (as a percentage of applicable NAAQS) is for 1-hour NO_2 at 44% of the standard for the Project. The modeled 1-hour NO_2 value in the required form is 40.9 $\mu g/m^3$. With a background value of 42.0 $\mu g/m^3$ added, a total concentration of 82.9 $\mu g/m^3$ is obtained for the Project, well below the 1-hour NO_2 NAAQS of 188 $\mu g/m^3$. **Table 4-3** presents the combined results of stationary and mobile sources.

4.2 RTAP Results

4.2.1 Stationary Sources

Since the three emergency generators are powered by clean burning natural gas, emissions of hazardous air pollutants are well below corresponding standards. Short-term results are based on continuous use of the engines for 24-hours. Annual results are based on the federal operating limit of 500 hours per year. The results of the stationary source hazardous air pollutant analysis are presented in **Table 4-4.**

In general, all RTAP pollutant concentrations are well below their corresponding standards. Acrolein is the most prevalent emitted RTAP and local concentrations are still only 36% of the standard.

Outside of emergency use during power loss, the generators are expected to be tested regularly, typically weekly or monthly, for less than one hour. Therefore, the assumption of continuous use for 24-hours is extremely conservative. Even in area power-loss situations, grid power is typically restored within 24 hours., however 24 hours was modeled.

There are obviously no diesel exhaust particulate emissions from natural gas reciprocating engines.

4.2.2 Mobile Sources

The results of the mobile source hazardous air pollutant impact analysis using AERMOD are presented in **Table 4-5.**

All modeled concentrations are well below their applicable RTAP standards. The highest modeled concentrations (as a percentage of the standard) are for formaldehyde, acrolein, and arsenic compounds, and each is below 10% of the standard for the Project.

U.S. EPA developed the diesel exhaust particulate RfC of 5 $\mu g/m^3$ to be protective of a lifetime of continuous exposure. The RfC is defined as "an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime".[16]

The maximum predicted annual diesel exhaust concentration of 0.16 µg/m^3 is roughly 3% of the RfC. Therefore, impacts of diesel exhaust are minimal.

Again, the highest concentrations are generally found immediately along the roads and tend to decrease rapidly with distance from the roadways. Thus, concentrations at nearby residential areas are well under the standards.

4.3 Mitigation

New Hampshire regulation ENV-A-1100 regulates idling of vehicles to reduce the air pollutants emitted from unnecessary idling. The time vehicles may be idling is a function of the outside temperature:

- At temperatures above 32°F, idling is limited to 5 minutes;
- At temperatures between -10°F and 32°F, idling is limited to 15 minutes;
- At temperatures below -10°F, there is no limit on idling time.

Vehicles in traffic, emergency vehicles, vehicles providing power take-off (PTO) for refrigeration or lift gate pumps, and vehicles supplying heat or air conditioning for passenger comfort during transportation are generally exempt from this regulation.

The facility is expected to enforce the NH vehicle idling regulations and to reduce the occurrence and duration of idling vehicles onsite to ensure compliance with these standards.

To mitigate impacts from the emergency engine backup power generator stationary sources on the property, cleaner natural gas fueled engines were chosen over diesel engines. Additionally, operations for testing and maintenance should be performed during times when the atmosphere is more unstable and has better mixing, leading to better dispersion of pollutants. These hours are typically mid-afternoon when the ground has been effectively heated by the midday sun.

4.4 Air Quality Permits

For the backup power emergency generators, according to ENV-A-610, a General State Permit (GSP) for Internal Combustion Engines – Emergency Generators or Fire Pump Engines is required

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16 US EPA. 2003. "IRIS Chemical Assessment Summary for Diesel engine exhaust (CAS No. N.A.)." 36p., February 28. Accessed on June 15, 2020 at https://www.epa.gov/iris

for each unit to be included within each of the three proposed buildings. No pollution control equipment is required, provided that the emissions from the units meet all applicable federal standards for non-road engines. No other air quality permits are expected to be required.

No air quality permits are required for transportation other than the vehicle registration, inspection, and maintenance requirements set forth by the U.S. Department of Transportation and the New Hampshire Department of Transportation.

4.5 Construction

Short-term air quality impacts from fugitive dust may be expected during excavation and the early phases of construction. Plans for controlling fugitive dust during excavation and construction include mechanical street sweeping, wetting and/or misting portions of the site during periods of high wind, and careful removal of debris by covered trucks. The construction contract will provide for several strictly enforced measures to be used by contractors to reduce potential emissions and minimize impacts. These measures are expected to include:

- Using wetting agents on area of exposed soil on a scheduled basis;
- Using covered trucks;
- Monitoring of actual construction practices to ensure that unnecessary transfers and mechanical disturbances of loose materials are minimized;
- Minimizing storage of debris on the site; and
- Periodic street and sidewalk cleaning with water to minimize dust accumulations.
- Limit maximum travel speeds on unpaved areas; and
- Provide wheel wash stations to limit trackout of soil during the excavation phase.

These measures will also be factored into the Stormwater Pollution Prevention Plan required to be implemented under the EPA NPDES Construction General Permit Program.

New Hampshire regulation ENV-A-1100 requires that vehicles idle for no more than five minutes when temperatures are above 32°F. To reduce engine idling, the selected contractor(s) will be notified of the New Hampshire anti-idling regulations.

Construction equipment engines will comply with requirements for the use of ultra-low sulfur diesel (ULSD) in off-road engines. The construction contractor will be encouraged to use diesel construction equipment with installed exhaust emission controls such as oxidation catalysts or particulate filters on their diesel engines.

In addition to the items listed above, all trucks leaving the site must have all dirt/mud removed from the wheels and undercarriage of the truck prior to leaving the site. In addition, any loads containing soil for off-site disposal will be covered. Construction vehicles and equipment will not be permitted to be washed in the streets outside of the Project site. Excess water from the wheel wash stations will be managed and catch basins in the surrounding street will be protected from potential runoff from the cleaning operations.

The Proponent acknowledges the importance of emission controls and will encourage contractors to use proper emission controls, use of clean fuels, control of truck and equipment idling times, and conducting operations without affect to neighbors' clean air are all important priorities to the Proponent.

4.6 Other Potential Impacts

We also understand a number of concerns over the potential for air quality impacts have been raised by the public through the Town's Planning Board review process, and based upon our analysis above, and conclusions described below, we note the following:

4.6.1 Distance Between Proposed Project Buildings and Existing Residential Dwellings.

Based upon the analysis above which demonstrates that both stationary and mobile sources of potential pollutants are expected to be well below applicable federal and state standards, there does not appear to be a need, from an air quality or health and safety perspective, to provide any specific setback or buffer between the proposed buildings on the Project site and abutting residential dwellings for purposes of air pollution control. We understand, however, that a 200-foot setback from the residential property boundary is required under the Hudson Zoning Ordinance and that the Proponent has provided a much greater setback than what the Hudson Zoning Ordinance requires.

4.6.2 Diesel Emissions and Particulates.

Based upon the analysis above which demonstrates that both stationary and mobile sources of potential pollutants are expected to be well below applicable federal and state standards, the Project's diesel emissions including particulates from exhaust, tire wear, and brake wear, are not expected to cause or exacerbate health conditions, such as asthma, for those persons living in nearby residential dwellings.

4.6.3 Compliance with Air Quality Standards.

As demonstrated in the analysis above which demonstrates that both stationary and mobile sources of potential pollutants are expected to be well below applicable federal and state standards, the characterization of Project emissions as creating a mushroom cloud of toxic emissions over the site with poisonous or cancerous plumes is simply incorrect and not based upon fact.

4.6.4 Truck Idling.

As noted above, New Hampshire regulation ENV-A-1100 regulates idling of vehicles to reduce the air pollutants emitted from unnecessary idling, and we have advised the Proponent concerning measures to be undertaken to ensure compliance with these idling requirements both during construction and post-construction operations.

4.7 Conclusions

The NAAQS and RTAP standards are designed to protect public health and welfare. Since all predicted concentrations are below their applicable NAAQS and/or RTAP standards, it can be concluded that the proposed Project will not cause or contribute to a condition of air pollution in the area. Therefore, with respect to air quality impacts, the Project meets the requirements laid out in Chapter 275 of the Town of Hudson's Site Plan Review regulations.

Table 4-1 Stationary Source NAAQS Results

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONC. (µg/m³)	BACKGROUND CONCENTRATION (µg/m³)	TOTAL CONCENTRATION [6] (µg/m³)	STANDARD (µg/m³)	% of Standard
PM_{10}	24 HOUR [2]	<0.01	31.0	31.0	150	21%
$PM_{2.5}$	24 HOUR [3]	<0.01	11.7	11.7	35	34%
	ANNUAL [4]	<0.01	4.7	4.7	12	39%
NO_2	1 HOUR [5]	7.11	42.0	49.1	188	26%
	ANNUAL [1]	0.31	5.6	5.9	100	6%

Notes:

[1] Highest Annual Concentration Over 5 Years

[2] Highest 6th-High Concentration Over 5 Years

[3] Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years

[4] Maximum Annual Concentration Averaged Over 5 Years

[5] Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years

[6] Discrepancies in sums may occur due to rounding.

Table 4-2 Mobile Source NAAQS Results

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONC. (μg/m³)	BACKGROUND CONCENTRATION (μg/m³)	TOTAL CONCENTRATION [6] (μg/m³)	STANDARD (μg/m³)	% of Standard
PM_{10}	24 HOUR [2]	3.72	31.0	34.7	150	23%
$PM_{2.5}$	24 HOUR [3]	1.16	11.7	12.9	35	37%
	ANNUAL [4]	0.46	4.7	5.2	12	43%
NO_2	1 HOUR [5]	38.59	42.0	80.6	188	43%
	ANNUAL [1]	3.34	5.6	9.0	100	9%

Notes:

[1] Highest Annual Concentration Over 5 Years

[2] Highest 6th-High Concentration Over 5 Years

[3] Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years

[4] Maximum Annual Concentration Averaged Over 5 Years

[5] Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years

[6] Discrepancies in sums may occur due to rounding.

Table 4-3 All Sources NAAQS Results

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONC. (µg/m³)	BACKGROUND CONCENTRATION (µg/m³)	TOTAL CONCENTRATION [6] (µg/m³)	STANDARD (µg/m³)	% of Standard
PM_{10}	24 HOUR [2]	3.72	31.0	34.7	150	23%
$PM_{2.5}$	24 HOUR [3]	1.16	11.7	12.9	35	37%
	ANNUAL [4]	0.46	4.7	5.2	12	43%
NO_2	1 HOUR [5]	40.96	42.0	82.9	188	44%
	ANNUAL [1]	3.38	5.6	9.0	100	9%

Notes:

[1] Highest Annual Concentration Over 5 Years

[2] Highest 6th-High Concentration Over 5 Years

[3] Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years

[4] Maximum Annual Concentration Averaged Over 5 Years

[5] Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years

[6] Discrepancies in sums may occur due to rounding.

Table 4-4 Stationary Source HAP (RTAP) Results

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	STANDARD ($\mu g/m^3$)	% of Standard
1,1,2,2-Tetrachloroethane	24 HOUR	2.28E-03	25	0%
	ANNUAL	1.21E-06	16	0%
1,1,2-Trichloroethane	24 HOUR	1.82E-03	277	0%
	ANNUAL	9.69E-07	184	0%
1,3-Butadiene	24 HOUR	1.53E-02	2	1%
	ANNUAL	8.11E-06	2	0%
1,3-Dichloropropene	24 HOUR	1.51E-03	20	0%
	ANNUAL	8.04E-07	20	0%
2,2,4-Trimethylpentane	24 HOUR	1.43E-02	NA	NA
	ANNUAL	7.58E-06	NA	NA
2-Methylnaphthalene	24 HOUR	1.89E-03	15	0%
	ANNUAL	1.01E-06	9.7	0%
Acenaphthene	24 HOUR	7.14E-05	NA	NA
	ANNUAL	3.80E-08	NA	NA
Acenaphthylene	24 HOUR	3.15E-04	NA	NA
	ANNUAL	1.68E-07	NA	NA
Acetaldehyde	24 HOUR	4.77E-01	161	0%
	ANNUAL	2.54E-04	9	0%
Acrolein	24 HOUR	2.93E-01	0.82	36%
	ANNUAL	1.56E-04	0.02	1%
Benzene	24 HOUR	2.51E-02	5.7	0%
	ANNUAL	1.34E-05	3.8	0%
Benzo(b)fluoranthene	24 HOUR	9.47E-06	0.36	0%
	ANNUAL	5.04E-09	0.24	0%
Benzo(e)pyrene	24 HOUR	2.37E-05	NA	NA
	ANNUAL	1.26E-08	NA	NA
Benzo(g,h,i)perylene	24 HOUR	2.36E-05	NA	NA
	ANNUAL	1.26E-08	NA	NA
Biphenyl	24 HOUR	1.21E-02	4.6	0%
	ANNUAL	6.44E-06	3.1	0%
Carbon Tetrachloride	24 HOUR	2.09E-03	111	0%
	ANNUAL	1.11E-06	100	0%

Table 4-4 Stationary Source HAP (RTAP) Results (Continued)

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION ($\mu g/m^3$)	STANDARD ($\mu g/m^3$)	% of Standard
Chlorobenzene	24 HOUR	1.73E-03	231	0%
	ANNUAL	9.23E-07	154	0%
Chloroform	24 HOUR	1.63E-03	175	0%
	ANNUAL	8.64E-07	117	0%
Chrysene	24 HOUR	3.95E-05	0.36	0%
	ANNUAL	2.10E-08	0.24	0%
Ethyl Benzene	24 HOUR	2.27E-03	1000	0%
	ANNUAL	1.21E-06	1000	0%
Ethylene Dibromide	24 HOUR	2.53E-03	0.05	5%
	ANNUAL	1.35E-06	0.05	0%
Fluoranthene	24 HOUR	6.33E-05	NA	NA
	ANNUAL	3.38E-08	NA	NA
Fluorene	24 HOUR	3.24E-04	NA	NA
	ANNUAL	1.72E-07	NA	NA
Formaldehyde	24 HOUR	2.80E-02	1.3	2%
	ANNUAL	1.49E-05	0.88	0%
Hexane	24 HOUR	6.33E-02	885	0%
	ANNUAL	3.38E-05	700	0%
Methanol	24 HOUR	1.43E-01	20000	0%
	ANNUAL	7.58E-05	20000	0%
Methylene Chloride	24 HOUR	1.14E-03	621	0%
	ANNUAL	6.08E-07	600	0%
Naphthalene	24 HOUR	4.25E-03	186	0%
	ANNUAL	2.26E-06	3	0%
PAH	24 HOUR	1.53E-03	NA	NA
	ANNUAL	8.18E-07	NA	NA
Phenanthrene	24 HOUR	5.94E-04	0.71	0%
	ANNUAL	3.16E-07	0.48	0%
Phenol	24 HOUR	1.37E-03	68	0%
	ANNUAL	7.32E-07	45	0%
Pyrene	24 HOUR	7.78E-05	0.71	0%
	ANNUAL	4.13E-08	0.48	0%

