AECOM

APPENDIX K

In-Air Acoustic Assessment

Prepared for

Beacon Wind LLC

Photo credit: Matt Goldsmith, Equinor

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Table of Contents

List of Figures

List of Tables

List of Attachments

Abbreviations and Acronyms

Acronym	Definition
ac	acre
AGRE	Astoria Gateway for Renewable Energy
ANSI	American National Standards Institute
Beacon Wind	Beacon Wind LLC
BOEM	Bureau of Ocean Energy Management
BW1	Beacon Wind 1
BW2	Beacon Wind 2
dB	decibels
dBA	A-weighted decibels
EEI	Edison Electrical Institute
EPA	United States Environmental Protection Agency
FHWA	Federal Highway Administration
ft	feet
FTA	Federal Transit Administration
ha	hectare
HDD	horizontal directional drilling
HVAC	heating, ventilation, and air-conditioning
HVDC	high-voltage direct current
Hz	Hertz (unit of frequency, cycles per second)
ISO	International Standards Organization
ISO-NE	New England ISO
kHz	kilohertz
kVA	kilovolt ampere
km	kilometer
kW	kilowatt
L_{90}	sound pressure level exceeded 90% of the time (typically indicative of the background sound level)
L_{dn}	day-night average sound pressure level
L_{eq}	equivalent (energy-average) sound pressure level
L_{max}	maximum instantaneous sound pressure level
$L_{w}A$	A-weighted sound power level
Lease Area	Designated Renewable Energy Lease Area OCS-A 0520
m	meter
mi	statute mile
mph	miles per hour
µPa	micro-Pascal
MVA	megavolt ampere
MW	megawatts
nm	nautical mile
NYPA	New York Power Authority
NYISO	New York Independent System Operator (NY ISO)

Abbreviations and Acronyms	
Acronym	**Definition**
NYSDEC	New York State Department of Environmental Conservation
OBCF	octave band center frequency
POI	Point of Interconnection
SPL	sound pressure level
WEA	Wind Energy Area
XFMR	transformer

Appendix K In-Air Acoustic Assessment

K.1 Introduction

K.1.1 Project Summary

Beacon Wind LLC (Beacon Wind) proposes to construct and operate an offshore wind facility located in the designated Renewable Energy Lease Area OCS-A 0520 (Lease Area). The Lease Area covers approximately 128,811 acres (ac; 52,128 hectares [ha]) and is located approximately 20 statute miles (mi) (17 nautical miles [nm], 32 kilometers [km])[1] south of Nantucket, Massachusetts and 60 mi (52 nm, 97 km) east of Montauk, New York. The Lease Area was awarded through the Bureau of Ocean Energy Management (BOEM) competitive renewable energy lease auction of the Wind Energy Area (WEA) offshore of Massachusetts.[2]

Beacon Wind proposes to develop the entire Lease Area in two wind farms, known as Beacon Wind 1 (BW1) and Beacon Wind 2 (BW2) (collectively referred to hereafter as the Project). The individual wind farms within the Lease Area will be electrically isolated and independent from the other via transmission systems that connect two separate offshore substations to two onshore Points of Interconnection (POIs). However, if BW1 and BW2 both interconnect with the New York Independent System Operator (NY ISO), the Project will assess the possibility of cable linkage between BW1 and BW2. Each wind farm will gather power from the associated turbines to a central offshore substation and deliver the generated power via a submarine export cable to an onshore substation for final delivery into the local utility distribution system at the selected POI.

The purpose of the Project is to generate renewable electricity from an offshore wind farm(s) located in the Lease Area. The Project addresses the need identified by northeast states to achieve offshore wind goals: New York (9,000 megawatts [MW]), Connecticut (2,000 MW), Rhode Island (up to 1,000 MW), and Massachusetts (5,600 MW).

BW1 will be developed first and constitutes the northern portion of the Lease Area. It covers approximately 56,535 ac (22,879 ha). The BW1 wind farm has a 25-year offtake agreement with the New York State Energy Research and Development Authority (NYSERDA) to deliver the power to its identified POI in Queens, New York.

BW2 spans the southern portion of the Lease Area and will be developed after BW1. It covers approximately 51,611 ac (20,886 ha). Beacon Wind is considering an Overlap Area of 20,665 ac (8,363 ha) that may be included in either wind farm. BW2 is being developed to addresses the need for renewable energy identified by states across the region, including New York, Massachusetts, Rhode Island, and Connecticut. The interconnectedness of the New England transmission system,

[1] Distances throughout the COP are provided as statute miles (mi) or nautical miles (nm) as appropriate, with kilometers (km) in parentheses. For reference, 1 mi equals approximately 0.87 nm or 1.6 km.

[2] On December 13-14, 2018, BOEM held a competitive lease sale (i.e., auction) for Wind Energy Areas offshore Massachusetts, pursuant to 30 CFR § 585.211. Equinor Wind US LLC was the winner of Lease Area OCS-A 0520. The Commercial Lease of Submerged Lands for Renewable Energy Development on the Outer Continental Shelf OCS-A 0520 (Lease) for 128,811 ac (52,128 ha) went into effect on April 1, 2019. Following issuance of the Lease, Equinor Wind US LLC began to conduct comprehensive desktop studies of the environmental resources found within the Lease Area. Equinor Wind US LLC assigned the lease to Beacon Wind LLC effective January 27, 2021.

managed by the New England ISO (ISO-NE), allows a single point of interconnection in the region to deliver offshore wind energy to all of the New England states (Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine). The magnitude of regional targets for offshore wind and the limited amount of developable area, given current and reasonably foreseeable BOEM leasing activity, demonstrates a need for full-build out of the Lease Area.

BW2 plans to deliver power to identified POIs either in Waterford, Connecticut or Queens, New York. Two locations are under consideration in Queens, New York for the single proposed BW1 landfall and onshore substation facility. These locations include the New York Power Authority (NYPA) site in the northeastern corner of the Astoria power complex and the Astoria Gateway for Renewable Energy (AGRE) site (which includes AGRE East and AGRE West) situated centrally and on the northern end of the complex adjacent to the East River, both collectively referred to hereafter as NYPA and AGRE. The Queens, New York, onshore substation facility sites that are not used (NYPA, AGRE East, or AGRE West) for BW1 will remain under consideration, in addition to the Waterford, Connecticut, site, for the single proposed BW2 onshore substation facility.

Beacon Wind is developing up to 155 wind turbines and supporting tower structures, and up to two offshore substation facilities, using up to 157 foundations in the Lease Area (encompassing both BW1 and BW2). BW1 will include between 61 and 94 wind turbines and BW2 will include between 61 and 94 wind turbines. The Overlap Area includes 33 wind turbines that could be incorporated into either BW1 or BW2. The BW1 and BW2 onshore components of the Project will include the landfall areas, high-voltage direct-current (HVDC) onshore cable, HVDC converter station and substation, and high-voltage alternating-current interconnection cables. Installation techniques for landfall of the submarine export cables may include trenchless (e.g., horizontal directional drilling (HDD), jack and bore, or micro-tunnel) and trenched (open cut trench) methods. This in-air acoustics assessment assesses the noise generated from construction of the onshore substation facilities, HDD activities, as the base case construction method of trenchless options under consideration, for the landfall of the submarine export cables, general construction for installation of the interconnection cables, and operation of the onshore substation facilities.

K.1.2 Acoustical Terminology and Concepts

This section outlines some of the relevant concepts in acoustics to help the non-specialist reader best understand the modeling assessment and results as presented in this report.

Sound can be described as the mechanical energy of a vibrating object transmitted by pressure waves through a liquid or gaseous medium (e.g., air) to a hearing organ, such as a human ear. In the science of acoustics, the fundamental model consists of a sound source, a receptor, and the propagation path between the two. The loudness of the sound source and obstructions or atmospheric factors affecting the propagation path to the receptor determine the sound level and characteristics of the sound perceived by the receptor. The following sections present the basic parameters used to describe the environmental sound levels evaluated in this analysis. Since noise is typically defined as unwanted sound and the purpose of this study is to determine the potential for unwanted sound at sensitive receptors (such as residences, schools, healthcare facilities, and houses of worship), the terms sound and noise are being used interchangeably in this document.

K.1.2.1 *Frequency*

Continuous sound can be described by frequency (pitch) and amplitude (loudness). A low-frequency sound is perceived as low in pitch. Frequency is expressed in terms of cycles per second, or Hertz

(Hz) (e.g., a frequency of 250 cycles per second is referred to as 250 Hz). High frequencies are sometimes more conveniently expressed in kilohertz (kHz), or thousands of Hertz. The audible frequency range for humans is generally between 20 Hz and 20,000 Hz (Cowan 1994), although human sensitivities to sounds within that frequency range considerably.

K.1.2.2 *Sound Pressure Levels and Decibels*

The amplitude of pressure waves generated by a sound source determines the loudness of that source. Sound pressure amplitude is measured in micro-Pascals (μPa). One μPa is approximately one hundred-billionth (0.00000000001) of normal atmospheric pressure. Sound pressure amplitudes for different kinds of noise environments can range from less than 100 to more than 100,000,000 μPa. Because of this large range of values and our sensitivity to changes in these values, sound is rarely expressed in terms of μPa. Instead, a logarithmic scale is used to describe sound pressure level (SPL) in terms of decibels (dB). The threshold of hearing for people less than 20 years old with healthy hearing mechanisms is about 0 dB, which corresponds to 20 μPa. Although this value increases with age, this is the reference used for calculating SPL (Cowan 1994).

K.1.2.3 *Addition of Decibels*

Because decibels are logarithmic units, SPL cannot be added or subtracted through ordinary arithmetic. Under the decibel scale, a doubling of sound energy corresponds to a 3-dB increase. In other words, when two identical sources at the same location are each producing sound of the same loudness, the resulting sound pressure level at a given distance would be 3 dB higher than that for one source under the same conditions. For example, if one automobile produces an SPL of 70 dB when it passes an observer, two cars passing simultaneously would not produce 140 dB; rather, they would combine to produce 73 dB. Under the decibel scale, three sources of equal loudness together produce a sound level 5 dB louder than that for one source.

K.1.2.4 *A-Weighted Decibels and Sound Perception*

The decibel scale alone does not adequately characterize how humans perceive sound. The dominant frequencies of a sound source have a substantial effect on the human response to that sound. Although the intensity (energy per unit area) of the sound is a purely physical quantity, the loudness or human response is determined by the characteristics of the human hearing mechanism.

Human hearing sensitivity is limited in the range of audible frequencies as well as in the way it perceives the SPL in that range. In general, people are most sensitive to sounds in the frequency range of 1,000 to 4,000 Hz and perceive sounds within that range better than sounds of the same amplitude at higher or lower frequencies (Cowan 1994). To approximate the response of the human hearing mechanism, sound levels of individual frequency bands are weighted, depending on the human sensitivity to those frequencies. Then, an “A-weighted” sound level (expressed in units of dBA) can be computed based on this information.

The A-weighting network approximates the frequency response of the average healthy human hearing mechanism when listening to sounds at moderate levels. When people make judgments of the relative loudness or annoyance of a sound, their judgments correlate well with the A-weighted levels of those sounds. Noise levels for environmental assessment reports are typically reported in terms of dBA. **Table K.1-1** describes typical A-weighted noise levels for various noise sources and environments based on field experience.

TABLE K.1-1. TYPICAL A-WEIGHTED NOISE LEVELS

Noise Source (at a Given Distance)	Scale of A-Weighted Sound Level (dBA)	Noise Environment	Human Judgment of Noise Loudness (Relative to a Reference Level of 70 dBA)
Military Jet Take-off with After-burner (50 feet [ft], 15 meters [m]) Civil Defense Siren (100 ft [30 m])	140 130	Aircraft Carrier Flight Deck	*128 times as loud *64 times as loud
Commercial Jet Take-off (200 ft [61 m])	120		Threshold of Pain *32 times as loud
Onshore Pile Driver (50 ft [15 m])	110	Rock Music Concert	*16 times as loud
Ambulance Siren (100 ft [30 m]) Newspaper Press (5 ft [1.5 m]) Power Lawn Mower (3 ft [0.9 m])	100		Very Loud *8 times as loud
Motorcycle (25 ft [7.6 m]) Propeller Plane Flyover (1,000 ft [305 m]) Diesel Truck, 40 miles per hour (mph) (64 kilometers [km] per hour) (50 ft [15 m])	90	Boiler Room Printing Press Plant	*4 times as loud
Garbage Disposal (3 ft [0.9 m])	80	High Urban Ambient Sound	*2 times as loud
Passenger Car, 65 mph (105 km per hour) (25 ft [7.6 m]) Vacuum Cleaner (10 ft [3 m])	70		Moderately loud *70 dB (Reference Loudness)
Normal Conversation (5 ft [1.5 m]) Air Conditioning Unit (100 ft [30 m])	60	Data Processing Center Department Store	*1/2 as loud
Light Traffic (100 ft [30 m])	50	Private Business Office	*1/4 as loud
Bird Calls (distant)	40	Lower Limit of Urban Ambient Sound	Quiet *1/8 as loud
Soft Whisper (5 ft [1.5 m])	30	Quiet Bedroom	
	20	Recording Studio	Very Quiet
	10		
	0		Threshold of Hearing

Note:
*Related to the base SPL assumption of 70 dBA, showing that each increment of 10 dBA doubles the perceived loudness and each decrement of 10 dBA halves the perceived loudness.
Source: AECOM

K.1.2.5 *Human Response to Changes in Noise Levels*

As discussed in **Section K.1.2.3**, doubling sound energy results in a 3-dB increase in sound level. However, for a sound level change measured with precise instrumentation, the subjective human perception of a doubling of loudness is different than what is measured. Under controlled conditions in an acoustical laboratory, the trained, healthy human ear is able to discern 1-dB changes in sound levels when exposed to steady, single-frequency ("pure-tone") signals in the midfrequency (500 to 2,000 Hz) range. In typical environments, changes in noise levels of 1 to 2 dB are generally not perceptible. However, it is widely accepted that people, in general, are able to begin to detect sound level increases of 3 dB in typical environments. Further, a 5-dB increase is generally perceived as a distinctly noticeable increase, and a 10-dB increase is generally perceived as a doubling of loudness. Therefore, a doubling of sound energy (or doubling the number of sources) that would result in a 3-dB increase in sound level, would generally be perceived as barely noticeable. Along the same lines, a tenfold increase in sound energy would generally be perceived as a doubling of perceived loudness.