Table 4-4 Stationary Source HAP (RTAP) Results (Continued)

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (µg/m³)	STANDARD (µg/m³)	% of Standard
Styrene	24 HOUR	1.35E-03	1000	0%
	ANNUAL	7.19E-07	1000	0%
Tetrachloroethane	24 HOUR	1.41E-04	NA	NA
	ANNUAL	7.52E-08	NA	NA
Toluene	24 HOUR	2.33E-02	5000	0%
	ANNUAL	1.24E-05	5000	0%
Vinyl Chloride	24 HOUR	8.48E-04	9.3	0%
	ANNUAL	4.53E-07	6.2	0%
Xylene	24 HOUR	1.05E-02	1550	0%
	ANNUAL	5.59E-06	100	0%

Table 4-5 Mobile Source HAP (RTAP) Results

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (µg/m³)	STANDARD (µg/m³)	% of Standard
Diesel Particulate	24 HOUR	6.28E-01	NA	NA
	ANNUAL (1)	1.57E-01	5	3%
1,3Butadiene	24 HOUR	4.95E-03	2	0%
	ANNUAL	1.03E-03	2	0%
Acetaldehyde	24 HOUR	4.52E-02	161	0%
	ANNUAL	9.13E-03	9	0%
Acrolein	24 HOUR	7.90E-03	0.82	1%
	ANNUAL	1.59E-03	0.02	8%
Arsenic Compounds	24 HOUR	1.30E-03	0.036	4%
	ANNUAL	1.97E-04	0.024	1%
Benzene	24 HOUR	4.22E-02	5.7	1%
	ANNUAL	1.22E-02	3.8	0%
Chromium 6+	24 HOUR	6.62E-06	0.036	0%
	ANNUAL	1.00E-06	0.024	0%
Ethyl Benzene	24 HOUR	4.17E-02	1000	0%
	ANNUAL	1.30E-02	1000	0%
Formaldehyde	24 HOUR	1.07E-01	1.3	8%
	ANNUAL	2.17E-02	0.88	2%

Table 4-5 Mobile Source HAP (RTAP) Results (Continued)

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (μg/m^3)	STANDARD (μg/m^3)	% of Standard
Hexane	24 HOUR	3.73E-02	885	0%
	ANNUAL	1.15E-02	700	0%
Manganese Compounds	24 HOUR	8.94E-04	0.1	1%
	ANNUAL	1.35E-04	0.05	0%
Naphthalene	24 HOUR	1.17E-02	186	0%
	ANNUAL	2.40E-03	3	0%
Nickel Compounds	24 HOUR	1.15E-03	3.6	0%
	ANNUAL	1.74E-04	2.4	0%
Propionaldehyde	24 HOUR	5.43E-03	239	0%
	ANNUAL	1.11E-03	8	0%
Styrene	24 HOUR	1.85E-03	1000	0%
	ANNUAL	4.03E-04	1000	0%
Toluene	24 HOUR	1.69E-01	5000	0%
	ANNUAL	5.25E-02	5000	0%
Total Mercury Compounds	24 HOUR	5.81E-05	0.3	0%
	ANNUAL	8.80E-06	0.3	0%
Xylene	24 HOUR	1.36E-01	1550	0%
	ANNUAL	4.22E-02	100	0%

(1) Annual Diesel Particulate standard is U.S. EPA Reference Exposure Concentration (RfC)

Figures

Figure 1 Site Location

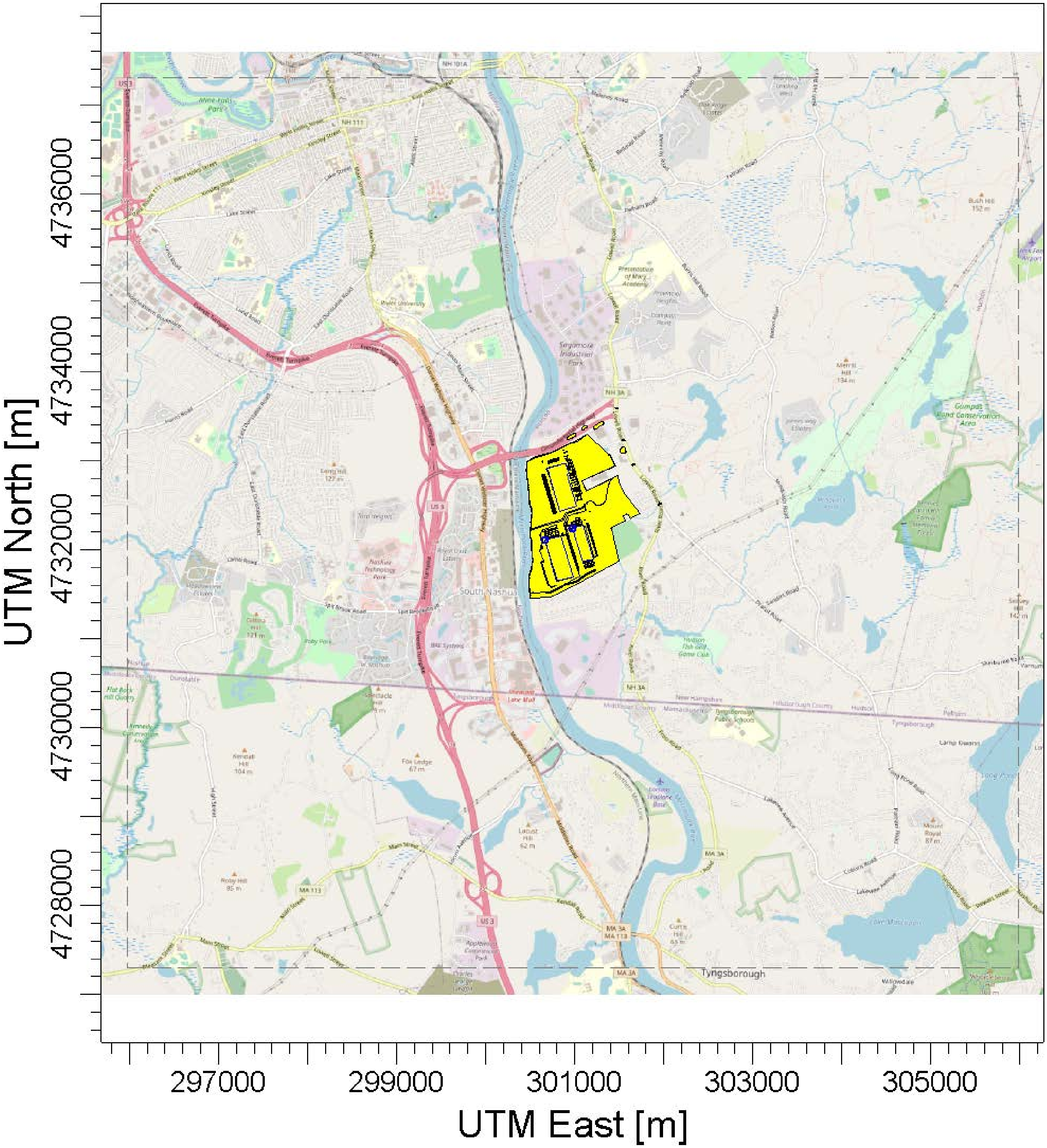
Figure 2 Urban/Rural 3km Radius

Figure 3 Wind Rose

Figure 4 Receptor Locations

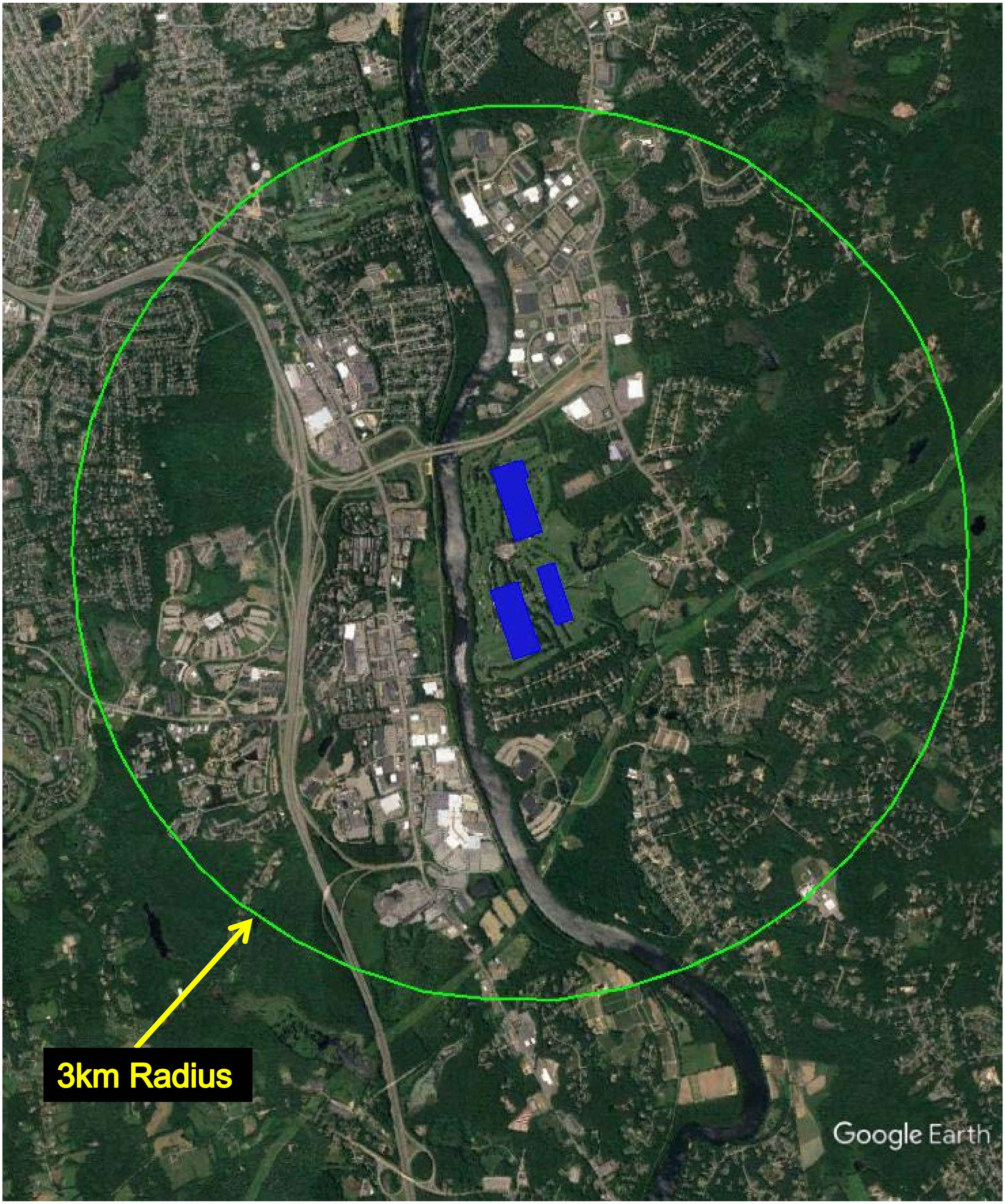
Figure 5 Stationary Source and Building Locations

Figure 6 Mobile Source Locations



5843/Hudson Logistics Center

Figure 1
Site Location



5843/Hudson Logistics Center

Epsilon
ASSOCIATES INC.