K.1.2.6 *Noise Descriptors*

Noise in our daily environment fluctuates over time. Some fluctuations are minor, but some are substantial. Some noise levels occur in regular patterns, but others are random. Some noise levels fluctuate rapidly, but others slowly. Some noise levels vary widely, but others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following are the noise descriptors used in this analysis:

- **Equivalent Sound Level (L_{eq})**: L_{eq} represents an average of the sound energy occurring over a specified period. The L_{eq} is the steady-state sound level containing the same acoustical energy as the time-varying sound that actually occurs during the same period. The 1-hour A-weighted equivalent sound level ($L_{eq[h]}$) is the energy-average of A-weighted sound levels occurring during a one-hour period and is the basis for noise abatement criteria for many agencies.
- **Maximum Sound Level (L_{max})**: L_{max} is the highest instantaneous sound level measured during a specified period.
- **Day-Night Level (L_{dn})**: L_{dn} is the energy-average of A-weighted sound levels occurring over a 24-hour period, with a 10-dB increase applied to A-weighted sound levels occurring during normal sleeping hours between 10 p.m. and 7 a.m. to account for the added sensitivity at those times. This metric is often used to assess community noise annoyance from sources that operate constantly at all hours.
- **Exceedance Level (L_n)**: The sound level exceeded “n” percent of a specified time interval. The most common of these is sound pressure level exceeded 90 percent of the time (L_{90}), which is usually used to quantify the residual ambient sound levels.

K.1.2.7 *Sound Propagation*

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

K.1.2.7.1 Geometric Spreading

Sound pressure from a stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. The sound pressure level attenuates (or decreases) at a rate of 6 dBA for each doubling of distance from a point source. Highways, trains, and power lines consist of several localized noise sources on a defined path and, therefore, can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. In general, sound pressure levels attenuate at a rate of 3 dBA for each doubling of distance from a line source.

Ground Absorption

The propagation path of onshore noise sources to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, this excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft (61 m). For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water) or elevated sources (such as wind turbines), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor, such as soft dirt, grass, or scattered bushes and trees), an excess ground-attenuation value of 1.5 dBA per doubling of distance is normally assumed. This results in drop-off rates of 7.5 dBA per doubling of distance from point sources and 4.5 dBA per doubling of distance from line sources. Since the region between the Project sites and the closest noise-sensitive receptors (e.g., residences, schools, healthcare facilities, and houses of worship) has a mix of acoustically hard and soft areas, this region is being modeled using an assumption of a moderate ground absorption.

Atmospheric Effects

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (more than 500 ft [152 m]) from a source due to atmospheric temperature inversion (increasing temperature with elevation, as occasionally occurs late at night) and they can decrease at similar distances due to temperature lapse (decreasing temperature with elevation, as typically occurs during a clear day). Other factors, such as humidity and air turbulence, can also have significant effects on sound propagation.

Shielding by Natural or Human-Made Features

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Natural terrain features (e.g., hills and dense woods) and human-made features (e.g., buildings and solid walls) can substantially reduce noise levels. Walls are often constructed between a source and a receptor specifically to reduce noise. A barrier that breaks the line-of-sight between a source and a receptor will typically result in at least 5 dBA of noise reduction. Taller barriers provide increased noise reduction, up to a practical limit of 10 to 15 dBA due to diffraction of sound over and around barriers. Vegetation between the sources and receptors is rarely effective in reducing noise because it does not create a solid barrier. In any case, this kind of noise attenuation is only effective when it is located within 200 ft (61 m) of a source or receptor

K.2 Relevant Regulations

K.2.1 Federal Noise Requirements

There are no federal noise regulations relevant to the in-air acoustic aspect of the Project.

K.2.2 New York State and New York City Noise Requirements

The New York State Department of Environmental Conservation (NYSDEC) guidelines are defined in the publication *Assessing and Mitigating Noise Impacts* (NYSDEC 2001). This document states that SPL increases from 0 to 3 dBA should have no appreciable effect on receivers; increases of 3 to 6 dBA may have the potential for adverse impact only in cases where the most sensitive of receptors are present; and increases of more than 6 dBA may require a more detailed analysis of impact potential depending on existing sound levels and the surrounding land uses. A-weighted sound pressure levels (in units of dBA) take into account human frequency sensitivity to moderate sound levels and are therefore used by most regulatory agencies to rate sound levels for human annoyance. The NYSDEC guidance states that the 6-dBA increase is to be used as a general guideline. Although not explicitly stated in the policy, the 6-dBA increase has been applied to the minimum measured L_{eq} or, alternatively, the time-averaged L_{90} sound level for the licensing of other projects in New York State. There are other guidelines that should also be considered. For example, in settings with low ambient sound levels, NYSDEC guidance considers a limit of 40 dBA to be adequately protective.

The NYSDEC policy further states that the United States Environmental Protection Agency (EPA) "Protective Noise Levels" guidance found that an annual day-night average sound level (L_{dn}) of 55 dBA was sufficient to protect the public health and welfare and, in most cases, did not create an annoyance. A 55-dBA L_{dn} would be equivalent to a daytime sound level of 55 dBA L_{eq}, and a nighttime sound level of 45 dBA L_{eq}, or a continuous level of approximately 49 dBA L_{eq}. In terms of absolute threshold values, the introduction of any new noise source should not raise ambient levels above 65 dBA L_{eq} in non-industrial settings to protect against speech disturbance or above approximately 79 dBA L_{eq} for industrial environments for associated noise-related health and safety reasons. In most cases, NYSDEC recommends that projects exceeding either of these threshold levels or resulting in an increase of 10 dBA consider mitigation measures.

K.2.2.1 *New York City*

Title 24, Chapter 2 of the New York City Administrative Code (i.e., Noise Code) regulates noise by the existing land use of receiving property rather than zoning designation. There are two separate regulations that apply to the Project operations: (1) octave band limits at residential and commercial properties, and (2) relative increase limits for off-site locations. These provisions do not apply to construction noise; however, construction is limited to Monday through Friday from 7:00 a.m. to 6:00 p.m., unless otherwise authorized. A noise mitigation plan must be completed for any construction activity before construction begins. Work may take place after hours and on weekends only with express authorization from the Departments of Buildings and Transportation. A noise mitigation plan must be in place before any authorization is granted.

The octave band limits in Administrative Code Section 24-232 are summarized in **Table K.2-1** and apply to residential/commercial properties as measured inside a room with windows open. The octave band limits are prescribed in unweighted decibels, equivalent to overall limits of 45 dBA for residential uses and 49 dBA for commercial uses.

TABLE K.2-1. NEW YORK CITY NOISE CODE SECTION 24-232 OCTAVE BAND LIMITS

Octave Band Center Frequency (Hz)	Maximum Sound Pressure Level (dB)	
	Interior of a Residential Use with Windows Open	Interior Office Space of Commercial Use with Windows Open
31.5	70	74
63	61	64
125	53	56
250	46	50
500	40	45
1000	36	41
2000	64	39
4000	33	38
8000	32	37

The relative increase limits in Administrative Code Section 24-218 prohibit an increase in the "ambient sound level" of 7 dBA or more during the nighttime hours of 10:00 p.m. to 7:00 a.m. at any receiving property. Ambient sound is defined in Administrative Code Section 24-203 as the total sound level "at a location that exists" excluding "extraneous sounds," which are defined as "intense, intermittent" sounds. Although the Administrative Code assigns no sound metric to the term "ambient sound," it is typical practice in noise assessments to represent this condition as the L_{eq} sound level.

In addition to the Noise Code, New York City also has a zoning regulation, established by the New York City Department of City Planning. Sections 42-213 and 214 of the New York City's Zoning Resolution set regulatory limits on octave band sound levels from the operation of a facility "at any point on or beyond any lot line." The decibel limits for octave bands from 31.5 to 16,000 Hz differ depending on manufacturing districts. The manufacturing district relevant to the Project is M3-1, as shown in **Table K.2-2**, given in unweighted decibels.

New York City zoning regulations classify the onshore components of the Project Area within the Astoria power complex as "M-3" (Heavy Manufacturing) zone.

TABLE K.2-2. NEW YORK CITY ZONING RESOLUTION SECTIONS 42-213 AND 214 OCTAVE BAND LIMITS

Octave Band Center Frequency (Hz)	At Project Property Line Manufacturing District M3 (dB)
31.5	80
63	80
125	75
250	70
500	64
1000	58
2000	53
4000	49
8000	46

K.2.3 State of Connecticut and Town of Waterford Noise Requirements

The State of Connecticut and the Town of Waterford have identical noise restrictions in Chapter 442, Section 22a-69-3 of the Regulations of Connecticut State Agencies – Department of Environmental Protection and Title 9, Section 9.06.050 of the Town of Waterford Code (CTDEEP 2022, Waterford 2022). These limits are listed in **Table K.2-3**, in terms of Zoning Classes A, B, and C. Class A Zones include residential uses and other noise-sensitive uses such as healthcare facilities, houses of worship, hotels, and other uses where people sleep or in areas where serenity and tranquility are essential to the intended use of the land. Class B Zones generally include commercial and institutional uses (including offices and educational uses) and Class C Zones generally include manufacturing and industrial uses.

Table K.2-3. STATE OF CONNECTICUT AND TOWN OF WATERFORD NOISE ORDINANCE LIMITS

Noise-Emitting Zone Class	Receiving Noise Zone Class			
	C	B	A (day)	A (night)
Class C	70 dBA	66 dBA	61 dBA	51 dBA
Class B	62 dBA	62 dBA	55 dBA	45 dBA
Class A	62 dBA	55 dBA	55 dBA	45 dBA

If the current background noise levels are higher than the limits listed in **Table K.2-3**, the regulatory limits are 5 dBA above the background level up to a limit of 80 dBA.

K.3 Acoustic Assessment Methodology

Noise modeling has been performed using the CadnaA computer program, which is a commercially available model that uses International Organization for Standardization (ISO) 9613-2 standard outdoor sound propagation calculation methods to generate noise contours (lines of constant noise level, similar in concept to elevation contours on topographical maps) that are superimposed on aerial photographs. The CadnaA model is accepted internationally by the acoustics professional community for these types of analyses. Manufacturers' sound power levels for loudest noise sources (such as offshore wind turbines and onshore transformers), three-dimensional drawings of site layouts, and topographic data were used as inputs to the model to take into account both atmospheric and ground conditions in three dimensions.

The construction and operational scenarios relevant to the analysis in this In-Air Acoustic Assessment are detailed in this Section and include the following:

- Construction and operations of the onshore substation facilities at the two locations under consideration in Queens New York for BW1 and BW2 and the one location under consideration for BW2 in Waterford, Connecticut;
- Specialized construction activities including:
  - HDD for Waterford, Connecticut, and if selected for New York, for installation of the onshore export and interconnection cables.

Additional noise-generating activities may be identified as the Project is further evaluated and refined. Additional noise modeling will be completed, as needed, once the final Project components are selected.

K.3.1 Wind Turbine Generators and Offshore Substation Facilities

Since the wind turbine generators and offshore substation facilities are planned to be more than 20 mi (32 km) from any onshore noise-sensitive receptors, it is assumed that operational noise generated by these sources will not cause impacts to these locations and surrounding environs.

K.3.2 Onshore Substation Facilities Operations

Currently, two locations in Queens, New York for BW1 and BW2 and one location in Waterford, Connecticut for BW2 are under consideration for the onshore substation facilities that pertain to the onshore components of the Project Area. Ambient noise levels were monitored at the closest representative noise-sensitive receptors to each site, to define existing conditions for the impact analysis. The CadnaA model has been used to generate noise contours around each site to determine the predicted future sound levels at the nearest noise-sensitive receptors.

The three onshore substation facilities have been evaluated using the CadnaA model, with details included in **Section K.5**. The computer models assumed calm winds, a temperature of 50 degrees Fahrenheit (10 degrees Celsius), 70 percent relative humidity, a ground absorption factor of 0.5 (typical for a mixed ground cover), and receivers at an elevation of 4.9 ft (1.5 m) above ground level. This provides a conservative analysis using average atmospheric and ground conditions for the adjacent noise-sensitive receptors. The three onshore substation facility locations have been modelled using a base-case electrical layout, which is a best estimate of the equipment needed at the current stage of engineering. The onshore substation facility footprint, location, and noise sources are modeled on this basis.

K.3.3 Construction

The most significant construction-related noise sources will be those associated with HDD activities at the landfall location(s) (if HDD is the selected installation method). With the three onshore substation facility locations under consideration, three landfall location(s) have been considered for the two BW1 and BW2 locations in Queens, New York and the BW2 location in Waterford, Connecticut. The CadnaA model was used to generate noise contours around the HDD landfall locations where HDD activities will be conducted to determine the maximum future sound levels expected at each of the closest noise-sensitive receptors. Generally acceptable environmental noise limits are being used for those locations and mitigation measures have been included where those limits are predicted to be exceeded at the closest noise-sensitive receptors. Details associated with this analysis are included in **Section K.5**.

K.4 Existing Acoustic Conditions

K.4.1 Noise Measurements

At the Queens, New York location one baseline noise monitoring system was deployed at each of the two onshore substation facilities' locations at representative property line sites representative of the closest noise-sensitive receptors to each potential facility. At the Waterford, Connecticut location, four baseline noise monitoring systems were deployed at representative property line sites representative of the closest noise-sensitive land uses to the potential facility. These long-term monitors were left unattended and secured until retrieved by the investigator. Sound pressure level monitoring was performed with Larson Davis Model LxT sound level meters, rated by the American National Standards Institute (ANSI) as Class 1, per ANSI S1.4-2014 (ANSI 2014). The sound level meter microphones were fitted with standard open-cell foam windscreens and positioned approximately 5 to 8 ft (1.5 to 2.4 m) above grade. The sound level meters were set using slow time-response and the A-weighting scale. Sound level meter calibration was field-checked before and after each measurement period with a Larson Davis Model CAL200 acoustic calibrator, and the meters were factory-calibrated within one year of the measurement period. Where not already described, sound level measurements performed for this field survey were conducted in a manner based on guidance from applicable portions of ISO 1996-1 (ISO 2016) and 1996-2 (ISO 2017) standards. A Kestrel Model 3500 handheld weather meter was used to determine or measure average wind speed, temperature, barometric pressure, and relative humidity at the beginning of each measurement. There were no adverse weather conditions for monitoring (such as high winds or precipitation) during the measurement period at Queens, New York. There were intermittent rain events that occurred during the Waterford, Connecticut monitoring period but these were generally limited in both intensity and duration.

K.4.2 Monitoring Locations

K.4.2.1 *Queens, New York*

Ambient sound level data was collected continuously from August 25 through August 27, 2021, and from September 27 through September 29, 2022, to collect sound pressure level data in the onshore substation facility study area. Observed meteorological data was considered adequate for the duration of ambient noise monitoring. The sound pressure level measurement locations are described as follows and photographs of the locations are included in **Attachment K-1** of this report.

NM-1: Long-term measurement deployment at the southwestern boundary of the manufacturing district along 20th Avenue and adjacent to 21st Street. This measurement is representative of baseline noise levels experienced at the nearest noise-sensitive receptors to the NYPA onshore substation facility along the south side of 20th Avenue. The dominant noise sources during the measurement period were continuous nondescript mechanical noise from the manufacturing district, heating, ventilation, and air conditioning (HVAC) unit operation at residential properties, and insect noise. Additional daytime noise sources included intermittent bird call, aircraft flyovers, vehicle pass-bys, and bicycle pass-bys.

NM-2: Long-term measurement deployment at the southwestern boundary of the manufacturing district along 20th Avenue and adjacent to 27th Street. This measurement is representative of baseline noise levels experienced at the nearest noise-sensitive receptors to the AGRE onshore substation facilities along the south side of 20th Avenue. The dominant noise source during the measurement period was continuous transformer-type noise from the Con Edison Astoria East substation. Additional daytime noise sources included intermittent bird call, aircraft flyovers, vehicle pass-bys, pedestrian pass-bys, and bicycle pass-bys.

NM-3: Long-term measurement deployment at the northern boundary of the Con Edison Fields (recreational/youth sports fields) within the existing manufacturing district. This measurement is representative of baseline noise levels experienced at this noise-sensitive sporting field and at the homes on the opposite side of 20th Avenue. The dominant noise sources during the measurement period were continuous nondescript mechanical noise from the manufacturing district, insect noise, and intermittent distant daytime construction noise from the northeast. Additional daytime noise sources included intermittent bird call, aircraft flyovers, and distant vehicle traffic noise.

Figure K.4-1 shows the three long-term noise measurement locations deployed in Queens, New York superimposed on aerial imagery of the study area.

K.4.2.2 *Waterford, Connecticut*

Sound level measurements were conducted continuously from March 31 through April 4, 2022, to collect sound pressure level data in the onshore substation facility Study Area. Observed meteorological data during sound level meter setups showed a temperature of 47 degrees Fahrenheit (30 degrees Celsius), humidity of 25 percent, and wind speeds ranging from 0 to 2 miles per hour (mph) (0 to 3 km per hour). The sound pressure level measurement locations are described as follows and photographs of the locations are included in **Attachment K-1** of this report.

Waterford (WFD) NM-1: Long-term measurement deployment at the northwest boundary of the Dominion Millstone Power Station along a fence line bordering a residential home on Millstone Road West. This measurement is representative of a baseline noise level experienced at the nearest noise-sensitive receptor to the Dominion Millstone Power Station at the southern terminus of Millstone Road West. The dominant noise sources during the measurement period were continuous and nondescript mechanical noise from the vicinity of the power station, intermittent train pass-bys, and insect noise. Additional noise sources included intermittent bird calls, aircraft flyovers, distant vehicular noise, and rustling leaves.

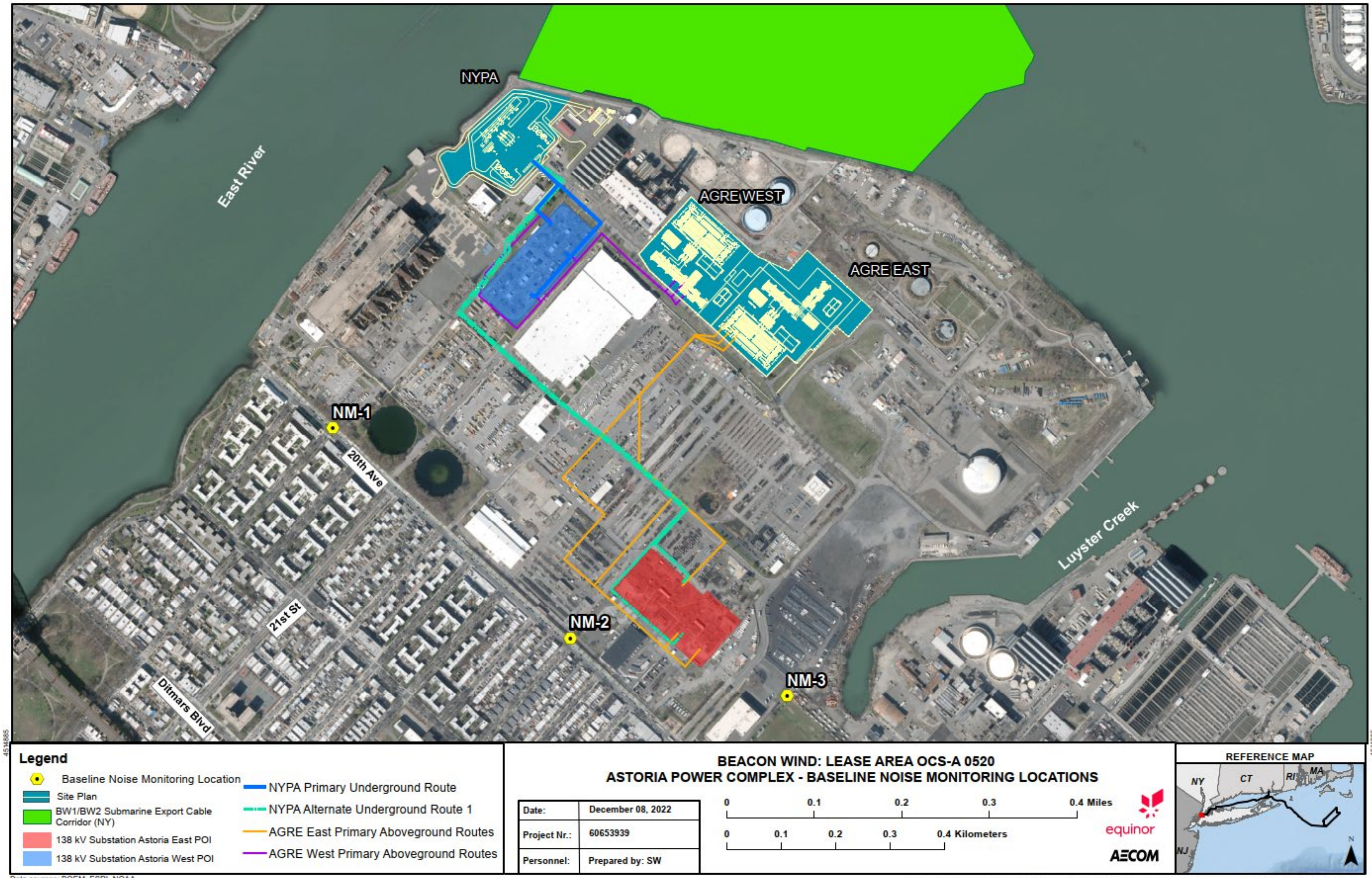
WFD NM-2: Long-term measurement deployment at a western boundary of Dominion Millstone Power Station property, north of the power station and west of the administrative buildings. This deployment is along the property line of an abandoned residence in disrepair between Millstone Road and Millstone Road West. This measurement is representative of a baseline noise level experienced at the nearest noise-sensitive receptors further north from the railroad corridor. The dominant noise sources during the measurement period were continuous and nondescript mechanical noise from the power station, HVAC unit operation at residential properties, and insect noise. Additional daytime noise sources included intermittent bird calls, aircraft flyovers, vehicle pass-bys, railroad operations, and distant home construction activities (roofing nailer) observed during monitoring system deployment.

WFD NM-3: Long-term measurement deployment at the east boundary of the Dominion Millstone Power Station on an access path at the corner of Gun Shot Road and Winward Way. This measurement is representative of a baseline noise level experienced at the nearest noise-sensitive receptors to the Dominion Millstone Power Station along the southern end of Gun Shot Road. The dominant noise sources during the measurement period were continuous and nondescript mechanical noise from the power station, HVAC unit operation at residential properties, and insect noise. Additional daytime noise sources included intermittent bird calls, vehicle pass-bys, and railroad operations.

WFD NM-4: Long-term measurement deployment at the east boundary of the Dominion Millstone Power Station along the shoreline of a pond towards the northern end of Gun Shot Road. This measurement is representative of a baseline noise level experienced at the nearest noise-sensitive receptors to the Dominion Millstone Power Station along the northern end of Gun Shot Road. The dominant noise sources during the measurement period were continuous and nondescript mechanical noise from the power station, HVAC unit operation at residential properties, and insect noise. Additional daytime noise sources included intermittent bird calls, aircraft flyovers, vehicle pass-bys, and railroad operations

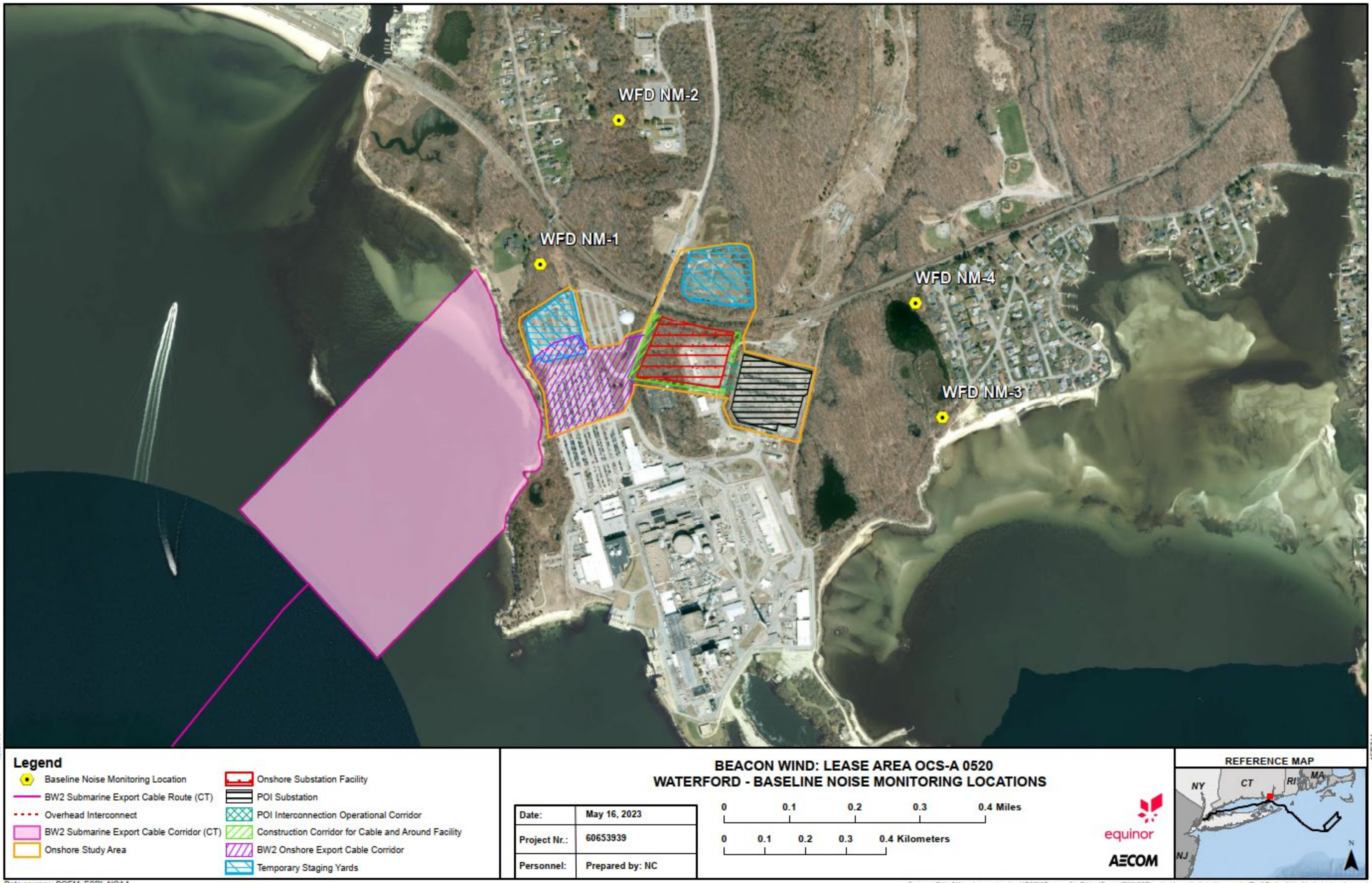
Figure K.4-2 shows the four long-term noise measurement locations deployed in Waterford, Connecticut superimposed on aerial imagery of the Study Area.

FIGURE K.4-1. BASELINE NOISE MONITORING LOCATIONS – QUEENS, NEW YORK



Data sources: BOEM, ESRI, NOAA
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

FIGURE K.4-2. BASELINE NOISE MONITORING LOCATIONS – WATERFORD, CONNECTICUT



Data sources: BOEM, ESRI, NOAA
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

K.4.3 Monitoring Results

K.4.3.1 *Queens, New York*

A summary of the noise monitoring results is shown in **Figure K.4-3**, **Figure K.4-4**, and **Figure K.4-5** for NM-1, NM-2, and NM-3, respectively.