Figure 2
Urban/Rural 3km Radius

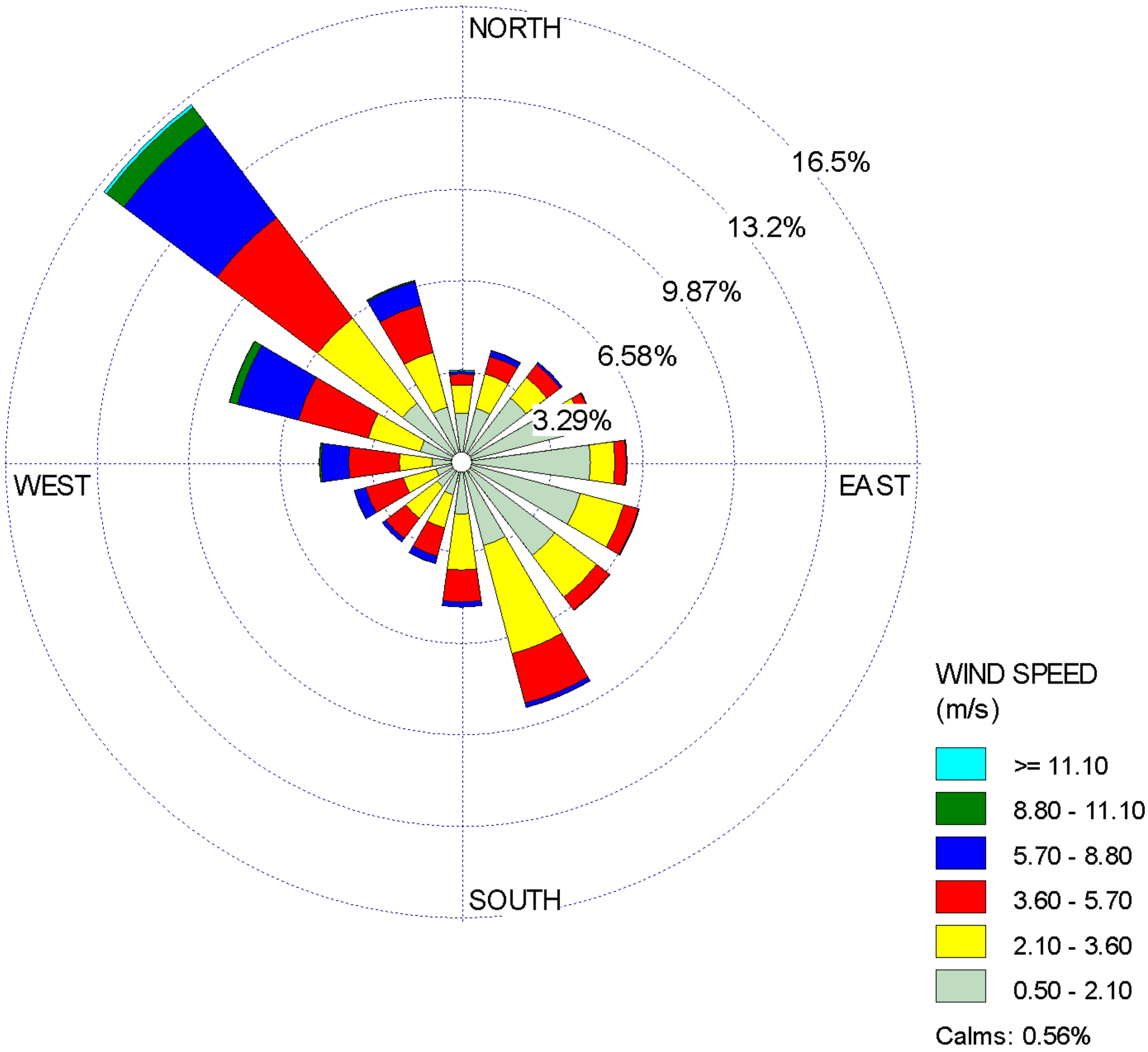
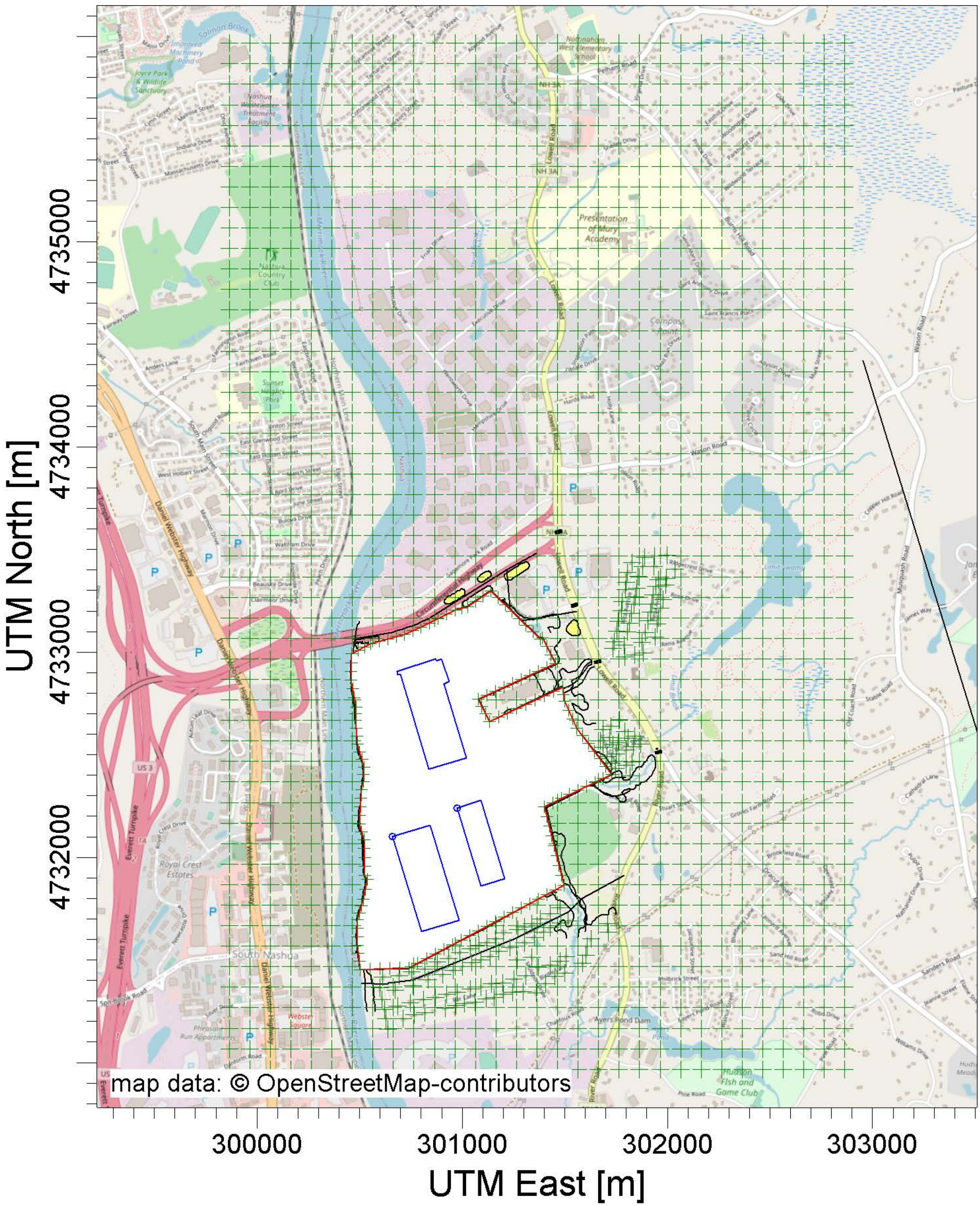


Figure 3

2014-2018 Concord (NH) Municipal Airport Wind Rose



5843/Hudson Logistics Center

Epsilon ASSOCIATES INC.

Figure 4
Receptor Locations

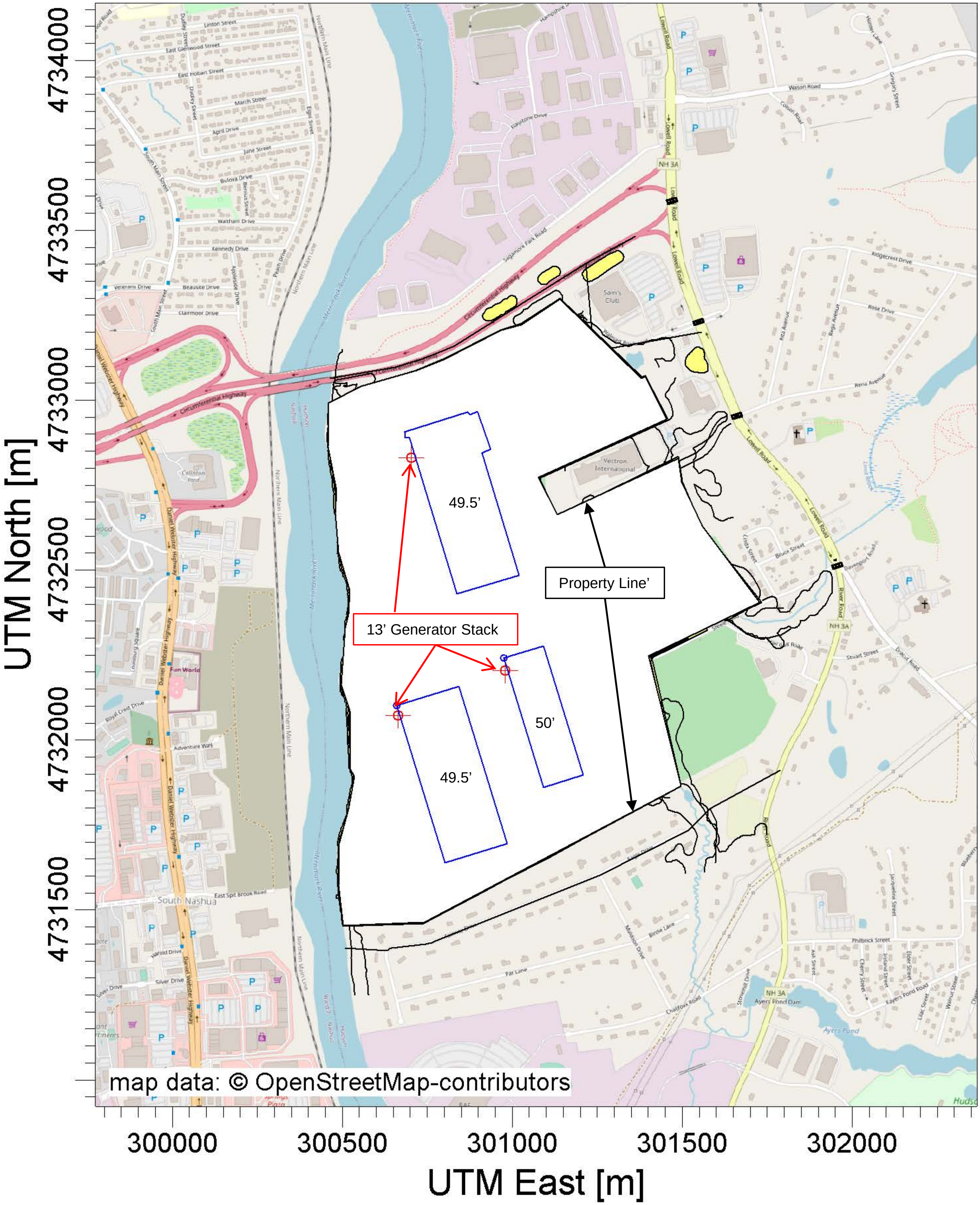


Figure 5

Stationary Sources Building Locations

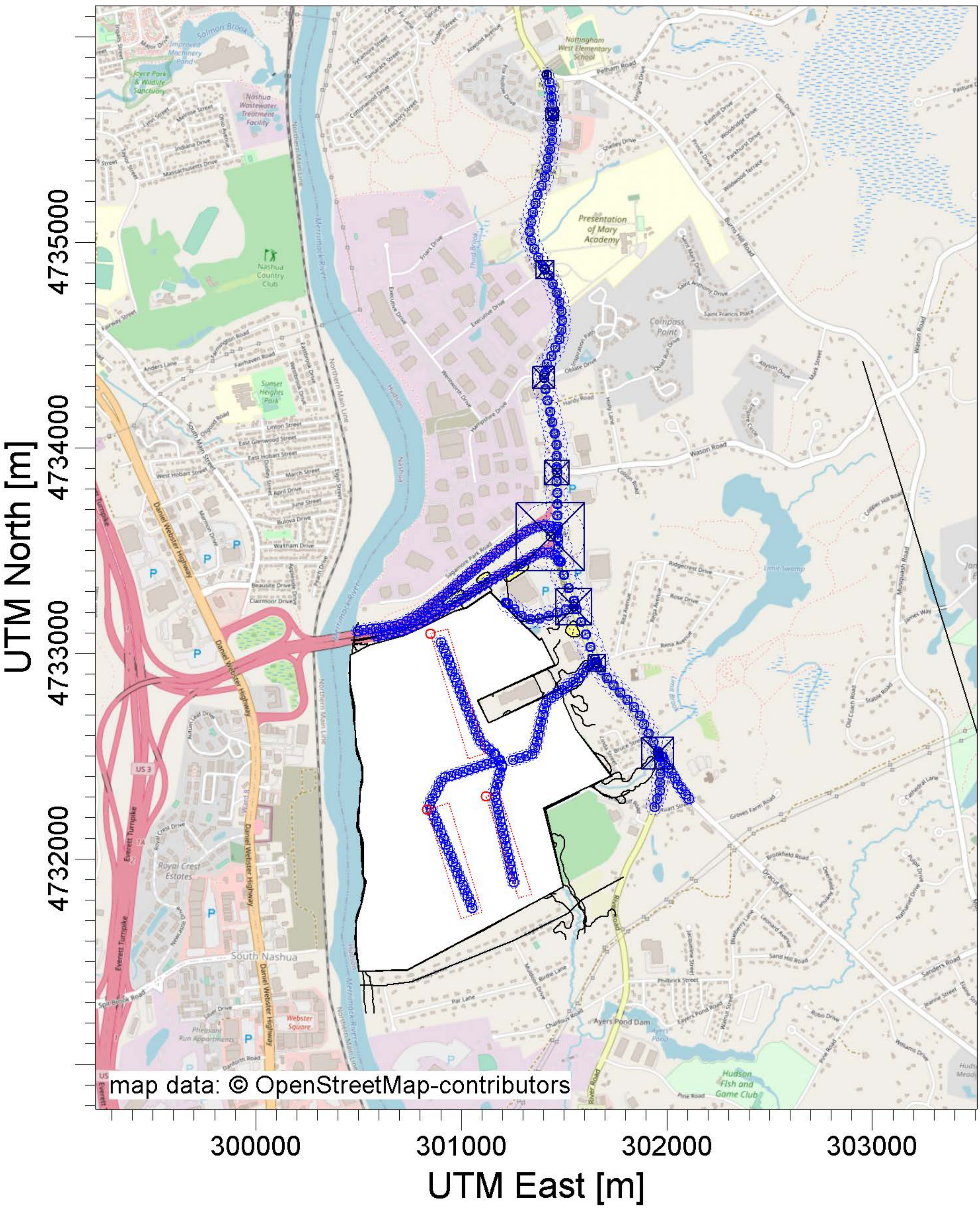


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Figure 6
Mobile Source Locations

Attachment A

Hudson Logistics - Hudson, NH

Diesel Engines

			Notes
Designation		EG1-3	
Number		3	
Electrical output	kilowatts	625	Spec sheet
Make		Generac	Spec sheet
model		SG625	Spec sheet
Fuel		Natural Gas	Spec sheet
Engine Horsepower	BHP	941.00	Spec sheet
Engine power	kilowatts	701.70	calculated
Fuel consumption @full load	scfh	6282.0	Spec sheet
Heat Input	MMBTU/hr:	6.40764	calculated (1020 Btu/scf)
Stack Parameters			
Exhaust Temperature	°F	1116.0	Spec sheet
Exhaust Temperature	°K	875.4	calculated
Total Exhaust Flow	ACFM	4070.0	Spec sheet
Flange Diameter	in.		
Maximum Backpressure	in. H2O	27.0	Spec sheet
Maximum velocity	fpm	17510.56	calculated
Flow area required	sq. ft	0.232	calculated
Number of exhausts (typ. 1 or 2)	#	1.0	Generac DWG I000022857
Selected silencer diameter	in	8.0	Generac DWG I000022857
Actual silencer opening area	sq. ft each	0.349	calculated
Actual velocity	fpm each	11659.691	calculated
Actual velocity	fps each	194.328	calculated
Single Stack Effective Diameter	ft	0.667	calculated
Single Stack Effective Diameter	m	0.203	calculated
Single Stack Effective Velocity	fps	194.328	calculated
Single Stack Effective Velocity	mps	59.231	calculated
Primary Building Height	ft	0.0	
Stack Height (above roofline)	ft	13.0	155.9" above pad base if ground mounted
Stack height (above ground)	ft	*12.99*	calculated
Stack Height	m	*3.96*	calculated
Pollutant	Emission factor unit	Emission factor	
NOx	g/BHP-hr	2.00	Part 60 Subpart JJJJ Table 1 limit
CO	g/BHP-hr	4.00	Part 60 Subpart JJJJ Table 1 limit
PM10	lb/MMBTU	7.71E-05	From Table 3.2-2 AP42
PM2.5	lb/MMBTU	7.71E-05	From Table 3.2-2 AP42
SO2	lb/MMBTU	5.88E-04	From Table 3.2-2 AP42
HAPs	lb/MMBTU	6.71E-02	From Table 3.2-2 AP42
CO2	lb/MMBTU	1.10E+02	From Table 3.2-2 AP42
Short Term Emission Rate			
NOx	g/s	0.0298	uses EPA intermittent factor (500 hrs/yr)
CO	g/s	1.0456	calculated
PM10	g/s	1.37E-07	calculated
PM2.5	g/s	1.37E-07	calculated
SO2	g/s	1.05E-06	calculated
Long TermEmission Rate	500	hrs/yr	
NOx	g/s	0.0298	calculated
CO	g/s	0.0597	calculated
PM10	g/s	7.83E-09	calculated
PM2.5	g/s	7.83E-09	calculated
SO2	g/s	5.97E-08	calculated