FIGURE K.4-3. NOISE MONITORING RESULTS FROM DEPLOYMENT NM-1, AUGUST 25-27, 2021

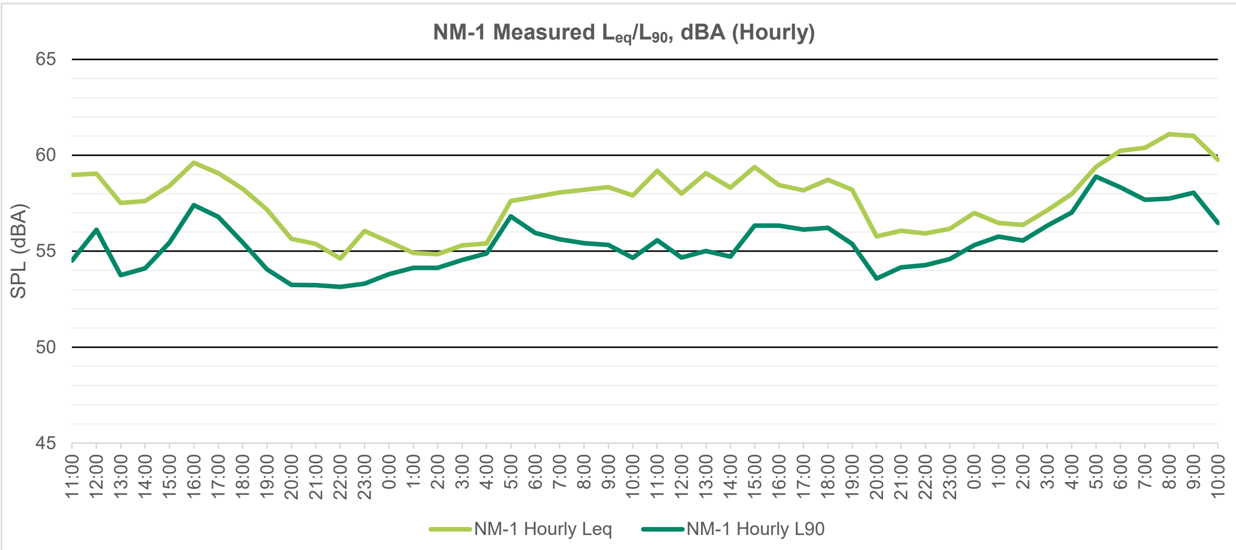


FIGURE K.4-4. NOISE MONITORING RESULTS FROM DEPLOYMENT NM-2, SEPTEMBER 27-28, 2022

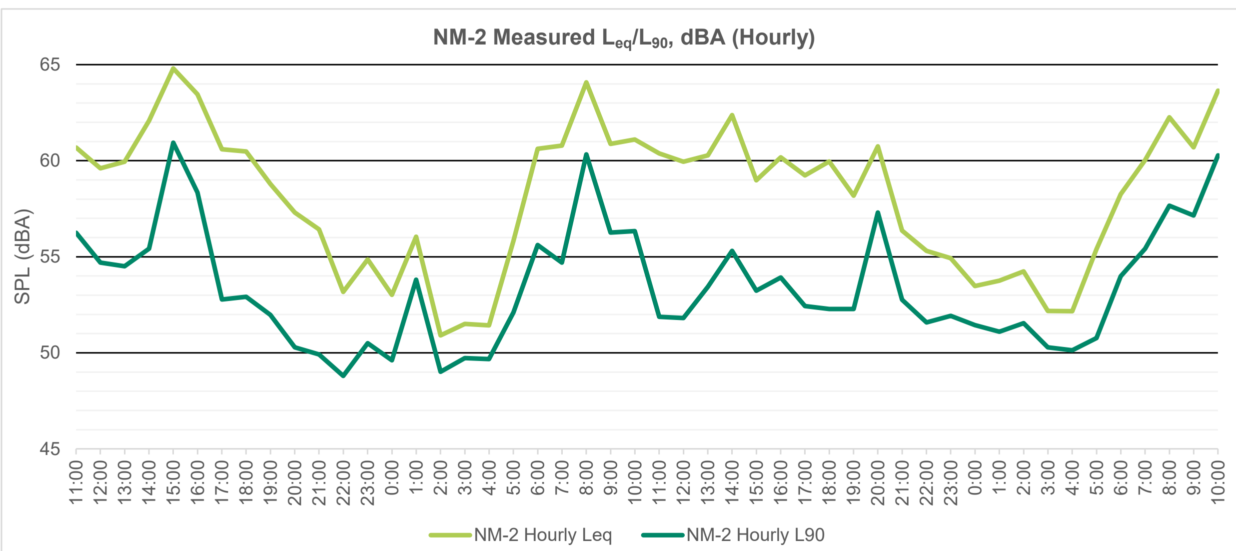
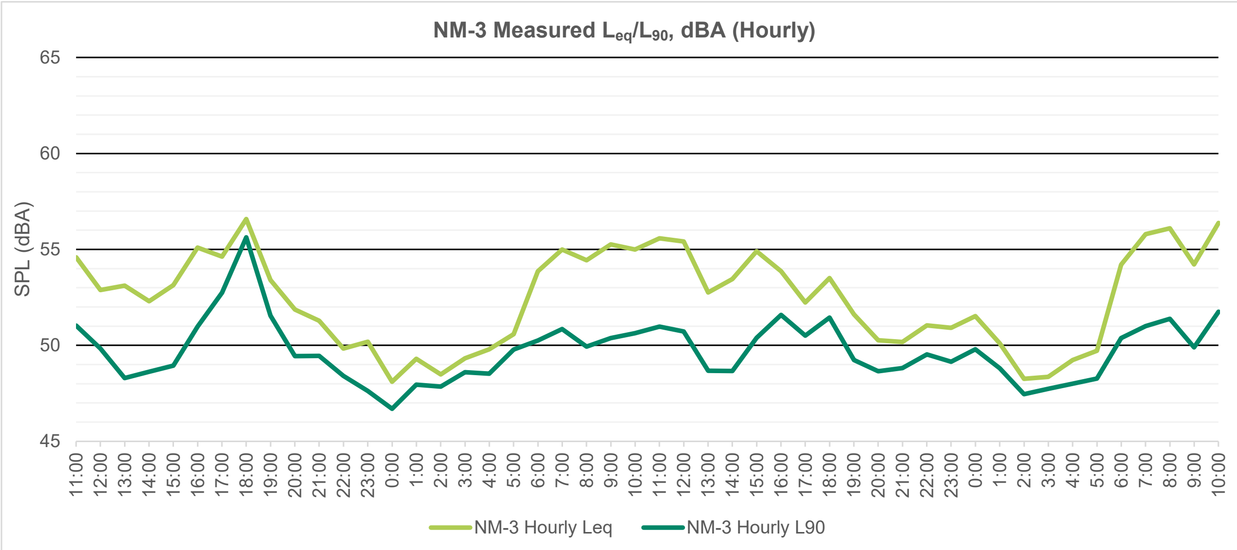


FIGURE K.4-5. NOISE MONITORING RESULTS FROM DEPLOYMENT NM-3, AUGUST 25-27, 2021



K.4.3.2 *Waterford, Connecticut*

A summary of the noise monitoring results are shown in **Figure K.4-6, Figure K.4-7, Figure K.4-8**, and **Figure K.4-9** for the Waterford, Connecticut onshore substation facility.

FIGURE K.4-6. NOISE MONITORING RESULTS FOR THE WATERFORD ONSHORE SUBSTATION FACILITY WFD NM-1, MARCH 30-APRIL, 2022

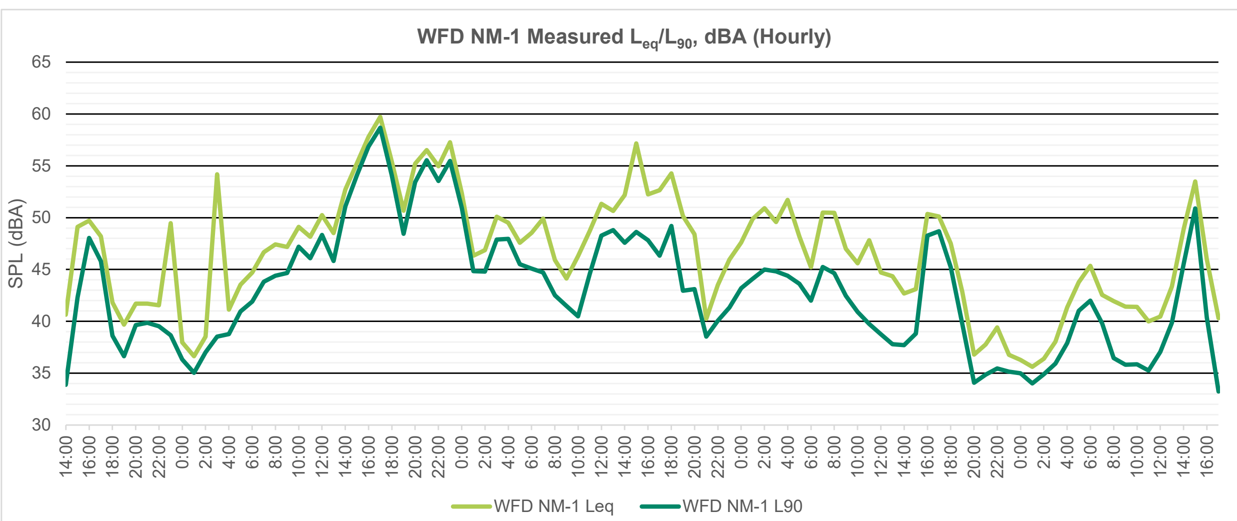
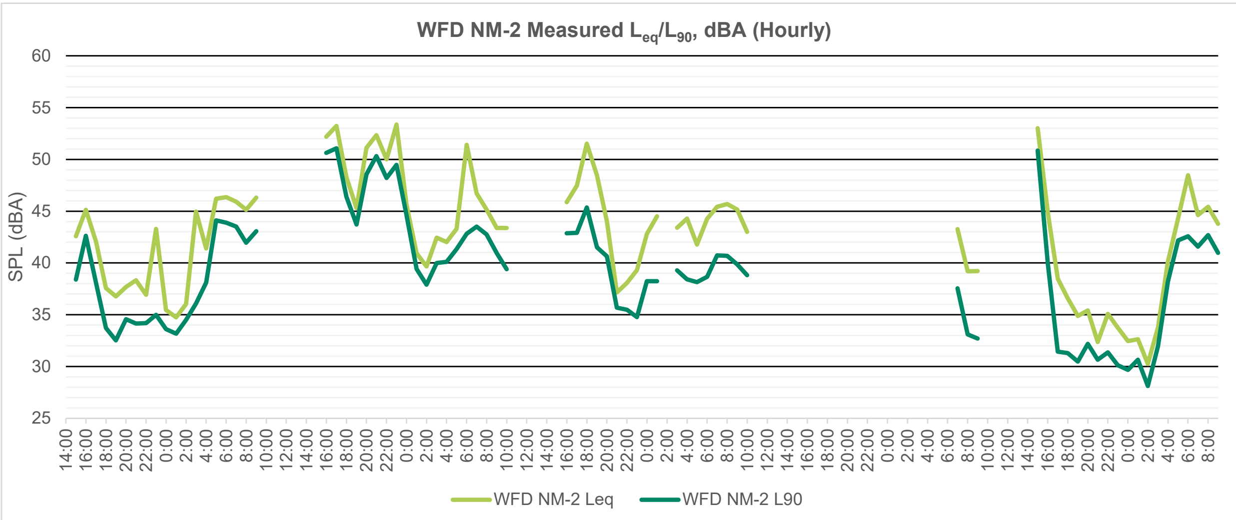


FIGURE K.4-7. NOISE MONITORING RESULTS FOR THE WATERFORD ONSHORE SUBSTATION FACILITY WFD NM-2, MARCH 30-APRIL 4, 2022



Note: Gaps in measured SPL represent periods where data suggest the connection between the sound level meter and microphone were interrupted or disconnected due to unknown factors.

FIGURE K.4-8. NOISE MONITORING RESULTS FOR THE WATERFORD ONSHORE SUBSTATION FACILITY NM-3, MARCH 30-APRIL 4, 2022

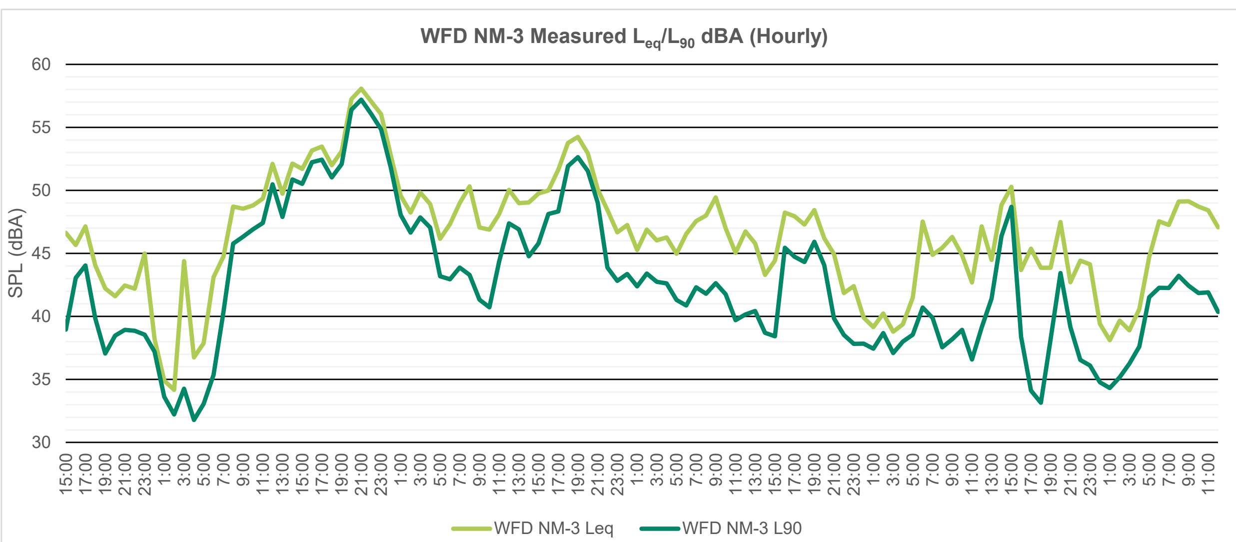
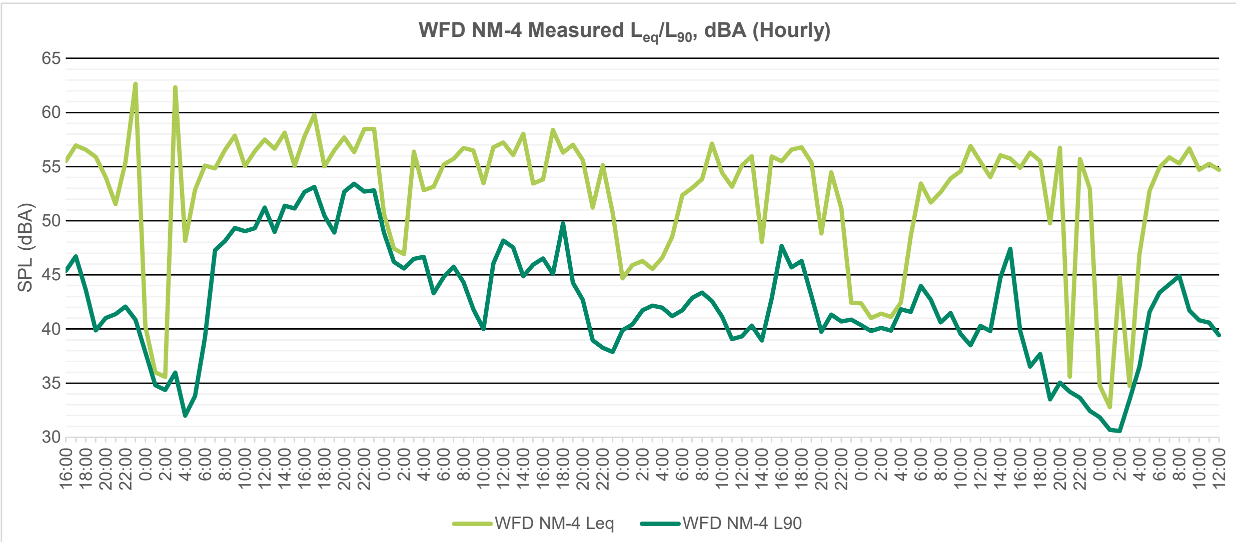


FIGURE K.4-9. NOISE MONITORING RESULTS FOR THE WATERFORD ONSHORE SUBSTATION FACILITY NM-4, MARCH 30-APRIL 4, 2022



K.5 Assessment Results

K.5.1 Future Onshore Substation Facility Operations Evaluation

For those onshore components of the Project Area, the only known operational Project-related noise sources anticipated to generate airborne acoustical impacts to noise-sensitive receptors are associated with the onshore substation facilities, depending on the site eventually chosen from the two current locations.