Hudson Logistics - Hudson, NH

Ambient Monitored Concentrations

POLLUTANT	AVERAGING TIME	Form	2016	2017	2018	Units	ppm/ppb to µg/m³ Conversion Factor	2016-2018 Background Concentration (µg/m³)	Location
SO_2 (1)(6)	1-Hour (5)	99th %	16.4	12.1	14.6	ppb	2.62	37.6	Concord, NH
	3-Hour	H2H	11.7	11	12.4	ppb	2.62	32.5	Concord, NH
PM-10 (7)	24-Hour	H2H	24	31	31	µg/m³	1	31	Pierce Island, Portsmouth, NH
PM-2.5	24-Hour (5)	98th %	11.3	11.6	12.3	µg/m³	1	11.7	Londonderry, NH
	Annual (5)	H	5.0	4.7	4.4	µg/m³	1	4.7	Londonderry, NH
NO_2 (3)	1-Hour (5)	98th %	24.3	23.3	19.4	ppb	1.88	42.0	Londonderry, NH
	Annual	H	3.0	2.6	2.5	ppb	1.88	5.6	Londonderry, NH
CO (2)	1-Hour	H2H	0.5	0.5	0.5	ppm	1146	600.5	Londonderry, NH
	8-Hour	H2H	0.4	0.5	0.4	ppm	1146	573.0	Londonderry, NH
Ozone (4)	8-Hour	H4H	0.064	0.063	0.066	ppm	1963	129.6	Gilson Road, Nashua, NH

Notes:
From MassDEP's Annual Air Quality Reports and EPA's AirData Website
(1) SO_2 reported ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 2.62 $\mu g/m^3$.
(2) CO reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1146 $\mu g/m^3$.
(3) NO_2 reported in ppb. Converted to $\mu g/m^3$ using factor of 1 ppm = 1.88 $\mu g/m^3$.
(4) O_3 reported in ppm. Converted to $\mu g/m^3$ using factor of 1 ppm = 1963 $\mu g/m^3$.
(5) Background level is the average concentration of the three years.
(6) The 24-hour and Annual standards were revoked by EPA on June 22, 2010, Federal Register 75-119, p. 35520.
(7) The Annual PM10 standard was revoked by EPA on October 17, 2006, Federal Register 71-200, p. 61144.
(8) The monitoring sites in RED were dismantled for 2018. The next most representative monitor was used.

Hudson Logistics - Hudson, NH
AERMOD Dispersion Modeling Analysis
NAAQS Results - Stationary Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (μg/m^3)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	BACKGROUND CONCENTRATION (μg/m^3)	TOTAL CONCENTRATION (μg/m^3)	STANDARD (μg/m^3)	% of Standard
PM_{10}	24 HOUR (2)	0.00001	15071424	300582.44, 4732901.80, 39.30, 39.30, 0.00	31.0	31.0	150	21%
$PM_{2.5}$	24 HOUR (3)	0.00001	2014-2018	300582.44, 4732901.80, 39.30, 39.30, 0.00	11.7	11.7	35	34%
	ANNUAL (4)	0.00000	2014-2018	301282.44, 4731901.80, 39.20, 39.20, 0.00	4.7	4.7	12	39%
NO_2	1 HOUR (5)	7.11061	2014-2018	300523.63, 4731999.11, 32.21, 45.08, 0.00	42.0	49.1	188	26%
	ANNUAL (1)	0.30969	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	5.6	5.9	100	6%

Notes:

(1) Highest Annual Concentration Over 5 Years
(2) Highest 6th-High Concentration Over 5 Years
(3) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years
(4) Maximum Annual Concentration Averaged Over 5 Years
(5) Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years

Hudson Logistics - Hudson, NH
AERMOD Dispersion Modeling Analysis
RTAPS Results - Stationary Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (μg/m³)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	STANDARD (μg/m³)	% of Standard
1,1,2,2-Tetrachloroethane	24 HOUR	2.28E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	25	0%
	ANNUAL	1.21E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	16	0%
1,1,2-Trichloroethane	24 HOUR	1.82E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	277	0%
	ANNUAL	9.69E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	184	0%
1,3-Butadiene	24 HOUR	1.53E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	2	1%
	ANNUAL	8.11E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	2	0%
1,3-Dichloropropene	24 HOUR	1.51E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	20	0%
	ANNUAL	8.04E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	20	0%
2,2,4-Trimethylpentane	24 HOUR	1.43E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	7.58E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
2-Methylnaphthalene	24 HOUR	1.89E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	15	0%
	ANNUAL	1.01E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	9.7	0%
Acenaphthene	24 HOUR	7.14E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	3.80E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Acenaphthylene	24 HOUR	3.15E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	1.68E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Acetaldehyde	24 HOUR	4.77E-01	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	161	0%
	ANNUAL	2.54E-04	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	9	0%
Acrolein	24 HOUR	2.93E-01	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.82	36%
	ANNUAL	1.56E-04	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.02	1%
Benzene	24 HOUR	2.51E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	5.7	0%
	ANNUAL	1.34E-05	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	3.8	0%
Benzo(b)fluoranthene	24 HOUR	9.47E-06	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.36	0%
	ANNUAL	5.04E-09	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.24	0%
Benzo(e)pyrene	24 HOUR	2.37E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	1.26E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Benzo(g,h,i)perylene	24 HOUR	2.36E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	1.26E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Biphenyl	24 HOUR	1.21E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	4.6	0%
	ANNUAL	6.44E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	3.1	0%
Carbon Tetrachloride	24 HOUR	2.09E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	111	0%
	ANNUAL	1.11E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	100	0%
Chlorobenzene	24 HOUR	1.73E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	231	0%
	ANNUAL	9.23E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	154	0%
Chloroform	24 HOUR	1.63E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	175	0%
	ANNUAL	8.64E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	117	0%
Chrysene	24 HOUR	3.95E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.36	0%
	ANNUAL	2.10E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.24	0%

Hudson Logistics - Hudson, NH

AERMOD Dispersion Modeling Analysis

RTAPS Results - Stationary Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (µg/m^3)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	STANDARD (µg/m^3)	% of Standard
Ethyl Benzene	24 HOUR	2.27E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	1000	0%
	ANNUAL	1.21E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	1000	0%
Ethylene Dibromide	24 HOUR	2.53E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.05	5%
	ANNUAL	1.35E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.05	0%
Fluoranthene	24 HOUR	6.33E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	3.38E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Fluorene	24 HOUR	3.24E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	1.72E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Formaldehyde	24 HOUR	2.80E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	1.3	2%
	ANNUAL	1.49E-05	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.88	0%
Hexane	24 HOUR	6.33E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	885	0%
	ANNUAL	3.38E-05	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	700	0%
Methanol	24 HOUR	1.43E-01	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	20000	0%
	ANNUAL	7.58E-05	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	20000	0%
Methylene Chloride	24 HOUR	1.14E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	621	0%
	ANNUAL	6.08E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	600	0%
Naphthalene	24 HOUR	4.25E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	186	0%
	ANNUAL	2.26E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	3	0%
PAH	24 HOUR	1.53E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	8.18E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Phenanthrene	24 HOUR	5.94E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.71	0%
	ANNUAL	3.16E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.48	0%
Phenol	24 HOUR	1.37E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	68	0%
	ANNUAL	7.32E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	45	0%
Pyrene	24 HOUR	7.78E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.71	0%
	ANNUAL (1)	4.13E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.48	0%
Styrene	24 HOUR	1.35E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	1000	0%
	ANNUAL	7.19E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	1000	0%
Tetrachloroethane	24 HOUR	1.41E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	7.52E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Toluene	24 HOUR	2.33E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	5000	0%
	ANNUAL	1.24E-05	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	5000	0%
Vinyl Chloride	24 HOUR	8.48E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	9.3	0%
	ANNUAL	4.53E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	6.2	0%
Xylene	24 HOUR	1.05E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	1550	0%
	ANNUAL	5.59E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	100	0%

Hudson Logistics - Hudson, NH

AERMOD Dispersion Modeling Analysis

NAAQS Results - Mobile Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (μg/m^3)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	BACKGROUND CONCENTRATION (μg/m^3)	TOTAL CONCENTRATION (μg/m^3)	STANDARD (μg/m^3)	% of Standard
PM_{10}	24 HOUR (2)	3.72129	16010824	300982.44, 4732401.80, 42.00, 42.00, 0.00	31.0	34.7	150	23%
$PM_{2.5}$	24 HOUR (3)	1.15865	2014-2018	300982.44, 4732401.80, 42.00, 42.00, 0.00	11.7	12.9	35	37%
	ANNUAL (4)	0.46383	2014-2018	300882.44, 4732401.80, 43.10, 43.10, 0.00	4.7	5.2	12	43%
NO_2	1 HOUR (5)	38.58741	2014-2018	301119.12, 4731663.71, 47.58, 47.58, 0.00	42.0	80.6	188	43%
	ANNUAL (1)	3.33506	2015	301064.57, 4733367.20, 45.00, 45.00, 0.00	5.6	9.0	100	9%

Notes:

(1) Highest Annual Concentration Over 5 Years
(2) Highest 6th-High Concentration Over 5 Years
(3) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years
(4) Maximum Annual Concentration Averaged Over 5 Years
(5) Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years

Hudson Logistics - Hudson, NH
AERMOD Dispersion Modeling Analysis
RTAPS Results - Mobile Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (µg/m³)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	STANDARD (µg/m³)	% of Standard
Diesel Particulate	24 HOUR	6.28E-01	15011224	301464.57, 4734267.20, 56.68 , 56.68, 0.00	NA	NA
	ANNUAL	1.57E-01	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	5	3%
1,3-Butadiene	24 HOUR	4.95E-03	15011224	301119.12, 4731663.71, 47.58, 47.58, 0.00	2	0%
	ANNUAL	1.03E-03	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	2	0%
Acetaldehyde	24 HOUR	4.52E-02	15011224	301119.12, 4731663.71, 47.58, 47.58 , 0.00	161	0%
	ANNUAL	9.13E-03	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	9	0%
Acrolein	24 HOUR	7.90E-03	15011224	301119.12, 4731663.71, 47.58, 47.58, 0.00	0.82	1%
	ANNUAL	1.59E-03	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	0.02	8%
Arsenic Compounds	24 HOUR	1.30E-03	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	0.036	4%
	ANNUAL	1.97E-04	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	0.024	1%
Benzene	24 HOUR	4.22E-02	15011224	301119.12, 4731663.71, 47.58, 47.58, 0.00	5.7	1%
	ANNUAL	1.22E-02	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	3.8	0%
Chromium 6+	24 HOUR	6.62E-06	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	0.036	0%
	ANNUAL	1.00E-06	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	0.024	0%
Ethyl Benzene	24 HOUR	4.17E-02	14011024	301664.57, 4733167.20, 51.35, 51.35, 0.00	1000	0%
	ANNUAL	1.30E-02	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	1000	0%
Formaldehyde	24 HOUR	1.07E-01	15011224	301119.12, 4731663.71, 47.58, 47.58, 0.00	1.3	8%
	ANNUAL	2.17E-02	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	0.88	2%
Hexane	24 HOUR	3.73E-02	14011024	301664.57, 4733167.20, 51.35, 51.35, 0.00	885	0%
	ANNUAL	1.15E-02	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	700	0%
Manganese Compounds	24 HOUR	8.94E-04	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	0.1	1%
	ANNUAL	1.35E-04	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	0.05	0%
Naphthalene	24 HOUR	1.17E-02	15011224	301119.12, 4731663.71, 47.58, 47.58, 0.00	186	0%
	ANNUAL	2.40E-03	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	3	0%
Nickel Compounds	24 HOUR	1.15E-03	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	3.6	0%
	ANNUAL	1.74E-04	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	2.4	0%
Propionaldehyde	24 HOUR	5.43E-03	15011224	301119.12, 4731663.71, 47.58, 47.58, 0.00	239	0%
	ANNUAL	1.11E-03	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	8	0%
Styrene	24 HOUR	1.85E-03	15011224	301119.12, 4731663.71, 47.58, 47.58, 0.00	1000	0%
	ANNUAL	4.03E-04	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	1000	0%
Toluene	24 HOUR	1.69E-01	14011024	301664.57, 4733167.20, 51.35, 51.35, 0.00	5000	0%
	ANNUAL	5.25E-02	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	5000	0%
Total Mercury Compounds	24 HOUR	5.81E-05	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	0.3	0%
	ANNUAL	8.80E-06	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	0.3	0%
Xylene	24 HOUR	1.36E-01	14011024	301664.57, 4733167.20, 51.35, 51.35, 0.00	1550	0%
	ANNUAL	4.22E-02	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	100	0%

Hudson Logistics - Hudson, NH
AERMOD Dispersion Modeling Analysis
NAAQS Results - All Sources

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PM_{10}	24 HOUR (2)	3.72129	16010824	300982.44, 4732401.80, 42.00, 42.00, 0.00	31.0	34.7	150	23%
$PM_{2.5}$	24 HOUR (3)	1.15865	2014-2018	300982.44, 4732401.80, 42.00, 42.00, 0.00	11.7	12.9	35	37%
	ANNUAL (4)	0.46383	2014-2018	300882.44, 4732401.80, 43.10, 43.10, 0.00	4.7	5.2	12	43%
NO_2	1 HOUR (5)	40.95797	2014-2018	301077.23, 4731641.41, 48.39, 48.39, 0.00	42.0	82.9	188	44%
	ANNUAL (1)	3.37819	2015	301064.57, 4733367.20, 45.00, 45.00, 0.00	5.6	9.0	100	9%

Notes:

(1) Highest Annual Concentration Over 5 Years
(2) Highest 6th-High Concentration Over 5 Years
(3) Maximum 8th-Highest 24-Hour Concentration Averaged Over 5 Years
(4) Maximum Annual Concentration Averaged Over 5 Years
(5) Maximum 8th-Highest Maximum Daily 1-Hour Concentration Averaged Over 5 Years

Hudson Logistics - Hudson, NH
AERMOD Dispersion Modeling Analysis
RTAPS Results - All Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (μg/m^3)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	STANDARD (μg/m^3)	% of Standard
Diesel Particulate	24 HOUR	6.28E-01	15011224	301464.57, 4734267.20, 56.68 , 56.68, 0.00	NA	NA
	ANNUAL	1.57E-01	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	5	3%
1,1,2,2-Tetrachloroethane	24 HOUR	2.28E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	25	0%
	ANNUAL	1.21E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	16	0%
1,1,2-Trichloroethane	24 HOUR	1.82E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	277	0%
	ANNUAL	9.69E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	184	0%
1,3-Butadiene	24 HOUR	1.71E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	2	1%
	ANNUAL	1.04E-03	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	2	0%
1,3-Dichloropropene	24 HOUR	1.51E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	20	0%
	ANNUAL	8.04E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	20	0%
2,2,4-Trimethylpentane	24 HOUR	1.43E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	7.58E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
2-Methylnaphthalene	24 HOUR	1.89E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	15	0%
	ANNUAL	1.01E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	9.7	0%
Acenaphthene	24 HOUR	7.14E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	3.80E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Acenaphthylene	24 HOUR	3.15E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	1.68E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Acetaldehyde	24 HOUR	4.94E-01	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	161	0%
	ANNUAL	9.56E-03	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	9	0%
Acrolein	24 HOUR	2.96E-01	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.82	36%
	ANNUAL	3.02E-03	2014	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.02	15%
Arsenic Compounds	24 HOUR	1.30E-03	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	0.036	4%
	ANNUAL	1.97E-04	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	0.024	1%
Benzene	24 HOUR	5.53E-02	15011224	301161.01, 4731686.00, 46.73, 46.73, 0.00	5.7	1%
	ANNUAL	1.22E-02	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	3.8	0%
Benzo(b)fluoranthene	24 HOUR	9.47E-06	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.36	0%
	ANNUAL	5.04E-09	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.24	0%
Benzo(e)pyrene	24 HOUR	2.37E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	1.26E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Benzo(g,h,i)perylene	24 HOUR	2.36E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	1.26E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Biphenyl	24 HOUR	1.21E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	4.6	0%
	ANNUAL	6.44E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	3.1	0%
Carbon Tetrachloride	24 HOUR	2.09E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	111	0%
	ANNUAL	1.11E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	100	0%
Chlorobenzene	24 HOUR	1.73E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	231	0%
	ANNUAL	9.23E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	154	0%
Chloroform	24 HOUR	1.63E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	175	0%
	ANNUAL	8.64E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	117	0%
Chromium 6+	24 HOUR	6.62E-06	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	0.036	0%
	ANNUAL	1.00E-06	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	0.024	0%
Chrysene	24 HOUR	3.95E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.36	0%
	ANNUAL	2.10E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.24	0%
Ethyl Benzene	24 HOUR	2.27E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	1000	0%
	ANNUAL	1.89E-05	2014	300523.04, 4732042.34, 33.50, 45.14, 0.00	1000	0%
Ethylene Dibromide	24 HOUR	2.53E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.05	5%
	ANNUAL	1.35E-06	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.05	0%

Hudson Logistics - Hudson, NH
AERMOD Dispersion Modeling Analysis
RTAPS Results - All Sources

POLLUTANT	AVERAGING TIME	MAXIMUM MODELED CONCENTRATION (µg/m^3)	DATE of MODELED MAX (YYMMDDHH or YYYY)	Location (UTME, UTMN, Elev., Hill, Flagpole) (m)	STANDARD (µg/m^3)	% of Standard
Fluoranthene	24 HOUR	6.33E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	3.38E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Fluorene	24 HOUR	3.24E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	1.72E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Formaldehyde	24 HOUR	1.21E-01	17120224	301119.12, 4731663.71, 47.58, 47.58, 0.00	1.3	9%
	ANNUAL	2.18E-02	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	0.88	2%
Hexane	24 HOUR	6.33E-02	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	885	0%
	ANNUAL	5.28E-04	2014	300523.04, 4732042.34, 33.50, 45.14, 0.00	700	0%
Manganese Compounds	24 HOUR	8.94E-04	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	0.1	1%
	ANNUAL	1.35E-04	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	0.05	0%
Methanol	24 HOUR	1.43E-01	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	20000	0%
	ANNUAL	7.58E-05	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	20000	0%
Methylene Chloride	24 HOUR	1.14E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	621	0%
	ANNUAL	6.08E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	600	0%
Naphthalene	24 HOUR	4.25E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	186	0%
	ANNUAL	3.54E-05	2014	300523.04, 4732042.34, 33.50, 45.14, 0.00	3	0%
Nickel Compounds	24 HOUR	1.15E-03	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	3.6	0%
	ANNUAL	1.74E-04	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	2.4	0%
PAH	24 HOUR	1.53E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	8.18E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Phenanthrene	24 HOUR	5.94E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.71	0%
	ANNUAL	3.16E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.48	0%
Phenol	24 HOUR	1.37E-03	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	68	0%
	ANNUAL	7.32E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	45	0%
Propionaldehyde	24 HOUR	5.43E-03	15011224	301119.12, 4731663.71, 47.58, 47.58, 0.00	239	0%
	ANNUAL	1.11E-03	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	8	0%
Pyrene	24 HOUR	7.78E-05	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.71	0%
	ANNUAL [(1)]	4.13E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	0.48	0%
Styrene	24 HOUR	2.56E-03	15011224	301161.01, 4731686.00, 46.73, 46.73, 0.00	1000	0%
	ANNUAL	4.04E-04	2015	301399.83, 4732787.85, 38.69, 38.69, 0.00	1000	0%
Tetrachloroethane	24 HOUR	1.41E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
	ANNUAL	7.52E-08	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	NA	NA
Toluene	24 HOUR	1.69E-01	14011024	301664.57, 4733167.20, 51.35, 51.35, 0.00	5000	0%
	ANNUAL	5.26E-02	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	5000	0%
Total Mercury Compounds	24 HOUR	5.81E-05	14011024	301464.57, 4734267.20, 56.68, 56.68, 0.00	0.3	0%
	ANNUAL	8.80E-06	2015	301364.57, 4734267.20, 56.77, 56.77, 0.00	0.3	0%
Vinyl Chloride	24 HOUR	8.48E-04	17120224	300523.04, 4732042.34, 33.50, 45.14, 0.00	9.3	0%
	ANNUAL	4.53E-07	2016	300523.04, 4732042.34, 33.50, 45.14, 0.00	6.2	0%
Xylene	24 HOUR	1.36E-01	14011024	301664.57, 4733167.20, 51.35, 51.35, 0.00	1550	0%
	ANNUAL	4.22E-02	2015	301464.57, 4733267.20, 47.30, 47.30, 0.00	100	0%

Attachment B

Hudson Logistics
2022 Mitigated Build
Intersection Peak Hour Emission Rates

Source ID	Intersection	Average Peak Delay time (s/veh)	Peak Traffic Volume (vph)	NOX (g/s)	PM10 (g/s)	PM2.5 (g/s)	Diesel Particulate (g/s)	1,3Butadiene (g/s)	Acetaldehyde (g/s)	Acrolein (g/s)	Arsenic Compounds (g/s)	Benzene (g/s)	Chromium 6+ (g/s)	Ethyl Benzene (g/s)	Formaldehyde (g/s)	Hexane (g/s)	Manganese Compounds (g/s)
				Idle MOVES Emission Factor NOX (g/hr)	Idle MOVES Emission Factor PM10 (g/hr)	Idle MOVES Emission Factor PM2.5 (g/hr)	Idle MOVES Emission Factor Diesel Particulate (g/hr)	Idle MOVES Emission Factor 1,3-Butadiene (g/hr)	Idle MOVES Emission Factor Acet-aldehyde (g/hr)	Idle MOVES Emission Factor Acrolein (g/hr)	Idle MOVES Emission Factor Arsenic (g/hr)	Idle MOVES Emission Factor Benzene (g/hr)	Idle MOVES Emission Factor Chromium 6+ (g/hr)	Idle MOVES Emission Factor Ethyl Benzene (g/hr)	Idle MOVES Emission Factor Formal-dehyde (g/hr)	Idle MOVES Emission Factor Hexane (g/hr)	Idle MOVES Emission Factor Manganese (g/hr)
				7.4221	0.5916	0.5429	5.92E-01	4.09E-03	3.54E-02	6.24E-03	1.39E-03	3.04E-02	7.07E-06	2.36E-02	8.35E-02	1.90E-02	9.54E-04
VOL1	1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road	43.16	75	1.85E-03	1.48E-04	1.36E-04	1.48E-04	1.02E-06	8.84E-06	1.56E-06	3.47E-07	7.59E-06	1.77E-09	5.89E-06	2.09E-05	4.75E-06	2.38E-07
VOL2	2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue	13.95	392	3.13E-03	2.50E-04	2.29E-04	2.50E-04	1.73E-06	1.49E-05	2.63E-06	5.86E-07	1.28E-05	2.98E-09	9.96E-06	3.52E-05	8.01E-06	4.02E-07
VOL3	3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway	28.30	535	8.67E-03	6.91E-04	6.34E-04	6.92E-04	4.78E-06	4.14E-05	7.29E-06	1.62E-06	3.55E-05	8.26E-09	2.76E-05	9.75E-05	2.22E-05	1.11E-06
VOL4	4: Lowell Road (Route 3A) & Sagamore Bridge Road	45.77	507	1.33E-02	1.06E-03	9.72E-04	1.06E-03	7.32E-06	6.34E-05	1.12E-05	2.49E-06	5.44E-05	1.27E-08	4.23E-05	1.50E-04	3.40E-05	1.71E-06
VOL5	5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road	43.45	88	2.19E-03	1.75E-04	1.60E-04	1.75E-04	1.21E-06	1.04E-05	1.84E-06	4.10E-07	8.97E-06	2.09E-09	6.96E-06	2.46E-05	5.61E-06	2.81E-07
VOL6	6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive	13.48	88	6.79E-04	5.42E-05	4.97E-05	5.42E-05	3.74E-07	3.24E-06	5.71E-07	1.27E-07	2.78E-06	6.47E-10	2.16E-06	7.64E-06	1.74E-06	8.73E-08
VOL7	7: Lowell Road (Route 3A) & Executive Drive	23.67	88	1.19E-03	9.51E-05	8.73E-05	9.52E-05	6.57E-07	5.69E-06	1.00E-06	2.23E-07	4.89E-06	1.14E-09	3.79E-06	1.34E-05	3.05E-06	1.53E-07
VOL8	8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway	27.70	88	1.40E-03	1.11E-04	1.02E-04	1.11E-04	7.69E-07	6.66E-06	1.17E-06	2.61E-07	5.72E-06	1.33E-09	4.44E-06	1.57E-05	3.57E-06	1.79E-07
VOL9	9: Lowell Road (Route 3A) & Pelham Road	65.81	88	3.32E-03	2.64E-04	2.43E-04	2.65E-04	1.83E-06	1.58E-05	2.79E-06	6.21E-07	1.36E-05	3.16E-09	1.05E-05	3.73E-05	8.49E-06	4.26E-07

Hudson Logistics
2022 Mitigated Build
Intersection Peak Hour Emission Rates

			Idle MOVES Emission Factor Mercury (g/hr)	Idle MOVES Emission Factor Naph-thalene (g/hr)	Idle MOVES Emission Factor Nickel (g/hr)	Idle MOVES Emission Factor Propion-aldehyde (g/hr)	Idle MOVES Emission Factor Styrene (g/hr)	Idle MOVES Emission Factor Toluene (g/hr)	Idle MOVES Emission Factor Xylene (g/hr)
			6.21E-05	9.17E-03	1.23E-03	4.29E-03	1.44E-03	9.16E-02	7.63E-02
	Average		Total Mercury Compounds	Naphthalene	Nickel Compounds	Propionaldehyde	Styrene	Toluene	Xylene
Intersection	Peak Delay time (s/veh)	Peak Traffic Volume (vph)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)	(g/s)
1: River Road (Route 3A)/Lowell Road (Route 3A) & Dracut Road & Steele Road	43.16	75	1.55E-08	2.29E-06	3.07E-07	1.07E-06	3.60E-07	2.29E-05	1.91E-05
2: Lowell Road (Route 3A) & Site Driveway/Rena Avenue	13.95	392	2.62E-08	3.87E-06	5.19E-07	1.81E-06	6.07E-07	3.86E-05	3.22E-05
3: Lowell Road (Route 3A) & Sam's Club Driveway/Walmart Driveway	28.30	535	7.25E-08	1.07E-05	1.44E-06	5.01E-06	1.68E-06	1.07E-04	8.91E-05
4: Lowell Road (Route 3A) & Sagamore Bridge Road	45.77	507	1.11E-07	1.64E-05	2.20E-06	7.68E-06	2.58E-06	1.64E-04	1.37E-04
5: Lowell Road (Route 3A) & Flagstone Drive/Wason Road	43.45	88	1.83E-08	2.71E-06	3.63E-07	1.27E-06	4.25E-07	2.70E-05	2.25E-05
6: Lowell Road (Route 3A) & Hampshire Drive/Oblate Drive	13.48	88	5.68E-09	8.40E-07	1.13E-07	3.93E-07	1.32E-07	8.39E-06	6.98E-06
7: Lowell Road (Route 3A) & Executive Drive	23.67	88	9.98E-09	1.47E-06	1.98E-07	6.90E-07	2.31E-07	1.47E-05	1.23E-05
8: Lowell Road (Route 3A) & Fox Hollow Drive/Nottingham Square Driveway	27.70	88	1.17E-08	1.73E-06	2.31E-07	8.07E-07	2.71E-07	1.72E-05	1.43E-05
9: Lowell Road (Route 3A) & Pelham Road	65.81	88	2.77E-08	4.10E-06	5.50E-07	1.92E-06	6.43E-07	4.09E-05	3.41E-05

Hudson Logistics

2022 Build

Roadway Link Peak Hour Emission Rates (g/s)