K.5.1.1 Onshore Substation Facility Primary Noise Sources and Reference Levels

Table K.5-1 lists the dominant noise sources associated with the onshore substation facilities (independent of site), along with their referenced sound levels. Sound power levels (L_WA) values are in dBA, provided by the listed references. Sound power levels, unlike sound pressure levels, are independent of location with respect to a source. The overall A-weighted levels are based on octave band center frequency (OBCF) data from the listed sources.

TABLE K.5-1. PRIMARY NOISE SOURCES AND REFERENCE LEVELS FOR THE ONSHORE SUBSTATION FACILITY

Source	Quantity in Layout	Relative Height ft [m]	L_WA	OBCF Source
540 MVA Transformer	3 (+1 back-up)	22 [7]	100	EEI XFMR a/
540 MVA Transformer Battery	3 (+1 back-up)	20 [6]	88	Harris XFMR b/
1600 kVA Auxiliary Transformer	2	22 [7] e/	68	Harris XFMR b/
Converter Reactor	8	34 [10]	105	Harris XFMR b/
Converter Module (indoors)	46	39 [12]	88	EEI XFMR a/
Star Point Reactor	1	20 [6] e/	85	Harris XFMR b/
Converter Building HVAC	3	20 [6] e/	81	Johnson Controls c/
Converter Cooling Fan Array	1	20 [6] e/	95	Wartsila d/
Notes:				

Source	Quantity in Layout	Relative Height ft [m]	L_WA	OBCF Source

a/ Edison Electrical Institute (EEI) 1984
b/ Harris 1998
c/ Johnson Controls Series 100 20,000 CFM Unit. Johnson Controls, Series 100 Performance Specification.
d/ Standard-Noise Radiator (6-Fan Array) (Wartsila 2012)
e/ Estimated height
HVAC – heating, ventilation, and air conditioning
kVA – kilovolt ampere
MVA – megavolt ampere
OBCF – octave band center frequency
XFMR - transformer

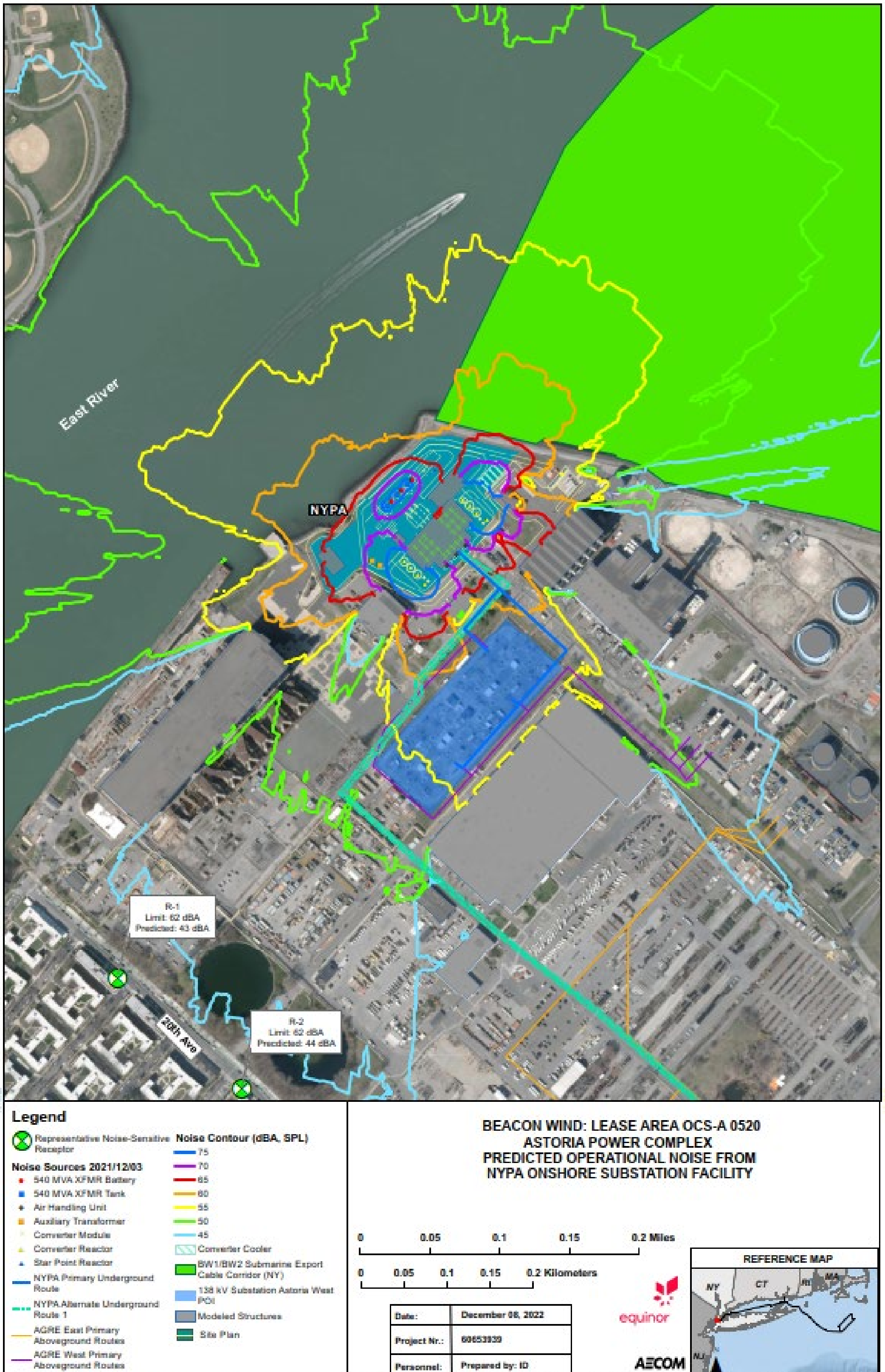
The site layouts and equipment lists were provided by Beacon Wind and Siemens Energy.

K.5.1.2 Onshore Substation Facility Noise Modeling Results and Impact Evaluation

K.5.1.2.1 Queens, New York

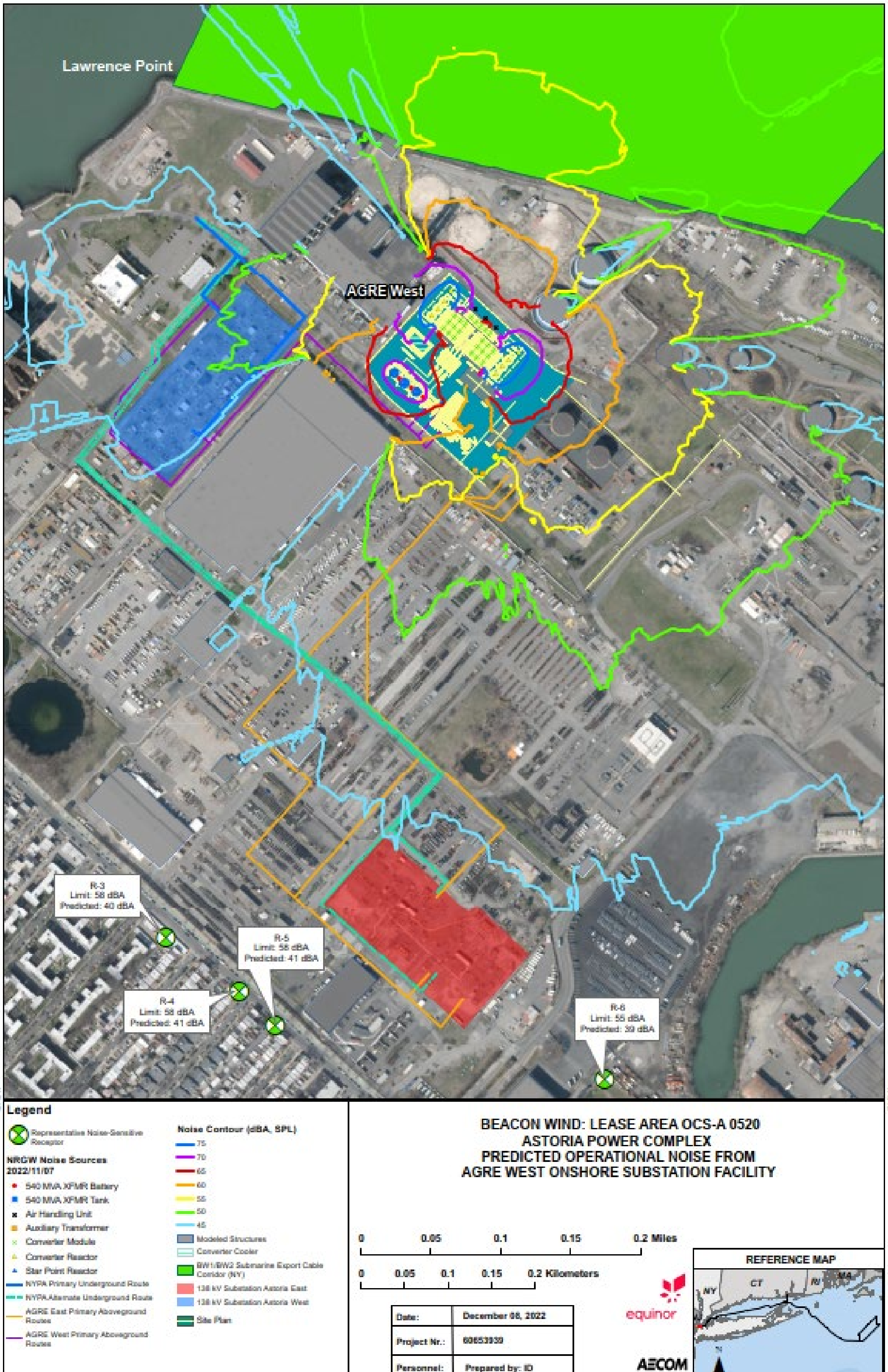
The modeling results for each onshore substation facility without mitigation are shown in **Figure K.5-1** for AGRE West and **Figure K.5-2** for NYPA. Modeling results for the combined operation of AGRE West and AGRE East onshore substation facilities are shown in **Figure K.5-3** and results for combined operation of NYPA and AGRE East are shown in **Figure K.5-4**.

FIGURE K.5-1. PREDICTED NOISE CONTOURS FOR THE ONSHORE SUBSTATION FACILITY AT NYPA



Data sources: BOEM, ESRI, NOAA
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

FIGURE K.5-2. PREDICTED NOISE CONTOURS FOR THE ONSHORE SUBSTATION FACILITY AT AGRE WEST



Data sources: BOEM, ESRI, NOAA
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

FIGURE K.5-3. PREDICTED NOISE CONTOURS FOR THE COMBINED ONSHORE SUBSTATION FACILITIES AT AGRE WEST AND AGRE EAST

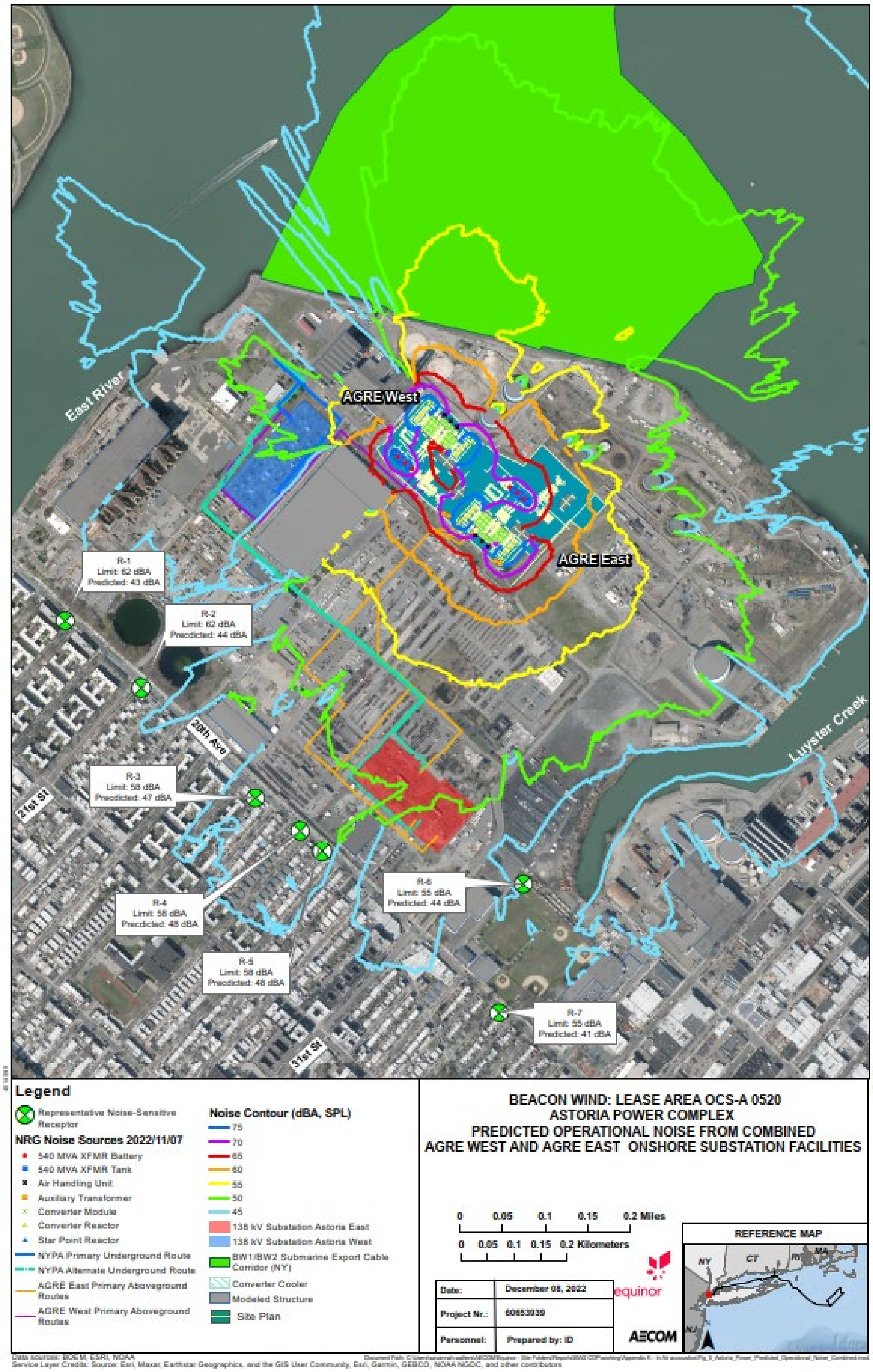
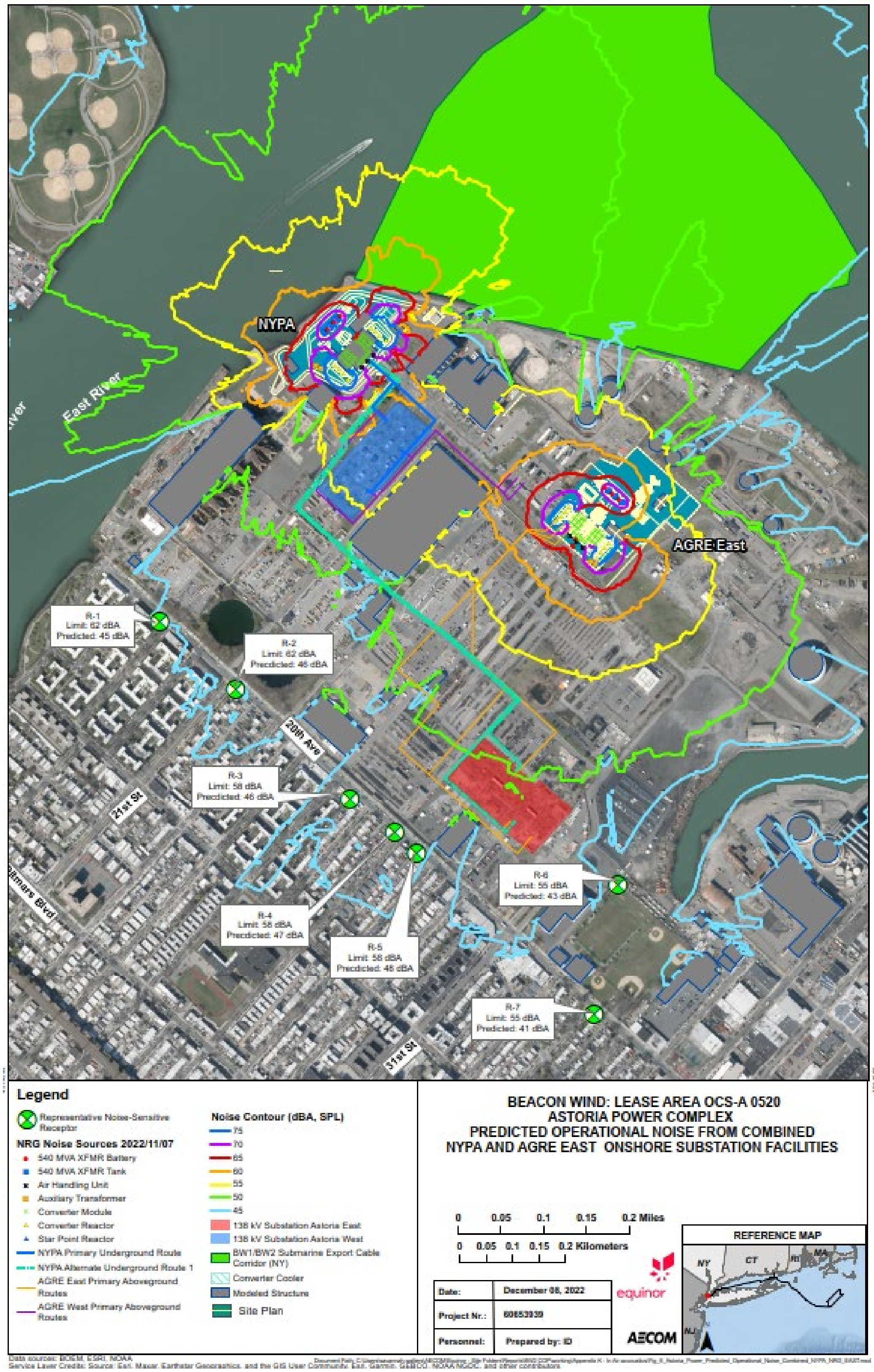


FIGURE K.5-4. PREDICTED NOISE CONTOURS FOR THE COMBINED ONSHORE SUBSTATION FACILITIES AT NYPA AND AGRE EAST



All four figures demonstrate that overall predicted noise levels are below the New York City Administrative Code Section 24-218 sound level limit of 7 dBA above the measured minimum ambient levels at select noise-sensitive receiver locations. **Table K.5-2** tabulates these values for detailed assessment.

TABLE K.5-2. COMPARISON OF PREDICTED OPERATIONAL AND AMBIENT NOISE LEVELS AND NEW YORK CITY ADMINISTRATIVE CODE

Substation Facility		Sound Pressure Level Results (dBA, L_{eq})				
		Predicted Operational Noise	Measured Night-time Ambient Noise	Combined Ambient + Operational Noise	Predicted Increase to Ambient	NYC Increase Limit
AGRE West	R1	39	55	55	+0	+7
	R2	39	55	55	+0	+7
	R3	40	51	51	+0	+7
	R4	41	51	51	+0	+7
	R5	41	51	51	+0	+7
	R6	39	48	49	+1	+7
	R7	31	48	48	+0	+7
NYPA	R1	43	55	55	+0	+7
	R2	44	55	55	+0	+7
	R3	38	51	51	+0	+7
	R4	39	51	51	+0	+7
	R5	37	51	51	+0	+7
	R6	34	48	48	+0	+7
	R7	32	48	48	+0	+7
Combined AGRE West + AGRE East	R1	43	55	55	+0	+7
	R2	44	55	55	+0	+7
	R3	47	51	52	+1	+7
	R4	48	51	52	+2	+7
	R5	48	51	53	+2	+7
	R6	44	48	50	+1	+7
	R7	41	48	49	+1	+7
Combined NYPA + AGRE East	R1	45	55	55	+0	+7
	R2	46	55	55	+1	+7
	R3	46	51	52	+1	+7
	R4	47	51	52	+2	+7
	R5	48	51	53	+2	+7
	R6	43	48	49	+1	+7
	R7	41	48	49	+1	+7

Source:
NYC Limit – New York City Administrative Code Section 24-218 Noise Limit, 2005

Table K.5-3 and **Table K.5-4** show the predicted operational octave band center frequency noise levels for individual onshore substation facility operation of AGRE West and NYPA at each studied receptor and compares them against the New York City Administrative Code Section 24-232 octave band noise level limits, respectively.

TABLE K.5-3. COMPARISON OF INDIVIDUAL PREDICTED OPERATIONAL OCTAVE-BAND CENTER FREQUENCY NOISE LEVELS WITH NEW YORK CITY ADMINISTRATIVE CODE – AGRE WEST

Octave-Band Center Frequency	NYC Code Limit	AGRE West						
		R-1	R-2	R-3	R-4	R-5	R-6	R-7
31.5	70	50	51	52	51	52	50	50
63	61	43	44	46	47	48	46	46
125	53	46	47	48	47	48	46	46
250	46	40	41	41	41	41	41	41
500	40	40	39	40	40	**41**	40	40
1000	36	32	32	33	35	34	32	32
2000	34	22	22	23	25	24	22	22
4000	33	N/A	N/A	N/A	1	N/A	N/A	N/A
8000	32	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Values listed are unweighted sound pressure levels. Bold values indicate non-compliance with limit.
N/A – Not applicable, no measurable acoustic energy at receptor distance
Source: NYC Code – New York City Administrative Code, Section 24-232, 2005

TABLE K.5-4. COMPARISON OF INDIVIDUAL PREDICTED OPERATIONAL OCTAVE-BAND CENTER FREQUENCY NOISE LEVELS WITH NEW YORK CITY ADMINISTRATIVE CODE - NYPA

Octave-Band Center Frequency	NYC Code Limit	NYPA						
		R-1	R-2	R-3	R-4	R-5	R-6	R-7
31.5	70	55	52	46	47	48	45	40
63	61	50	50	43	46	42	40	38
125	53	50	50	45	46	44	42	40
250	46	44	43	39	40	38	36	34
500	40	**43**	**44**	38	39	37	34	32
1000	36	**37**	**38**	31	33	29	26	24
2000	34	28	30	21	22	19	15	11
4000	33	9	9	N/A	N/A	N/A	N/A	N/A
8000	32	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Values listed are unweighted sound pressure levels. Bold values indicate non-compliance with limit.
N/A – Not applicable, no measurable acoustic energy at receptor distance
Source: NYC Code – New York City Administrative Code, Section 24-232, 2005

Predicted octave-band center frequency noise levels for the onshore substation facility operations were in excess of the New York City Administrative Code limits at the studied receptors by up to 1 dBA for AGRE and by up to 4 dBA for NYPA. This excess is caused primarily by contributions from the nearest (i.e., southwest facing) converter reactors.

Table K.5-5 and **Table K.5-6** show the predicted combined operations octave band center frequency noise levels for both potential substation operational combinations at each studied receptor and compares them against the New York City Administrative Code Section 24-232 octave band noise level limits.

TABLE K.5-5. COMPARISON OF COMBINED AGRE WEST & AGRE EAST PREDICTED OPERATIONAL OCTAVE-BAND CENTER FREQUENCY NOISE LEVELS WITH NEW YORK CITY ADMINISTRATIVE CODE

Octave-Band Center Frequency	NYC Code Limit	Combined AGRE West + AGRE East						
		R-1	R-2	R-3	R-4	R-5	R-6	R-7
31.5	70	53	54	55	55	56	54	49
63	61	48	51	53	55	55	49	48
125	53	49	51	53	**54**	**54**	50	47
250	46	43	45	47	**47**	**47**	45	41
500	40	**43**	**44**	**47**	**47**	**48**	**44**	**41**
1000	36	36	37	**41**	**42**	**43**	**37**	35
2000	34	26	28	32	33	34	27	25
4000	33	2	6	10	12	13	6	N/A
8000	32	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Values listed are unweighted sound pressure levels. Bold values indicate non-compliance with limit.
N/A – Not applicable, no measurable acoustic energy at receptor distance
Source: NYC Code – New York City Administrative Code, Section 24-232, 2005

TABLE K.5-6. COMPARISON OF COMBINED NYPA & AGRE EAST PREDICTED OPERATIONAL OCTAVE-BAND CENTER FREQUENCY NOISE LEVELS WITH NEW YORK CITY ADMINISTRATIVE CODE

Octave-Band Center Frequency	NYC Code Limit	Combined NYPA + AGRE East						
		R-1	R-2	R-3	R-4	R-5	R-6	R-7
31.5	70	56	55	54	54	54	52	49
63	61	52	53	53	55	54	47	48
125	53	52	52	53	53	53	49	48
250	46	46	46	46	**47**	46	44	41
500	40	**45**	**46**	**46**	**47**	**48**	**43**	**41**
1000	36	39	**40**	**40**	**42**	**42**	36	35
2000	34	30	31	31	33	33	27	25
4000	33	9	11	10	12	12	6	N/A
8000	32	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Values listed are unweighted sound pressure levels. Bold values indicate non-compliance with limit.
N/A – Not applicable, no measurable acoustic energy at receptor distance
Source: NYC Code – New York City Administrative Code, Section 24-232, 2005

Predicted octave-band center frequency noise levels for combined onshore substation facility operations were in excess of the New York City Administrative Code limits at the studied receptors by up to 8 dBA for both combined scenarios. This excess is caused by contributions from the nearest (i.e., southwest facing) converter reactors. However, as is shown in **Attachment K-2**, the current background noise levels in this area are well above the City's limit and the predicted levels in all octave bands.

Table K.5-7 and **Table K.5-8** show the predicted operational octave band center frequency noise levels for individual onshore substation facility operation at each studied receptor and compares them against New York City's Zoning Resolution octave band noise level limits for AGRE West and NYPA, respectively.

TABLE K.5-7. COMPARISON OF PREDICTED OPERATIONAL OCTAVE-BAND CENTER FREQUENCY NOISE LEVELS WITH NEW YORK CITY ZONING RESOLUTION - AGRE WEST

Octave-Band Center Frequency	NYC Zoning Resolution Limit	AGRE West						
		R-1	R-2	R-3	R-4	R-5	R-6	R-7
31.5	80	50	51	52	51	52	50	50
63	80	43	44	46	47	48	46	46
125	75	46	47	48	47	48	46	46
250	70	40	41	41	41	41	41	41
500	64	40	39	40	40	41	40	40
1000	58	32	32	33	35	34	32	32
2000	53	22	22	23	25	24	22	22
4000	49	N/A	N/A	N/A	1	N/A	N/A	N/A
8000	46	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Values listed are unweighted sound pressure levels.
N/A – Not applicable, no measurable acoustic energy at receptor distance
Source: NYC Code – New York City Administrative Code, Section 24-232, 2005

TABLE K.5-8. COMPARISON OF PREDICTED OPERATIONAL OCTAVE-BAND CENTER FREQUENCY NOISE LEVELS WITH NEW YORK CITY ZONING RESOLUTION - NYPA

Octave-Band Center Frequency	NYC Zoning Resolution Limit	NYPA						
		R-1	R-2	R-3	R-4	R-5	R-6	R-7
31.5	80	55	52	46	47	48	45	40
63	80	50	50	43	46	42	40	38
125	75	50	50	45	46	44	42	40
250	70	44	43	39	40	38	36	34
500	64	43	44	38	39	37	34	32
1000	58	37	38	31	33	29	26	24
2000	53	28	30	21	22	19	15	11
4000	49	9	9	N/A	N/A	N/A	N/A	N/A
8000	46	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Values listed are unweighted sound pressure levels.
N/A – Not applicable, no measurable acoustic energy at receptor distance
Source: NYC Code – New York City Administrative Code, Section 24-232, 2005

Predicted octave band center frequency noise levels for the onshore substation facility operations were below the New York City Zoning Resolution limits at the studied receptors.

Table K.5-9 and **Table K.5-10** show the predicted combined operational octave band center frequency noise levels for combined facility operation at each studied receptor and compares them against New York City's Zoning Resolution octave band noise level limits.