Link Number	Roadway Segment	Link Distance (meters)	Link Distance (miles)	NOX	Total PM10	Total PM2.5	SO2	Diesel Particulate	1,3Butadiene	Acetaldehyde	Acrolein	Arsenic Compounds	Benzene	Chromium 6+	Ethyl Benzene	Formaldehyde	Hexane
L1	River Road, S of Dracut/Steele	279	0.1734	5.36E-04	6.19E-05	3.05E-05	2.83E-06	2.17E-05	1.18E-07	1.04E-06	1.80E-07	1.78E-08	1.77E-06	9.08E-11	2.15E-06	2.47E-06	1.97E-06
L3	Dracut Road, (River Rd to Stuart Street)	266.3	0.1655	1.66E-03	1.92E-04	9.45E-05	8.76E-06	6.74E-05	3.67E-07	3.22E-06	5.58E-07	5.52E-08	5.56E-06	2.82E-10	6.90E-06	7.66E-06	6.32E-06
L4	Lowell Road, Dracut Rd to Rena Ave/Site Drive	539.2	0.3350	9.71E-03	1.12E-03	5.52E-04	5.12E-05	3.94E-04	2.15E-06	1.88E-05	3.26E-06	3.22E-07	2.70E-05	1.65E-09	2.57E-05	4.47E-05	2.23E-05
L6	Site Driveway to Rotary	687.5	0.4272	6.83E-02	9.32E-03	4.20E-03	3.84E-04	2.72E-03	1.79E-05	1.58E-04	2.74E-05	2.99E-06	1.99E-04	1.53E-08	1.64E-04	3.77E-04	1.36E-04
L7	Lowell Road, Rena/Site to Walmart/Sams Drive	299.5	0.1861	2.48E-02	2.86E-03	1.41E-03	1.31E-04	1.01E-03	5.48E-06	4.81E-05	8.33E-06	8.24E-07	7.99E-05	4.20E-09	9.48E-05	1.14E-04	8.61E-05
L8	Sams Driveway	374.6	0.2328	2.23E-02	3.04E-03	1.37E-03	1.25E-04	8.87E-04	5.84E-06	5.16E-05	8.95E-06	9.77E-07	7.22E-05	4.98E-09	7.24E-05	1.23E-04	6.34E-05
L10	Lowell Rd, Walmart/Sams to Sagamore Bridge Rd	316.3	0.1965	3.85E-02	4.45E-03	2.19E-03	2.03E-04	1.56E-03	8.51E-06	7.46E-05	1.29E-05	1.28E-06	1.22E-04	6.53E-09	1.42E-04	1.77E-04	1.28E-04
L11	Sagamore Bridge Rd WB	1151.9	0.7158	9.73E-02	6.25E-03	3.79E-03	5.20E-04	2.78E-03	1.88E-05	1.66E-04	2.88E-05	2.31E-06	2.21E-04	1.18E-08	1.77E-04	3.92E-04	1.46E-04
L12	Sagamore Bridge Rd EB	1010.9	0.6281	1.79E-02	1.15E-03	6.98E-04	9.59E-05	5.12E-04	3.46E-06	3.06E-05	5.31E-06	4.26E-07	4.16E-05	2.17E-09	3.47E-05	7.23E-05	2.90E-05
L13	Lowell Rd, Sagamore Bridge Rd to Flagstone/Wason	338.7	0.2105	7.15E-03	8.26E-04	4.07E-04	3.77E-05	2.90E-04	1.58E-06	1.39E-05	2.40E-06	2.38E-07	2.22E-05	1.21E-09	2.52E-05	3.30E-05	2.27E-05
L16	Lowell Rd, Wason/Flagstone to Oblate/Hampshire	457.5	0.2843	9.66E-03	1.12E-03	5.49E-04	5.10E-05	3.92E-04	2.14E-06	1.87E-05	3.24E-06	3.21E-07	2.78E-05	1.64E-09	2.81E-05	4.45E-05	2.47E-05
L19	Lowell Rd, Oblate/Hampshire to Executive Dr	553.9	0.3442	1.17E-02	1.35E-03	6.65E-04	6.17E-05	4.74E-04	2.59E-06	2.27E-05	3.93E-06	3.89E-07	3.24E-05	1.98E-09	3.05E-05	5.39E-05	2.64E-05
L22	Lowell Rd, Executive to Nottingham Sq, Fox Hollow	780.8	0.4852	1.65E-02	1.90E-03	9.37E-04	8.70E-05	6.69E-04	3.65E-06	3.20E-05	5.54E-06	5.48E-07	4.31E-05	2.80E-09	3.62E-05	7.60E-05	3.03E-05
L25	Lowell Rd, Fox/Nottingham to Pelham Rd	197.1	0.1225	4.16E-03	4.81E-04	2.37E-04	2.20E-05	1.69E-04	9.20E-07	8.07E-06	1.40E-06	1.38E-07	1.56E-05	7.06E-10	2.16E-05	1.92E-05	2.02E-05
L28	Lot A Road	993.4	0.6173	1.38E-01	2.49E-02	9.31E-03	8.31E-04	5.01E-03	4.72E-05	4.45E-04	7.75E-05	9.12E-06	4.29E-04	4.66E-08	3.08E-04	1.06E-03	2.46E-04
L29	Lot B Road	609.1	0.3785	4.25E-02	7.68E-03	2.87E-03	2.56E-04	1.54E-03	1.45E-05	1.37E-04	2.39E-05	2.81E-06	1.38E-04	1.44E-08	1.09E-04	3.27E-04	9.00E-05
L30	Lot C Road	636.2	0.3953	2.09E-02	3.78E-03	1.41E-03	1.26E-04	7.60E-04	7.16E-06	6.75E-05	1.18E-05	1.38E-06	6.75E-05	7.07E-09	5.30E-05	1.61E-04	4.36E-05

Hudson Logistics

2022 Build

Roadway Link Peak Hour Emission Rates (g/s)

Link Number	Roadway Segment	Link Distance (meters)	Link Distance (miles)	Manganese Compounds	Total Mercury Compounds	Naphthalene	Nickel Compounds	Propionaldehyde	Styrene	Toluene	Xylene
L1	River Road, S of Dracut/Steele	279	0.1734	1.23E-08	7.97E-10	2.73E-07	1.58E-08	1.27E-07	4.71E-08	8.75E-06	6.98E-06
L3	Dracut Road, (River Rd to Stuart Street)	266.3	0.1655	3.80E-08	2.47E-09	8.48E-07	4.90E-08	3.95E-07	1.46E-07	2.80E-05	2.24E-05
L4	Lowell Road, Dracut Rd to Rena Ave/Site Drive	539.2	0.3350	2.22E-07	1.44E-08	4.95E-06	2.86E-07	2.31E-06	8.54E-07	1.04E-04	8.41E-05
L6	Site Driveway to Rotary	687.5	0.4272	2.06E-06	1.34E-07	4.15E-05	2.66E-06	1.92E-05	7.02E-06	6.63E-04	5.39E-04
L7	Lowell Road, Rena/Site to Walmart/Sams Drive	299.5	0.1861	5.67E-07	3.69E-08	1.27E-05	7.31E-07	5.89E-06	2.18E-06	3.85E-04	3.08E-04
L8	Sams Driveway	374.6	0.2328	6.73E-07	4.38E-08	1.36E-05	8.67E-07	6.28E-06	2.29E-06	2.93E-04	2.36E-04
L10	Lowell Rd, Walmart/Sams to Sagamore Bridge Rd	316.3	0.1965	8.80E-07	5.73E-08	1.96E-05	1.13E-06	9.14E-06	3.39E-06	5.76E-04	4.60E-04
L11	Sagamore Bridge Rd WB	1151.9	0.7158	1.59E-06	1.03E-07	4.37E-05	2.05E-06	2.06E-05	7.62E-06	7.20E-04	5.83E-04
L12	Sagamore Bridge Rd EB	1010.9	0.6281	2.93E-07	1.91E-08	8.06E-06	3.78E-07	3.80E-06	1.40E-06	1.41E-04	1.14E-04
L13	Lowell Rd, Sagamore Bridge Rd to Flagstone/Wason	338.7	0.2105	1.64E-07	1.06E-08	3.65E-06	2.11E-07	1.70E-06	6.30E-07	1.02E-04	8.18E-05
L16	Lowell Rd, Wason/Flagstone to Oblate/Hampshire	457.5	0.2843	2.21E-07	1.44E-08	4.93E-06	2.85E-07	2.30E-06	8.50E-07	1.14E-04	9.18E-05
L19	Lowell Rd, Oblate/Hampshire to Executive Dr	553.9	0.3442	2.68E-07	1.74E-08	5.97E-06	3.45E-07	2.78E-06	1.03E-06	1.24E-04	9.99E-05
L22	Lowell Rd, Executive to Nottingham Sq, Fox Hollow	780.8	0.4852	3.77E-07	2.45E-08	8.42E-06	4.86E-07	3.92E-06	1.45E-06	1.47E-04	1.19E-04
L25	Lowell Rd, Fox/Nottingham to Pelham Rd	197.1	0.1225	9.52E-08	6.19E-09	2.12E-06	1.23E-07	9.89E-07	3.66E-07	8.79E-05	6.99E-05
L28	Lot A Road	993.4	0.6173	6.28E-06	4.09E-07	1.15E-04	8.10E-06	5.32E-05	1.82E-05	1.23E-03	1.01E-03
L29	Lot B Road	609.1	0.3785	1.94E-06	1.26E-07	3.56E-05	2.50E-06	1.64E-05	5.61E-06	4.36E-04	3.57E-04
L30	Lot C Road	636.2	0.3953	9.54E-07	6.20E-08	1.75E-05	1.23E-06	8.07E-06	2.76E-06	2.12E-04	1.73E-04

Hudson Logistics Center
2022 Build
Onsite Lot Peak Hour Emission Rates

Source ID	Lot	Lot Area (m2)	Average Peak Delay time (s/veh)	Peak Truck Traffic Volume (vph)	NOX (g/s/m2)	PM10 (g/s/m2)	PM2.5 (g/s/m2)	Diesel Particulate (g/s/m2)	1,3Butadiene (g/s/m2)	Acetaldehyde (g/s/m2)	Acrolein (g/s/m2)	Arsenic Compounds (g/s/m2)	Benzene (g/s/m2)	Chromium 6+ (g/s/m2)	Ethyl Benzene (g/s/m2)	Formaldehyde (g/s/m2)	Hexane (g/s/m2)
					Idle MOVES Emission Factor NOX (g/hr)	Idle MOVES Emission Factor PM10 (g/hr)	Idle MOVES Emission Factor PM2.5 (g/hr)	Idle MOVES Emission Factor Diesel Particulate (g/hr)	Idle MOVES Emission Factor 1,3-Butadiene (g/hr)	Idle MOVES Emission Factor Acet-aldehyde (g/hr)	Idle MOVES Emission Factor Acrolein (g/hr)	Idle MOVES Emission Factor Arsenic (g/hr)	Idle MOVES Emission Factor Benzene (g/hr)	Idle MOVES Emission Factor Chromium 6+ (g/hr)	Idle MOVES Emission Factor Ethyl Benzene (g/hr)	Idle MOVES Emission Factor Formal-dehyde (g/hr)	Idle MOVES Emission Factor Hexane (g/hr)
					7.4221	0.5916	0.5429	5.92E-01	4.09E-03	3.54E-02	6.24E-03	1.39E-03	3.04E-02	7.07E-06	2.36E-02	8.35E-02	1.90E-02
LOTA	Lot A	60875.8	900.00	20	1.69E-07	1.35E-08	1.24E-08	1.35E-08	9.33E-11	8.08E-10	1.42E-10	3.17E-11	6.94E-10	1.61E-13	5.38E-10	1.91E-09	4.33E-10
LOTB	Lot B	34974.2	900.00	26	3.83E-07	3.05E-08	2.80E-08	3.06E-08	2.11E-10	1.83E-09	3.22E-10	7.18E-11	1.57E-09	3.65E-13	1.22E-09	4.31E-09	9.81E-10
LOTC	Lot C	54773.4	900.00	13	1.22E-07	9.75E-09	8.95E-09	9.76E-09	6.74E-11	5.83E-10	1.03E-10	2.29E-11	5.01E-10	1.17E-13	3.89E-10	1.38E-09	3.13E-10

Hudson Logistics Center
2022 Build
Onsite Lot Peak Hour Emission Rates

				Idle MOVES Emission Factor Manganese (g/hr)	Idle MOVES Emission Factor Mercury (g/hr)	Idle MOVES Emission Factor Naph-thalene (g/hr)	Idle MOVES Emission Factor Nickel (g/hr)	Idle MOVES Emission Factor Propion-aldehyde (g/hr)	Idle MOVES Emission Factor Styrene (g/hr)	Idle MOVES Emission Factor Toluene (g/hr)	Idle MOVES Emission Factor Xylene (g/hr)
				9.54E-04	6.21E-05	9.17E-03	1.23E-03	4.29E-03	1.44E-03	9.16E-02	7.63E-02
				Manganese Compounds	Total Mercury Compounds	Naphthalene	Nickel Compounds	Propionaldehyde	Styrene	Toluene	Xylene
Lot	Lot Area (m2)	Average Peak Delay time (s/veh)	Peak Truck Traffic Volume (vph)	(g/s/m2)	(g/s/m2)	(g/s/m2)	(g/s/m2)	(g/s/m2)	(g/s/m2)	(g/s/m2)	(g/s/m2)
Lot A	60875.8	900.00	20	2.18E-11	1.42E-12	2.09E-10	2.81E-11	9.79E-11	3.29E-11	2.09E-09	1.74E-09
Lot B	34974.2	900.00	26	4.93E-11	3.21E-12	4.74E-10	6.35E-11	2.21E-10	7.43E-11	4.73E-09	3.94E-09
Lot C	54773.4	900.00	13	1.57E-11	1.02E-12	1.51E-10	2.03E-11	7.07E-11	2.37E-11	1.51E-09	1.26E-09

Langan Hudson Logistics

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (meters)	Link Distance (miles)	Link Average Width (ft)	Estimated Average Speed (mph)	AM Peak Hour Project Trips	PM Peak Hour Project Trips
L1	River Road, S of Dracut/Steele	279.00	0.17	68	30	9	8
L3	Dracut Road, (River Rd to Stuart Street)	266.30	0.17	50	30	30	26
L4	Lowell Road, Dracut Rd to Rena Ave/Site Drive	539.20	0.34	80	30	50	75
L6	Site Driveway to Rotary	687.50	0.43	54	20	252	364
L7	Lowell Road, Rena/Site to Walmart/Sams Drive	299.50	0.19	106	30	238	345
L8	Sams Driveway	374.60	0.23	75	20	135	218
L10	Lowell Rd, Walmart/Sams to Sagamore Bridge Rd	316.30	0.20	110	30	337	507
L11	Sagamore Bridge Rd WB	1,151.90	0.72	50	50	279	419
L12	Sagamore Bridge Rd EB	1,010.90	0.63	50	50	58	88
L13	Lowell Rd, Sagamore Bridge Rd to Flagstone/Wason	338.70	0.21	90	30	58	88
L16	Lowell Rd, Wason/Flagstone to Oblate/Hampshire	457.50	0.28	90	30	58	88
L19	Lowell Rd, Oblate/Hampshire to Executive Dr	553.90	0.34	75	30	58	88
L22	Lowell Rd, Executive to Nottingham Sq, Fox Hollow	780.80	0.49	75	30	58	88
L25	Lowell Rd, Fox/Nottingham to Pelham Rd	197.10	0.12	60	30	58	88
L28	Lot A Road	993.40	0.62	50	10	238	384
L29	Lot B Road	609.10	0.38	50	10	114	193
L30	Lot C Road	636.20	0.40	50	10	88	91

Langan Hudson Logistics

Regional Mesoscale Emissions Analysis - Roadway Emissions
Link Data

Link Number	Roadway Segment	Link Distance (meters)	Link Distance (miles)	Link Average Width (ft)	Estimated Average Speed (mph)
L1	River Road, S of Dracut/Steele	279.00	0.17	68	30
L3	Dracut Road, (River Rd to Stuart Street)	266.30	0.17	50	30
L4	Lowell Road, Dracut Rd to Rena Ave/Site Drive	539.20	0.34	80	30
L6	Site Driveway to Rotary	687.50	0.43	54	20
L7	Lowell Road, Rena/Site to Walmart/Sams Drive	299.50	0.19	106	30
L8	Sams Driveway	374.60	0.23	75	20
L10	Lowell Rd, Walmart/Sams to Sagamore Bridge Rd	316.30	0.20	110	30
L11	Sagamore Bridge Rd WB	1,151.90	0.72	50	50
L12	Sagamore Bridge Rd EB	1,010.90	0.63	50	50
L13	Lowell Rd, Sagamore Bridge Rd to Flagstone/Wason	338.70	0.21	90	30
L16	Lowell Rd, Wason/Flagstone to Oblate/Hampshire	457.50	0.28	90	30
L19	Lowell Rd, Oblate/Hampshire to Executive Dr	553.90	0.34	75	30
L22	Lowell Rd, Executive to Nottingham Sq, Fox Hollow	780.80	0.49	75	30
L25	Lowell Rd, Fox/Nottingham to Pelham Rd	197.10	0.12	60	30
L28	Lot A Road	993.40	0.62	50	10
L29	Lot B Road	609.10	0.38	50	10
L30	Lot C Road	636.20	0.40	50	10