TABLE K.5-9. COMPARISON OF COMBINED PREDICTED AGRE WEST + AGRE EAST OPERATIONAL OCTAVE-BAND CENTER FREQUENCY NOISE LEVELS WITH NEW YORK CITY ZONING RESOLUTION

Octave-Band Center Frequency	NYC Zoning Resolution Limit	AGRE West + AGRE East						
		R-1	R-2	R-3	R-4	R-5	R-6	R-7
31.5	80	55	52	46	47	48	45	40
63	80	50	50	43	46	42	40	38
125	75	50	50	45	46	44	42	40
250	70	44	43	39	40	38	36	34
500	64	43	44	38	39	37	34	32
1000	58	37	38	31	33	29	26	24
2000	53	28	30	21	22	19	15	11
4000	49	9	9	N/A	N/A	N/A	N/A	N/A
8000	46	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Values listed are unweighted sound pressure levels.
N/A – Not applicable, no measurable acoustic energy at receptor distance
Source: NYC Zoning Resolution – New York City Department of City Planning, Sections 42-213 and 214 of the New York City Zoning Resolution, 1961

TABLE K.5-10. COMPARISON OF COMBINED PREDICTED NYPA + AGRE EAST OPERATIONAL OCTAVE-BAND CENTER FREQUENCY NOISE LEVELS WITH NEW YORK CITY ZONING RESOLUTION

Octave-Band Center Frequency	NYC Zoning Resolution Limit	NYPA + AGRE East						
		R-1	R-2	R-3	R-4	R-5	R-6	R-7
31.5	80	56	55	54	54	54	52	49
63	80	52	53	53	55	54	47	48
125	75	52	52	53	53	53	49	48
250	70	46	46	46	47	46	44	41
500	64	45	46	46	47	48	43	41
1000	58	39	40	40	42	42	36	35
2000	53	30	31	31	33	33	27	25
4000	49	9	11	10	12	12	6	N/A
8000	46	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Notes:
Values listed are unweighted sound pressure levels.
N/A – Not applicable, no measurable acoustic energy at receptor distance
Source: NYC Zoning Resolution – New York City Department of City Planning, Sections 42-213 and 214 of the New York City Zoning Resolution, 1961

Predicted octave band center frequency noise levels for the combined operation of the Queens, New York onshore substation facilities were below the New York City Zoning Resolution limits at the studied receptors.

K.5.1.2.2 Waterford, Connecticut

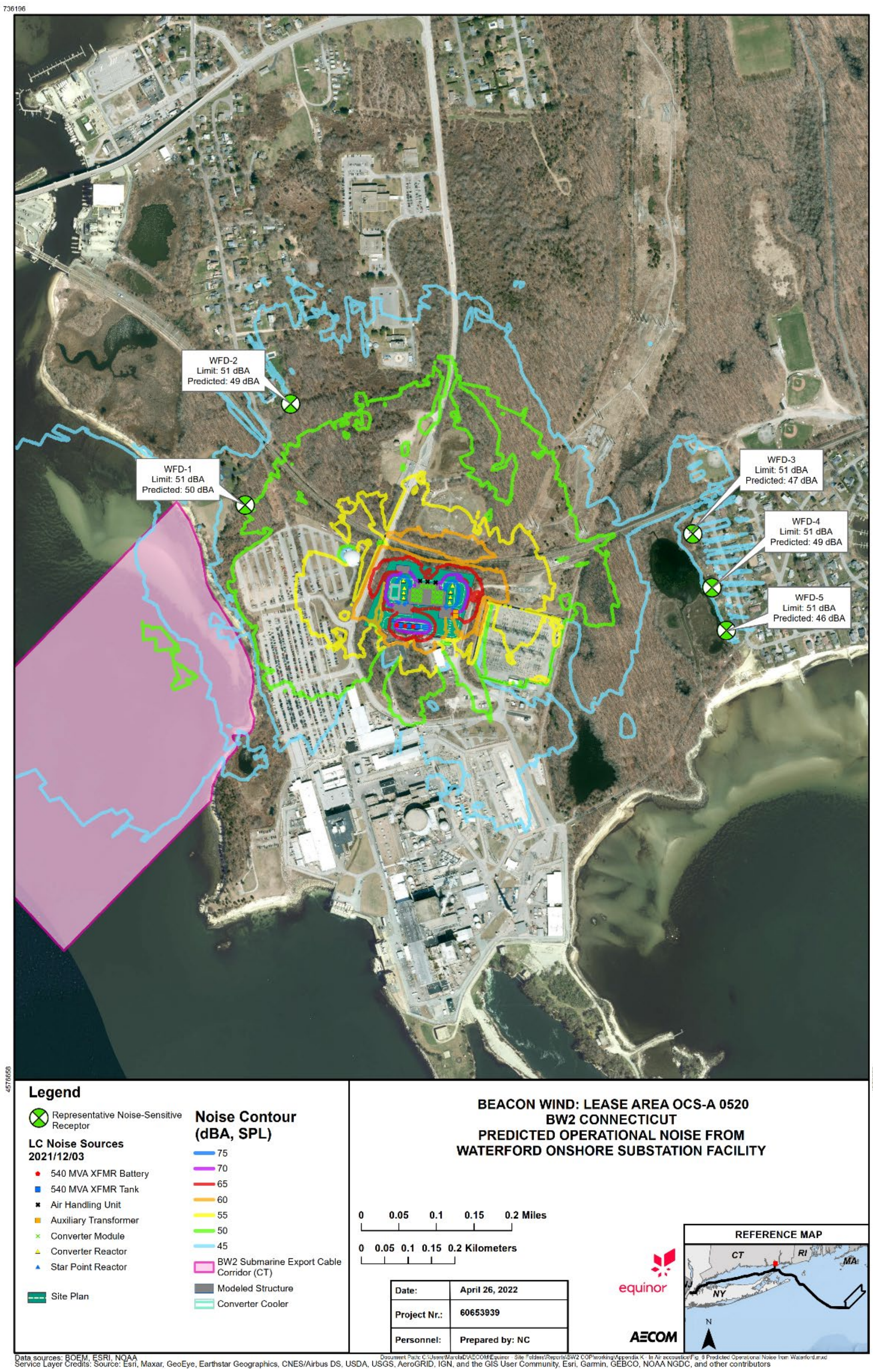
The modeling results for the Waterford, Connecticut onshore substation facility without mitigation are shown in **Figure K.5-5**. The figure demonstrates that overall predicted noise levels are below the Chapter 442, Section 22a-69-3 of the State Regulations and Title 9, Section 9.06.050 of the Town of Waterford Code sound level limit of 51 dBA, L_{eq} at studied noise-sensitive receiver locations. **Table K.5-11** tabulates these values for detailed assessment.

TABLE K.5-11. COMPARISON OF PREDICTED OPERATIONAL NOISE LEVELS AND STATE/TOWN NOISE LEVEL LIMIT

Receptor ID	Predicted Operational Noise Sound Pressure Level (dBA, L_{eq})	Nighttime Noise Level Limit at Residential Land Uses (dBA, L_{eq})
WFD-1	50	51
WFD-2	49	51
WFD-3	47	51
WFD-4	49	51
WFD-5	46	51

Source:
State of Connecticut - Regulations of Connecticut State Agencies Section 22a-69-3
Town of Waterford – Town of Waterford Code Title 9, Section 9.06.050

FIGURE K.5-5. PREDICTED NOISE CONTOURS FOR THE ONSHORE SUBSTATION FACILITY AT WATERFORD, CONNECTICUT



K.5.1.3 *Onshore Substation Facilities Mitigation Measures*

K.5.1.3.1 Queens, New York

Upon initial calculation, onshore substation facility operations in Queens, New York were determined to exceed the New York City's octave band Noise Code limits (**Table K.5-3**). Noise mitigation measures are required for either of the onshore substation sites selected to bring Project operations within the octave band center frequency limits. The key contributors to this exceedance are the converter reactors on the southern edges of the proposed converter buildings and the 540-MVA main transformers. To avoid potential non-compliance with New York City's octave band noise level limits, final equipment selection will be reviewed and vetted by a noise control engineer so that installed equipment will meet the applicable criteria.

Although it does not play a role in the assessment of octave band noise level limit compliance related to New York City Administrative Code Section 24-232, it should be noted that existing nighttime conditions at the studied receptors were measured to be in notable excess of the octave band limits stipulated in the New York City Noise Code by up to 16 dBA. Thus, although predicted project-generated noise levels are non-compliant with the New York City Noise Code, they would not generate a perceptible change to the existing noise level within any octave band. Comparison plots of measured ambient octave band data and the New York City Administrative Code Section 24-232 limits are provided in **Attachment K-2**

K.5.1.3.2 Waterford, Connecticut

Upon initial calculation, onshore substation facility operations in Waterford, Connecticut were determined to be compliant with the applicable state and local noise regulations. Thus, no noise mitigation measures are required for this onshore substation facility.

K.5.2 Construction Noise Evaluation

K.5.2.1 Offshore Installation

Offshore installation activities will mostly be occurring more than 20 mi (32 km) from any noise-sensitive receptors, with the exception of vessel operations to and from the shoreline. The dominant noise sources from these operations would include vessel engines, and these would be close enough to noise-sensitive receptors to be audible for short periods of time. The greatest potential for noise impacts from these operations are addressed in a separate study presented in **Appendix L Underwater Acoustic Assessment**.

K.5.2.2 HDD Construction

The noise from HDD construction activities is provided below and are applicable to the landfall locations at each onshore substation facility location being considered. **Table K.5-12** lists the dominant noise sources associated with the HDD activities (independent of site), along with their referenced sound levels.

TABLE K.5-12. PRIMARY NOISE SOURCES AND REFERENCE LEVELS FOR HDD ACTIVITIES

HDD Source	Quantity Assumed	L_wA
Drill Rig and Power Unit	1	113
Mud Mixer/Recycling Unit	1	101
Mud Pumping Unit	1	113
Vertical Sump Pump	1	105
Generator – 100 kW	1	111
Generator – 100 kW	1	113

Notes:
kW - kilowatt

K.5.2.2.1 Queens, New York

The modeling results for HDD activities for the onshore substation facilities without mitigation are provided in **Table K.5-13** and shown in **Figure K.5-6** for NYPA and **Figure K.5-7** for the AGRE site.

TABLE K.5-13. SUMMARY OF HDD CONSTRUCTION NOISE PREDICTION RESULTS – QUEENS, NEW YORK

Substation Facility	Receptor ID	Predicted Sound Pressure Level for HDD Construction Activities (dBA, Leq)
NYPA	R-1	47
	R-2	45
	R-3	37
	R-4	41
	R-5	37
	R-6	33
	R-7	27
AGRE East / West	R-1	39
	R-2	41
	R-3	46
	R-4	47
	R-5	46
	R-6	40
	R-7	37

Table K.5-13 demonstrates that overall predicted HDD noise levels are below 65 dBA at studied noise-sensitive receiver locations. This is an internal design goal based on typical daytime noise limits for urban environments used throughout the country. Therefore, activity-specific mitigation measures are not necessary, as this activity is in line with the 65 dBA goal. However, Beacon Wind will apply those additional mitigation measures detailed in **Section K.5.2.4** to further minimize construction-related noise.

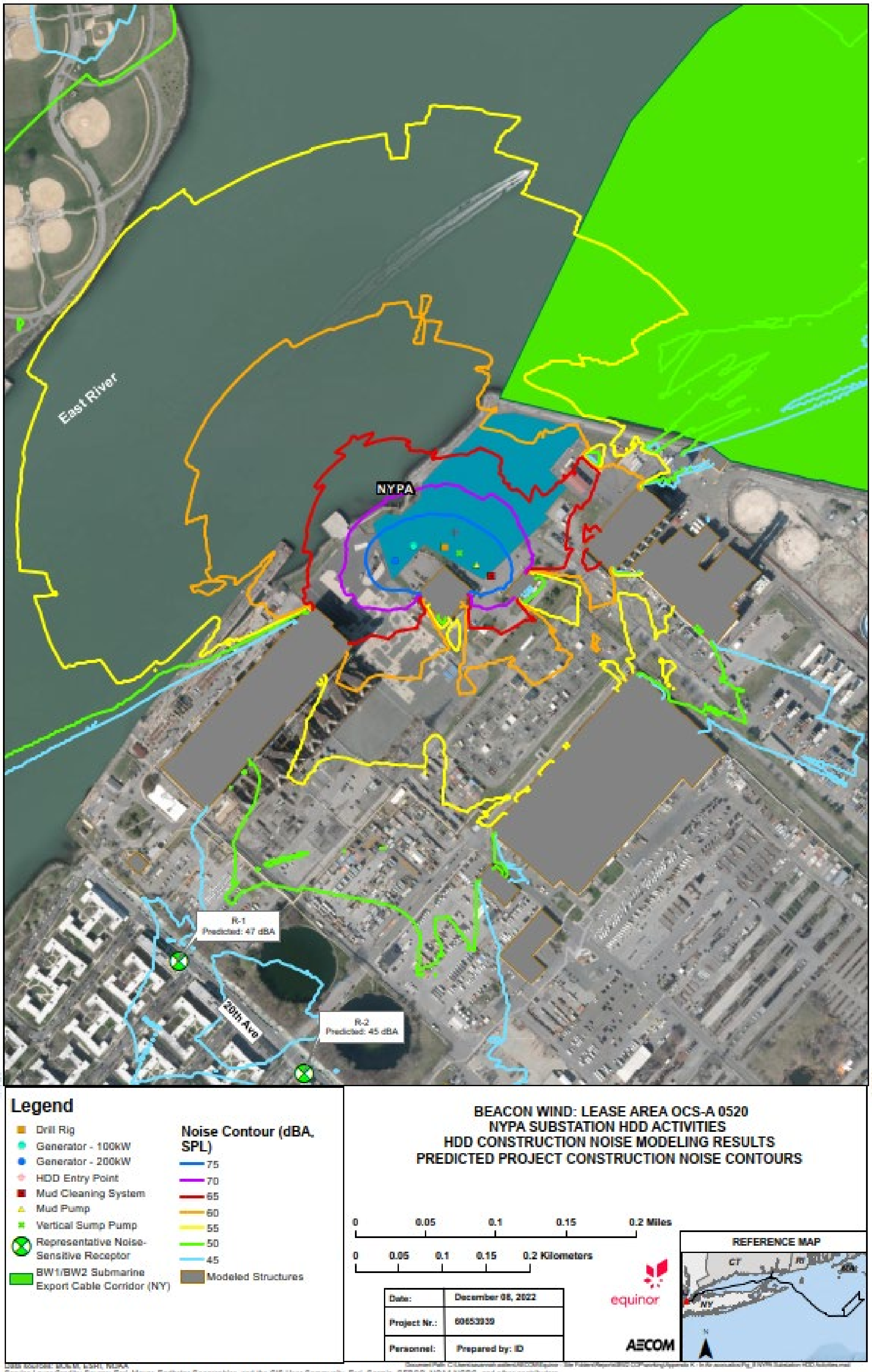
If HDD is selected as the submarine export cable landfall installation method, installation of offshore casing pipe and goalposts will be required in the waters of the East River northwest of the onshore substation facilities to receive the HDD cable connection. The temporary installation of casing pipes by pneumatic pipe ramming and the temporary installation of goal posts by impact driving would occur and would require multiple days of offshore construction activities. This effort would occur during daytime periods and using a single impact pile driving system with an assumed reference noise level of 126 L_wA. The modeling results for offshore casing pipe and goalpost installation activities for the onshore substation facilities without mitigation are provided in **Table K.5-14**.