Attachment C

Langan Hudson Logistics

Mobile Source Temporal Variations

Offsite Roadways and Intersections

Hours	January	February	March	April	May	June	July	August	September	October	November	December
0:00	0.3469	0.3412	0.3076	0.2970	0.2862	0.2826	0.2928	0.2910	0.2946	0.2892	0.2982	0.2937
1:00	0.2857	0.2810	0.2533	0.2446	0.2357	0.2327	0.2411	0.2397	0.2426	0.2382	0.2456	0.2419
2:00	0.3878	0.3814	0.3437	0.3320	0.3199	0.3158	0.3273	0.3253	0.3293	0.3232	0.3333	0.3283
3:00	0.4694	0.4617	0.4161	0.4019	0.3872	0.3823	0.3962	0.3937	0.3986	0.3913	0.4035	0.3974
4:00	0.5102	0.5018	0.4523	0.4368	0.4209	0.4156	0.4306	0.4280	0.4333	0.4253	0.4386	0.4319
5:00	0.6531	0.6423	0.5789	0.5591	0.5387	0.5320	0.5512	0.5478	0.5546	0.5444	0.5614	0.5529
6:00	0.6327	0.6222	0.5608	0.5416	0.5219	0.5153	0.5340	0.5307	0.5373	0.5274	0.5438	0.5356
7:00	0.5714	0.5620	0.5066	0.4892	0.4714	0.4655	0.4823	0.4793	0.4853	0.4764	0.4912	0.4838
8:00	0.6122	0.6022	0.5427	0.5242	0.5051	0.4987	0.5167	0.5136	0.5199	0.5104	0.5263	0.5183
9:00	0.9592	0.9434	0.8503	0.8212	0.7913	0.7813	0.8096	0.8046	0.8146	0.7996	0.8245	0.8121
10:00	0.8980	0.8832	0.7960	0.7688	0.7408	0.7314	0.7579	0.7532	0.7626	0.7486	0.7719	0.7602
11:00	1.0000	0.9835	0.8865	0.8562	0.8250	0.8146	0.8440	0.8388	0.8492	0.8336	0.8596	0.8466
12:00	0.7347	0.7226	0.6513	0.6290	0.6061	0.5985	0.6201	0.6163	0.6239	0.6125	0.6316	0.6220
13:00	0.7755	0.7627	0.6875	0.6640	0.6398	0.6317	0.6545	0.6505	0.6586	0.6465	0.6666	0.6566
14:00	0.5918	0.5821	0.5247	0.5067	0.4882	0.4821	0.4995	0.4964	0.5026	0.4934	0.5088	0.5011
15:00	0.8163	0.8029	0.7237	0.6989	0.6734	0.6649	0.6890	0.6848	0.6932	0.6805	0.7017	0.6911
16:00	0.6122	0.6022	0.5427	0.5242	0.5051	0.4987	0.5167	0.5136	0.5199	0.5104	0.5263	0.5183
17:00	0.4082	0.4014	0.3618	0.3495	0.3367	0.3325	0.3445	0.3424	0.3466	0.3403	0.3509	0.3456
18:00	0.1837	0.1806	0.1628	0.1573	0.1515	0.1496	0.1550	0.1541	0.1560	0.1531	0.1579	0.1555
19:00	0.2041	0.2007	0.1809	0.1747	0.1684	0.1662	0.1722	0.1712	0.1733	0.1701	0.1754	0.1728
20:00	0.2041	0.2007	0.1809	0.1747	0.1684	0.1662	0.1722	0.1712	0.1733	0.1701	0.1754	0.1728
21:00	0.1837	0.1806	0.1628	0.1573	0.1515	0.1496	0.1550	0.1541	0.1560	0.1531	0.1579	0.1555
22:00	0.1633	0.1606	0.1447	0.1398	0.1347	0.1330	0.1378	0.1370	0.1386	0.1361	0.1403	0.1382
23:00	0.2857	0.2810	0.2533	0.2446	0.2357	0.2327	0.2411	0.2397	0.2426	0.2382	0.2456	0.2419

Lot A and Lot A Road

Hours	January	February	March	April	May	June	July	August	September	October	November	December
0:00	0.8000	0.7868	0.7092	0.6849	0.6600	0.6516	0.6752	0.6711	0.6794	0.6669	0.6877	0.6773
1:00	0.7000	0.6885	0.6205	0.5993	0.5775	0.5702	0.5908	0.5872	0.5945	0.5835	0.6017	0.5926
2:00	0.7000	0.6885	0.6205	0.5993	0.5775	0.5702	0.5908	0.5872	0.5945	0.5835	0.6017	0.5926
3:00	0.9000	0.8852	0.7978	0.7705	0.7425	0.7331	0.7596	0.7549	0.7643	0.7503	0.7737	0.7620
4:00	0.8000	0.7868	0.7092	0.6849	0.6600	0.6516	0.6752	0.6711	0.6794	0.6669	0.6877	0.6773
5:00	1.0000	0.9835	0.8865	0.8562	0.8250	0.8146	0.8440	0.8388	0.8492	0.8336	0.8596	0.8466
6:00	0.8000	0.7868	0.7092	0.6849	0.6600	0.6516	0.6752	0.6711	0.6794	0.6669	0.6877	0.6773
7:00	0.5000	0.4918	0.4432	0.4281	0.4125	0.4073	0.4220	0.4194	0.4246	0.4168	0.4298	0.4233
8:00	0.5000	0.4918	0.4432	0.4281	0.4125	0.4073	0.4220	0.4194	0.4246	0.4168	0.4298	0.4233
9:00	0.6000	0.5901	0.5319	0.5137	0.4950	0.4887	0.5064	0.5033	0.5095	0.5002	0.5158	0.5080
10:00	0.5000	0.4918	0.4432	0.4281	0.4125	0.4073	0.4220	0.4194	0.4246	0.4168	0.4298	0.4233
11:00	0.5000	0.4918	0.4432	0.4281	0.4125	0.4073	0.4220	0.4194	0.4246	0.4168	0.4298	0.4233
12:00	0.6000	0.5901	0.5319	0.5137	0.4950	0.4887	0.5064	0.5033	0.5095	0.5002	0.5158	0.5080
13:00	0.5000	0.4918	0.4432	0.4281	0.4125	0.4073	0.4220	0.4194	0.4246	0.4168	0.4298	0.4233
14:00	0.4000	0.3934	0.3546	0.3425	0.3300	0.3258	0.3376	0.3355	0.3397	0.3334	0.3438	0.3386
15:00	0.4000	0.3934	0.3546	0.3425	0.3300	0.3258	0.3376	0.3355	0.3397	0.3334	0.3438	0.3386
16:00	0.3000	0.2951	0.2659	0.2568	0.2475	0.2444	0.2532	0.2516	0.2548	0.2501	0.2579	0.2540
17:00	0.3000	0.2951	0.2659	0.2568	0.2475	0.2444	0.2532	0.2516	0.2548	0.2501	0.2579	0.2540
18:00	0.3000	0.2951	0.2659	0.2568	0.2475	0.2444	0.2532	0.2516	0.2548	0.2501	0.2579	0.2540
19:00	0.4000	0.3934	0.3546	0.3425	0.3300	0.3258	0.3376	0.3355	0.3397	0.3334	0.3438	0.3386
20:00	0.2000	0.1967	0.1773	0.1712	0.1650	0.1629	0.1688	0.1678	0.1698	0.1667	0.1719	0.1693
21:00	0.3000	0.2951	0.2659	0.2568	0.2475	0.2444	0.2532	0.2516	0.2548	0.2501	0.2579	0.2540
22:00	0.4000	0.3934	0.3546	0.3425	0.3300	0.3258	0.3376	0.3355	0.3397	0.3334	0.3438	0.3386
23:00	0.7000	0.6885	0.6205	0.5993	0.5775	0.5702	0.5908	0.5872	0.5945	0.5835	0.6017	0.5926

Langan Hudson Logistics

Mobile Source Temporal Variations

Lot B and Lot B Road

Hours	January	February	March	April	May	June	July	August	September	October	November	December
0:00	0.0385	0.0378	0.0341	0.0329	0.0317	0.0313	0.0325	0.0323	0.0327	0.0321	0.0331	0.0326
1:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2:00	0.1154	0.1135	0.1023	0.0988	0.0952	0.0940	0.0974	0.0968	0.0980	0.0962	0.0992	0.0977
3:00	0.1154	0.1135	0.1023	0.0988	0.0952	0.0940	0.0974	0.0968	0.0980	0.0962	0.0992	0.0977
4:00	0.2308	0.2270	0.2046	0.1976	0.1904	0.1880	0.1948	0.1936	0.1960	0.1924	0.1984	0.1954
5:00	0.3077	0.3026	0.2728	0.2634	0.2538	0.2506	0.2597	0.2581	0.2613	0.2565	0.2645	0.2605
6:00	0.3846	0.3783	0.3410	0.3293	0.3173	0.3133	0.3246	0.3226	0.3266	0.3206	0.3306	0.3256
7:00	0.4615	0.4539	0.4091	0.3951	0.3807	0.3759	0.3895	0.3871	0.3919	0.3847	0.3967	0.3907
8:00	0.5000	0.4918	0.4432	0.4281	0.4125	0.4073	0.4220	0.4194	0.4246	0.4168	0.4298	0.4233
9:00	0.8846	0.8701	0.7842	0.7574	0.7298	0.7206	0.7466	0.7420	0.7512	0.7374	0.7604	0.7489
10:00	0.8462	0.8322	0.7501	0.7244	0.6980	0.6892	0.7142	0.7098	0.7186	0.7054	0.7274	0.7164
11:00	1.0000	0.9835	0.8865	0.8562	0.8250	0.8146	0.8440	0.8388	0.8492	0.8336	0.8596	0.8466
12:00	0.6154	0.6053	0.5455	0.5269	0.5077	0.5013	0.5194	0.5162	0.5226	0.5130	0.5290	0.5210
13:00	0.6923	0.6809	0.6137	0.5927	0.5711	0.5639	0.5843	0.5807	0.5879	0.5771	0.5951	0.5861
14:00	0.5385	0.5296	0.4773	0.4610	0.4442	0.4386	0.4545	0.4517	0.4573	0.4489	0.4629	0.4559
15:00	0.8077	0.7944	0.7160	0.6915	0.6663	0.6579	0.6817	0.6775	0.6859	0.6733	0.6943	0.6838
16:00	0.6154	0.6053	0.5455	0.5269	0.5077	0.5013	0.5194	0.5162	0.5226	0.5130	0.5290	0.5210
17:00	0.3462	0.3405	0.3069	0.2964	0.2856	0.2820	0.2922	0.2904	0.2940	0.2886	0.2976	0.2931
18:00	0.0769	0.0757	0.0682	0.0659	0.0635	0.0627	0.0649	0.0645	0.0653	0.0641	0.0661	0.0651
19:00	0.0385	0.0378	0.0341	0.0329	0.0317	0.0313	0.0325	0.0323	0.0327	0.0321	0.0331	0.0326
20:00	0.1538	0.1513	0.1364	0.1317	0.1269	0.1253	0.1298	0.1290	0.1306	0.1282	0.1322	0.1302
21:00	0.0769	0.0757	0.0682	0.0659	0.0635	0.0627	0.0649	0.0645	0.0653	0.0641	0.0661	0.0651
22:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

Lot C and Lot C Road

Hours	January	February	March	April	May	June	July	August	September	October	November	December
0:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
1:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
2:00	0.1538	0.1513	0.1364	0.1317	0.1269	0.1253	0.1298	0.1290	0.1306	0.1282	0.1322	0.1302
3:00	0.1538	0.1513	0.1364	0.1317	0.1269	0.1253	0.1298	0.1290	0.1306	0.1282	0.1322	0.1302
4:00	0.2308	0.2270	0.2046	0.1976	0.1904	0.1880	0.1948	0.1936	0.1960	0.1924	0.1984	0.1954
5:00	0.3077	0.3026	0.2728	0.2634	0.2538	0.2506	0.2597	0.2581	0.2613	0.2565	0.2645	0.2605
6:00	0.3846	0.3783	0.3410	0.3293	0.3173	0.3133	0.3246	0.3226	0.3266	0.3206	0.3306	0.3256
7:00	0.4615	0.4539	0.4091	0.3951	0.3807	0.3759	0.3895	0.3871	0.3919	0.3847	0.3967	0.3907
8:00	0.5385	0.5296	0.4773	0.4610	0.4442	0.4386	0.4545	0.4517	0.4573	0.4489	0.4629	0.4559
9:00	0.9231	0.9079	0.8183	0.7903	0.7615	0.7519	0.7791	0.7743	0.7839	0.7695	0.7935	0.7815
10:00	0.9231	0.9079	0.8183	0.7903	0.7615	0.7519	0.7791	0.7743	0.7839	0.7695	0.7935	0.7815
11:00	1.0000	0.9835	0.8865	0.8562	0.8250	0.8146	0.8440	0.8388	0.8492	0.8336	0.8596	0.8466
12:00	0.6154	0.6053	0.5455	0.5269	0.5077	0.5013	0.5194	0.5162	0.5226	0.5130	0.5290	0.5210
13:00	0.7692	0.7566	0.6819	0.6586	0.6346	0.6266	0.6492	0.6452	0.6532	0.6412	0.6612	0.6512
14:00	0.5385	0.5296	0.4773	0.4610	0.4442	0.4386	0.4545	0.4517	0.4573	0.4489	0.4629	0.4559
15:00	0.8462	0.8322	0.7501	0.7244	0.6980	0.6892	0.7142	0.7098	0.7186	0.7054	0.7274	0.7164
16:00	0.6154	0.6053	0.5455	0.5269	0.5077	0.5013	0.5194	0.5162	0.5226	0.5130	0.5290	0.5210
17:00	0.3846	0.3783	0.3410	0.3293	0.3173	0.3133	0.3246	0.3226	0.3266	0.3206	0.3306	0.3256
18:00	0.0769	0.0757	0.0682	0.0659	0.0635	0.0627	0.0649	0.0645	0.0653	0.0641	0.0661	0.0651
19:00	0.0769	0.0757	0.0682	0.0659	0.0635	0.0627	0.0649	0.0645	0.0653	0.0641	0.0661	0.0651
20:00	0.1538	0.1513	0.1364	0.1317	0.1269	0.1253	0.1298	0.1290	0.1306	0.1282	0.1322	0.1302
21:00	0.0769	0.0757	0.0682	0.0659	0.0635	0.0627	0.0649	0.0645	0.0653	0.0641	0.0661	0.0651
22:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
23:00	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000

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VIA EMAIL ONLY **Justin.Dunn@hillwood.com**

13 July 2020

Mr. Justin Dunn
Hillwood Enterprises, L.P.
5050 W. Tilghman Street, Suite 435
Allentown, PA 18104

Re: Sound Study Update
Proposed Hudson Logistics Center
Hudson, New Hampshire
OAA File 4228A

Dear Mr. Dunn:

As you are aware, Ostergaard Acoustical Associates (OAA) prepared a detailed acoustical report on the proposed Hudson Logistics Center, dated 18 May 2020. The report was submitted to the Town and the Town's acoustical consultant, Harris Miller Miller & Hanson Inc. (HMMH) prepared a letter dated 29 June with comments/feedback about the report. In addition, the public and board have raised various questions about sound produced by the application during the 24 June meeting, site walk-throughs, and through other avenues. The project must meet Code Section 275-6(H) General Requirements of a Site Plan Approval process, which calls for the elimination of undesirable and preventable elements of pollution such as noise… into the environment which might prove harmful to persons, structures or adjacent properties. In addition, and perhaps more stringent, the site must comply with the Town of Hudson's Noise Code under Section 249 of the Town Code. This letter report will provide an update to our sound study and address several of the questions raised to date.

Since the last meeting, the project has continued to evolve to respond to sound and other requests made by the board. In addition, as the design progresses various details will be finalized which allow us to refine our acoustical model, and more accurately predict future site sound levels. In this letter, the buildings on Lots A, B, and C are referred to as Building A, B, and C, respectively. Multiple updates are being implemented to the plan that affects acoustics including:

- Moving the Building B north about 150 feet and Building C north about 50 feet, further away from residential abutters. Building B will be approximately 450 feet from the southern property line; Building C will be 590 feet from the southern property line.

- Updating HVAC plans to more accurately reflect needed equipment location and quantities.

- Improving the earthen berm between the development and residences to the south. A sound wall will be placed on top of portions of the earthen berm as well.

- ❑ Adding a supplemental sound wall in areas where a berm is not feasible.

- ❑ Designing and locating a 625kW emergency generator for each building, each with a sound power level of 114 dB(A), which will produce sound levels of about 40 dB(A) at residences.

The HMMH letter raised six preliminary comments to the board. Below is a summary of the HMMH questions or concerns, and OAA's response.

1. HMMH requested information on the sound propagation standard that the acoustical modelling software, CadnaA used. OAA sets our model to use ISO 9613 "Acoustics – Attenuation of sound during propagation outdoors," which is one of the most common sound propagation methods used today.

2. HMMH inquired about trucks using the access drive south of Building B. Trucks will use this drive to move between the west and east docks but sound produced by this activity is lower in sound level than the maximum truck yard activities that were the focus of our report. For example, the maximum sound level of a driving truck is about 74 dB(A) at 50 feet, which is 5 dB lower in level than maximum sound levels of truck yard activity which occurs at docks and trailer spots. HMMH also references truck idling which, based on experience at these types of facilities, is significantly lower in level than both a driving truck or yard activity and is generally prohibited for long periods on site.

3. HMMH recommends ambient background sound data is obtained to compare to project sound emissions to show compliance with Section 249-4(D) of the Town Noise Ordinance. OAA finds this requirement of the noise code to be highly variable from an evaluation as well as an enforcement aspect. This makes it difficult to use in the design process. We acknowledge the intent of this section is to minimize the acoustical impact of a new noise source, which we agree with. OAA will deploy long-term sound level monitors to acquire ambient data, which will be used to refine our project criteria and meet the intent of Section 249-4(D). These data will be provided in an updated acoustical report in the coming weeks.

4. HMMH requested octave band data of the sound model to confirm compliance with Noise Ordinance Section 249-4(E) pure tone sound. While the model has evolved since the 18 May report, and is not yet finalized, the following table represents the various input octave band and A-weighted sound power levels for the sound model, which is based on measurements at similar facilities:

		Octave Band Center Frequency, Hz								
Sound Source	**Height (ft)**	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**A-wt**
Truck_air_brake	3	102	102	98	98	103	108	112	111	116
Truck_backup_alarm	3	95	95	90	91	109	100	87	73	109
Truck_couple_decouple	4	109	108	108	109	109	106	101	95	113
Truck_driving	8	123	113	109	106	101	99	98	92	108
OAA Truck Design Spectrum	8	128	117	114	111	106	104	103	97	113

Of these truck source spectrums, the only one that is tonal in nature is the standard backup alarm, which is concentrated in the 1000 Hz octave band. Inputting these sources into the model at a truck location nearest Location C results in the following maximum sound levels at a dwelling nearby Location C.

	Octave Band Center Frequency, Hz								
Sound Source	**63**	**125**	**250**	**500**	**1000**	**2000**	**4000**	**8000**	**A-wt**
Truck_air_brake	53	48	43	42	37	34	28	5	43
Truck_backup_alarm	53	47	43	42	39	32	19	-	43
Truck_couple_decouple	53	49	45	44	39	33	21	-	45
Truck_driving	60	51	46	43	37	32	20	-	44
OAA Truck Design Spectrum	64	53	49	45	38	33	22	-	47

This example reflects the attenuation provided by the most current version of the earthen berm and shows no resulting pure tone at nearby residential receptors. All site activity will comply with Section 249-4(E). Additional details will be included in our full updated acoustical report.

5. HMMH has requested details regarding any sound walls that are proposed. While these details are still being refined, typical sound walls installed at similar facilities are either precast concrete or an engineered barrier system, which at a minimum will have a surface weight of at least 7 pounds per square foot to sufficiently attenuate site sound to match what is identified in the acoustical model.

6. HMMH has requested addressing construction noise, and specifically whether there will be any blasting or pile driving. Details continue to be refined. Blasting is not anticipated at this time, but the project will fully conform to the Town's Noise Ordinance Section 249-4(I) which regulates construction noise, as well as any other requirements regulating blasting in the unlikely event blasting needs are encountered.

Public comments have also been collected and questions warrant response. A summary and response are provided below for pertinent questions; questions have been identified using letters to differentiate from the HMMH response letter responses.

a. Operational Hours/24/7. There's a difference between noise at night and during the day. Concerns with beeping sounds.
Response: The sound study takes into account back up alarms that might be present on tractor trailers as well as increased sensitivity that occurs during the nighttime hours.

b. The more you can move those buildings further away from the neighborhood the better you have a chance. I don't know if the noise studies were done in the right way
Response: The sound study follows professionally acceptable practices and is being reviewed by the town's hired peer review acoustical consultant. Project plans have updated to reflect shifting of Building B and C further north, away from residential abutters, as noted above.

c. How many trailer jockeys will be used during the day – and will they be used 24 hours? They make noise too.
Response: The number of terminal tractors, or trailer jockeys, to be used is dependent on the tenant. In general, a site of this size would have four to six. Terminal tractors remain on site and are the primary mover of empty and loaded trailers around the site. Terminal tractor noise is no different than over-the-road line haul trucks and was included in the model.

d. Were actual noise readings taken or just modeling?
Response: To date, the sound study has focused on modelling of future sound emissions. Models are created using actual data taken from similar facilities and are an accurate method to predict sound emissions.

e. Have they done any background noise checking in our neighborhood?
Response: An ambient sound study is being undertaken to quantify existing conditions in order to more accurately determine project noise goals and show compliance with Section 249-4(D).

f. Independent truckers use the standard beep beep beep alarms. No way to control that.
Response: Independent truck vendors utilize a variety of back-up alarm types including standard tonal alarms or "beepers" but also more modern broadband back-up alarms or "shushers". Broadband alarms are less annoying and blend in more readily with background sound. Such alarms cannot be mandated for independent vendors, however, our acoustical report has recommended them for on-site terminal tractors which are responsible for the majority of back-up movements on site. Outside vender tonal alarms will be mitigated by the proposed earthen berm and sound walls.

g. Coupling and uncoupling. Study says it's not a problem because it's averaged over time. But if you're in bed and you hear the coupling and decoupling – it's a problem
<u>Response:</u> The Town Noise Code uses an hourly average sound level as part of its noise code under Section 249-4(B). This approach allows for intermittent events to comply with the limit when averaged, however, our sound study takes a conservative approach and does not utilize averaging to comply with code limits. Updated plans now have all maximum site sound emissions below the Town's nighttime hourly average sound limits.

h. EPA put out a chart that noise levels as low at 40 db can disturb sleep; A lot of those 50 db numbers they came up with in the report are suspect
<u>Response:</u> Noise codes generally regulate nighttime sound emissions to be at or below 50 dB(A). The reason behind this is that an open window will attenuate sound about 10 dB, which results in indoor sound levels at or below 40 dB(A). A closed window will reduce sound generally by 20 dB or more depending on the construction, resulting in interior sound levels of 30 dB or below.

i. Construction is noisy – my daughter has trouble sleeping. Would like some consideration of noise during construction. They are raising the ground elevation behind my house by 10 feet so sound will carry; 50 dB impacts
<u>Response:</u> Per the Town Code, construction noise is permitted Monday through Saturday, between the hours of 7:00 a.m. and 7:00 p.m.

j. Has Hillwood considered install a sound wall on top of the earthen berm? Has Hillwood considered building a small sound wall on the roofs of the building that abut the neighborhoods to assist in mitigating sound from rooftop HVAC equipment? How does the proposed 15-foot sound wall truly mitigate the sound refracted of the 50-foot building?
<u>Response:</u> The project team is considering a variety of mitigation measures including a collection of the referenced techniques. The acoustical model takes into account reflections from the buildings and provides a realistic picture of how site sound will propagate to off-site receptors.

k. Quiet hours will need to be put in place for the construction company extending from 8 or 9pm until 7am. My children are in bed by 7 and lately the sounds of loud motorcycles on Rt 3A has been keeping my daughter up until 8 or 9 pm interrupting her much needed sleep for proper growth and development not to mention all around general household sanity. If construction starts before my children's normal waking time of 6-6:30 I am again worried that the noise will wake them early especially on weekends when we hope that she catches up on her sleep. I am lucky enough to work a part time job allowing for my children to be home during the week and this type of work will interrupt their napping schedule.
<u>Response:</u> The project will fully comply with Noise Ordinance Section 249-4(I) which limits the time of day construction noise can occur.

l. Hours. Quiet hours for these facilities must be mandated. I am not opposed to 2nd and 3rd shift work as long as it is done inside the facilities and I cannot hear the goings on. Trucks cannot be pulling in, starting up and rolling out at all hours of the night. Again, with children in this neighborhood, their sleep schedules are a necessity to consider. Numerous studies have been done on the ability for students to concentrate and learn based on the amount and quality of their sleep. 8pm to 7am quiet house should be maintained for a site that will be this close to housing developments.
Response: The project goal is to allow for nighttime operations and provide for sufficiently low off-site sound levels through distance and mitigation.

m. Sound Concerns: Will the proposed barriers will this help reduce sound? Between engines, forklifts, back up alarms. This is extremely concerning to since this would be a 24/7 operation. Has Hillwood Development encountered this before when building next to residential homes?
Response: Residential zones abut non-residential zones across the county and as such, there is always an increased concern for noise at the boundaries of these zones. The proposed mitigation measures associated with this project are focused on minimizing any impact that might occur.

n. Please find attached "Nose Level Estimate Chart" from http://www.paging-solutions.com/charts/noiselevel.pdf . This chart indicates the noise from a diesel engine is 90-94 decibels. Hudson's ordinance for evening sound level is 50 decibels. The Illinois Department of Transportation https://idot.illinois.gov/Assets/uploads/files/Doing-Business/Manuals-Guides-&-Handbooks/Highways/Design-and-Environment/Environment/Highway%20Traffic%20Noise%20--%20Noise%20Fundamentals%20111215.pdf states that sound lowers over 3 decibels for every doubling of distance over pavement. Therefore, the sound needs to lower at least 40 decibels (90-50) before it reaches the property line. 40/3 is 13. 13 doublings of length are required as a sound buffer. Or over 16,000 feet are required to buffer the sound of just one diesel truck to meet the 50 decibel residential allowance. (1+2+4+8+16+32+64+128+256+512+1024+2048+4096+8192)=16,383 feet buffer are required as a buffer to lower the sound of one diesel truck to meet the 50 decibel residential ordinance. If the Town of Hudson doesn't require an appropriate setback at the beginning of this project, they will probably be unsuccessful in trying to get this facility to comply with sound ordinance complaints that could arise after construction.
Response: The referenced "Noise Level Estimate Chart" provides sound levels but no distance. Diesel engine sound levels of 90 dB will occur at a distance of less than 10 feet. The Illinois DOT reference is correct when projecting a roadway noise source. Here road noise acts as a line noise source and will fall off by 3 dB for every doubling of distance. Sources operating at this site will act as a point noise source and fall off by 6 dB for every doubling of distance. With this in mind, a source producing 90 dB(A) at 10 feet would

attenuate to 50 dB(A) at a distance of 1,000 feet. An earthen berm is proposed to provide attenuation in lieu of this distance.

o. Did the acoustic study take into account sound reflection or refraction off the buildings and redirection of sound waves? Did the acoustic study examine the effects of multiple, if not ten or more trucks backing up at once or functioning at once, combined with other noise impacts such as HVAC systems?
Response: The model does take into account reflection of sound from buildings and other structures. Regarding multiple noise sources, while multiple sources can occur at the same time, site sound is dynamic and it is rare that all sources will produce their maximum sound concurrently with a negative result. As a conservative approach a handful of sources potentially occurring simultaneously was investigated. In reality, maximum sound levels will be interspersed across a period across various locations.

p. I also need to point out that vehicles are much noisier than they used to be, with lack of any state ordinances on mufflers. Almost every car, truck, and motorcycle sounds like it is intended to be raced on a track. How is it that a Hudson resident who lives in a different neighborhood can rightfully complain about a barking dog as a noise nuisance, yet my family has to be blasted with motor vehicle noise so loud and so pervasively around the clock we cannot converse and hear each other in our own home, even with closed windows? I am convinced that an independent noise study at this intersection would prove that the noise level is at a dangerous level. I would not want my fellow Hudson Residents in neighborhoods abutting Green Meadow Golf Course to have to endure the same volume of noise, either.
Response: Over the years, the modernization of the motor vehicle and improved emissions standards has resulted in a decrease of vehicle sound. All motor vehicles are required to have a working muffler by local, State, and Federal law.

I trust that the above information and responses are helpful to resolve aspects of the site noise that have been raised. We will continue to work with the project team, as well as Town professionals to address any and all noise concerns they may have.

Regards,

OSTERGAARD ACOUSTICAL ASSOCIATES

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