TABLE K.5-14. SUMMARY OF CASING PIPE AND GOALPOST CONSTRUCTION NOISE PREDICTION RESULTS – QUEENS, NEW YORK

Substation Facility	Receptor ID	Predicted Sound Pressure Level for Casing Pipe and Goalpost Construction Activities (dBA, Leq)
NYPA	R-1	39
	R-2	39
	R-3	39
	R-4	46
	R-5	46
	R-6	38
	R-7	36
AGRE East / West	R-1	40
	R-2	41
	R-3	40
	R-4	48
	R-5	48
	R-6	41
	R-7	39

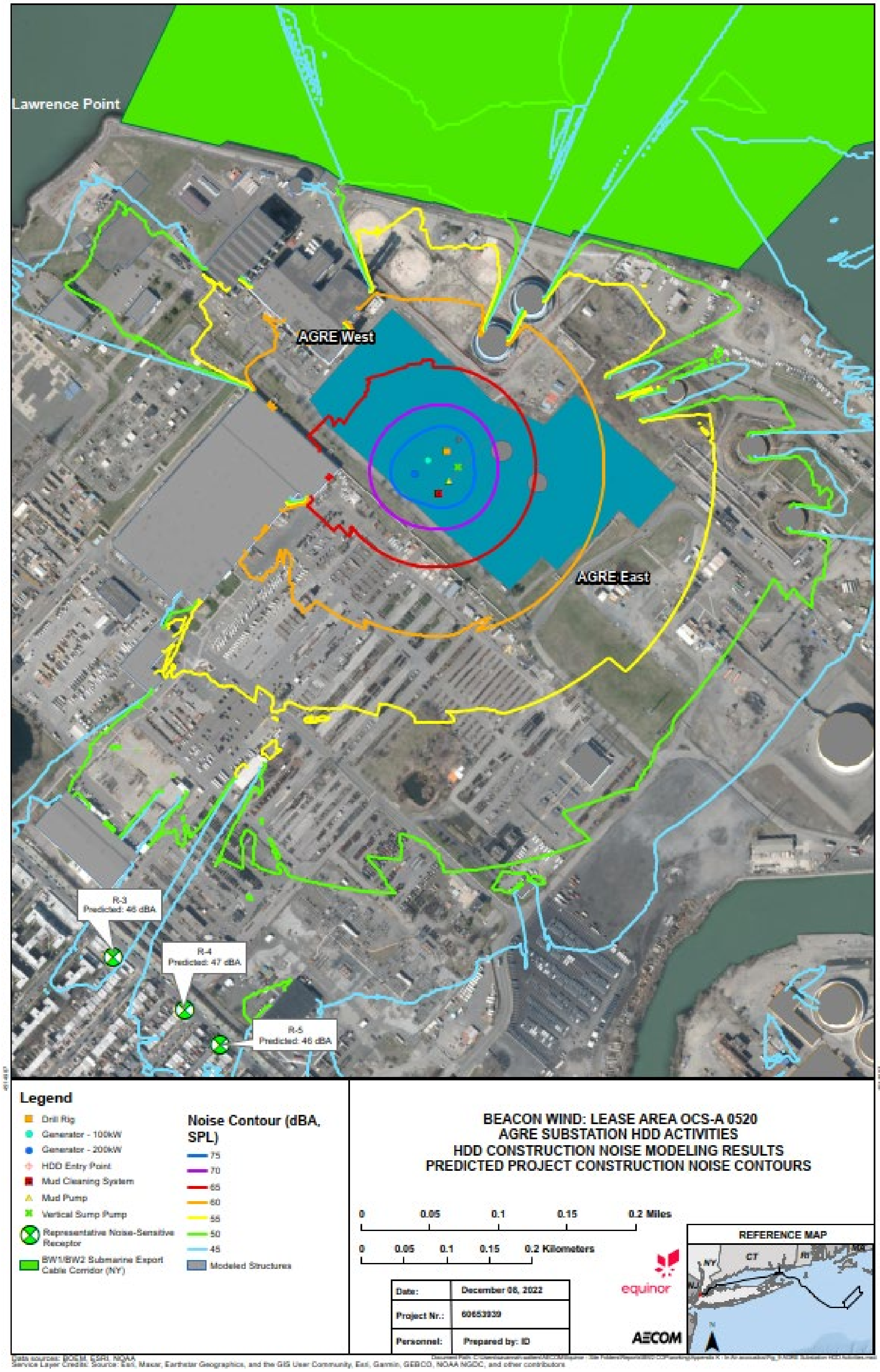
Table K.5-14 demonstrates that overall predicted casing pipe and goalpost installation noise levels are below 65 dBA at studied noise-sensitive receiver locations. Therefore, activity-specific mitigation measures are not necessary, as this activity is in line with the 65 dBA goal. However, Beacon Wind will apply those additional mitigation measures detailed in **Section K.5.2.4** to further minimize construction-related noise. This information is detailed within **Appendix L Underwater Acoustic Assessment**, as it relates to underwater acoustic impacts.

FIGURE K.5-6. PREDICTED NOISE CONTOURS FOR HDD ACTIVITIES AT NYPA



Data Sources: BOEM, ESRI, NOAA
Service Layer Credits: Source: Esri, Maxar, Earthstar Geographics, and the GIS User Community, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

FIGURE K.5-7. PREDICTED NOISE CONTOURS FOR HDD ACTIVITIES AT AGRE



K.5.2.2.2 Waterford, Connecticut

The modeling results for HDD activities for the onshore substation facility without mitigation are provided in and shown in **Figure K.5-8** for Waterford, Connecticut.

TABLE K.5-15. SUMMARY OF HDD CONSTRUCTION NOISE PREDICTION RESULTS– WATERFORD, CONNECTICUT

Receptor ID	Predicted Sound Pressure Level for HDD Construction Activities (dBA, L_{eq})
WFD-1	46
WFD-2	44
WFD-3	41
WFD-4	40
WFD-5	40

Table K.5-15 demonstrates that overall predicted HDD noise levels are below 65 dBA at studied noise-sensitive receiver locations. This is an internal design goal based on typical daytime noise limits for urban environments used throughout the country. Therefore, activity-specific mitigation measures are not necessary, as this activity is in line with the 65 dBA goal. However, Beacon Wind will apply those additional mitigation measures detailed in **Section K.5.2.4** to further minimize construction-related noise.

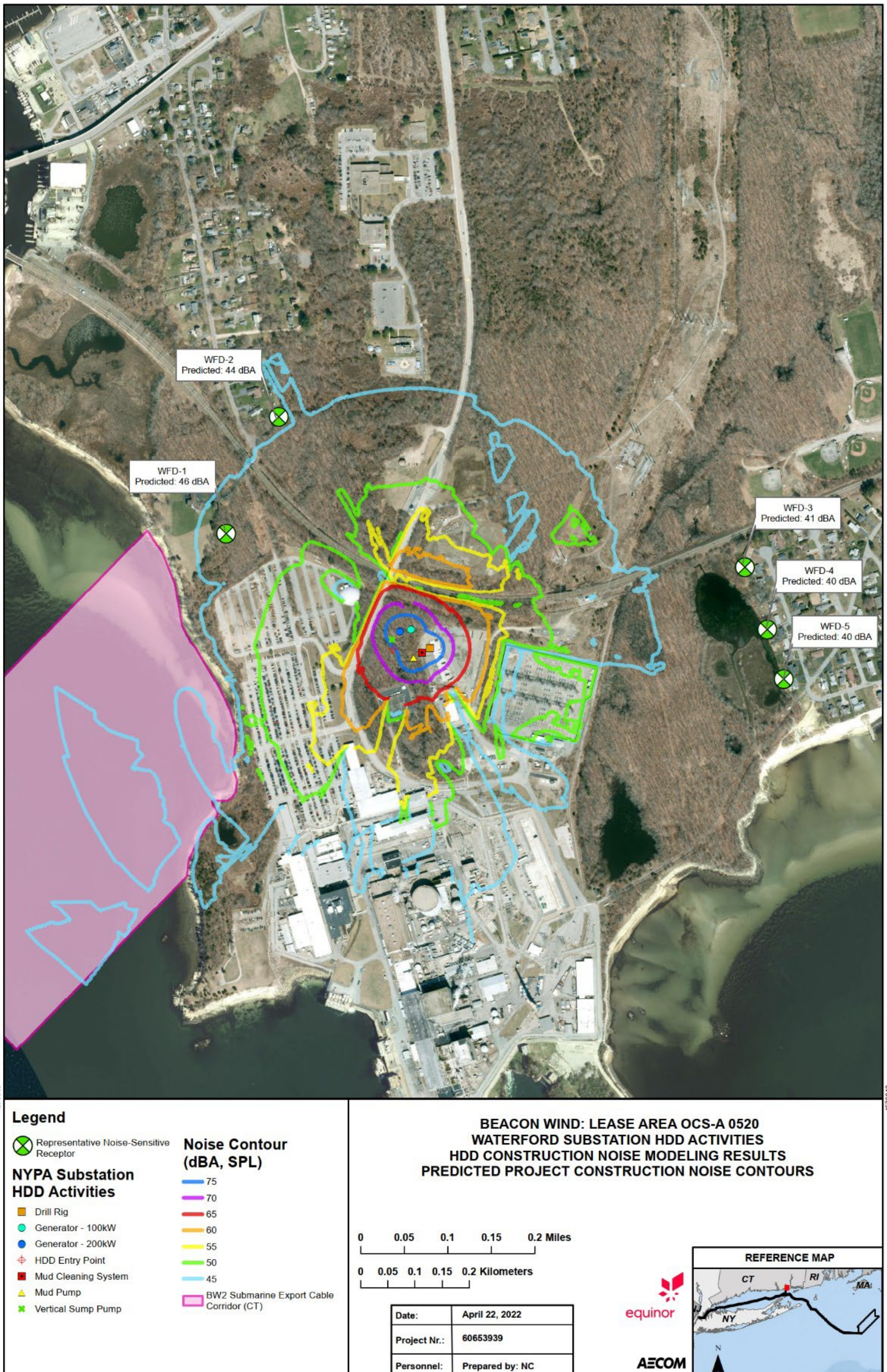
For completion of the HDD for the submarine export cable landfall method, installation of offshore casing pipes and goalposts will be required in the waters of Niantic Bay west of the onshore substation facility to support the HDD cable connection. The temporary installation of casing pipes by pneumatic pipe ramming and the temporary installation of goal posts by impact pile driving would occur and would require multiple days of offshore construction activities. This effort would occur during daytime periods and using an impact pile driving system with an assumed reference noise level of 126 L_wA. The modeling results for offshore casing pipe and goalpost installation activities for the onshore substation facilities without mitigation are provided in **Table K.5-16**.

TABLE K.5-16. SUMMARY OF CASING PIPE AND GOALPOST CONSTRUCTION NOISE PREDICTION RESULTS – WATERFORD, CONNECTICUT

Receptor ID	Predicted Sound Pressure Level for Casing Pipe and Goalpost Construction Activities (dBA, L_{eq})
WFD-1	56
WFD-2	44
WFD-3	39
WFD-4	39
WFD-5	39

Table K.5-16 demonstrates that overall predicted casing pipe and goalpost construction noise levels are below 65 dBA at studied noise-sensitive receiver locations. Therefore, activity-specific mitigation measures are not necessary, as this activity is in line with the 65 dBA goal. However, Beacon Wind will apply those additional mitigation measures detailed in **Section K.5.2.4** to further minimize construction-related noise. This information is detailed within **Appendix L Underwater Acoustic Assessment**, as it relates to underwater acoustic impacts.

FIGURE K.5-8. PREDICTED NOISE CONTOURS FOR HDD ACTIVITIES AT WATERFORD, CONNECTICUT



Data sources: BOEM, ESRI, NOAA
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

K.5.2.3 Onshore Construction of Substation Facility, Interconnection, and POI

The potential for noise impacts from substation facility construction, interconnection cable installation, and final tie-in at the Queens, New York and Waterford, Connecticut POIs are a function of the specific receptors in the vicinity of the Queens, New York and Waterford, Connecticut power complexes as well as the equipment used and proposed hours of operation. Onshore construction will include the following activities:

- Onshore Substation Facility Construction include:
  - Site preparation, excavation, and grading;
  - Construction of foundations for the control building, transformers, reactors, and switchgear;
  - Construction of electrical grounding, duct banks, and underground conduits;
  - Installation of appropriate drainage systems, security fence, noise barrier, and station service; and
  - Installation of above-ground structures including transformers, switchgears, and cable systems.
- Interconnection and POI Construction include:
  - Excavation and trenching for underground electric transmission route;
  - Installation of underground electric transmission cables; and
  - Tie-in activities at the Astoria East and/or Astoria West POI.

Construction is anticipated to occur during typical work hours. However, in specific instances, or at the request of the Department of Public Works, the Project may seek municipal approval to work at night or outside the normal hours of construction allowed by local bylaw. Nighttime work will be minimized and performed only on an as-needed basis and will be coordinated with New York City and the Town of Waterford.

The construction of the onshore substation facilities will be the most noise-intensive portion of the greater onshore construction effort due to the need for demolition, site grading, and the potential need for impact or vibratory pile driving. Thus, the onshore construction noise assessment analyzed a single worst-case construction noise scenario assuming simultaneous operation of planned construction equipment.

The location and operational duration of each piece of equipment will vary within the Project Area, with no single location having extended periods of noise exposure. Construction of the onshore substation facilities will take up to 48 months. **Table K.5-17** lists the dominant construction equipment noise sources associated with the onshore substation facilities' construction activities (independent of site), along with their referenced sound power levels.

TABLE K.5-17. PRIMARY NOISE SOURCES AND REFERENCE LEVELS FOR ONSHORE SUBSTATION FACILITY CONSTRUCTION ACTIVITIES

Construction Source	Quantity Assumed	L_wA
Large Bulldozer	1	110
All-Terrain Forklift	1	109
Front End Loader	1	107
Medium Crane	1	105
Medium Aerial Lift	1	107
Medium Excavator	1	109
Vibratory Piling Rig	1	126
Generator	1	110

Source: Federal Highway Administration (FHWA) 2006; Federal Transportation Administration (FTA) 2018

The construction equipment listed above was combined into a single aggregate area noise source. This area source spanning the entire construction work area was modeled at a constant height of approximately 10 feet above ground.

K.5.2.3.1 Queens, New York

The modeling results for the onshore substation facility construction activities without mitigation are summarized in **Table K.5-18** and shown in **Figure K.5-9** for NYPA, **Figure K.5-10** for AGRE West, **Figure K.5-11** for combined construction activities at AGRE West and AGRE East, and **Figure K.5-12** for combined construction activities at NYPA and AGRE East.

TABLE K.5-18. SUMMARY OF SUBSTATION CONSTRUCTION NOISE PREDICTION RESULTS – QUEENS, NEW YORK

Substation Facility	Receptor ID	Predicted Sound Pressure Level for Substation Construction Activities (dBA, Leq)
NYPA	R-1	48
	R-2	49
	R-3	55
	R-4	56
	R-5	55
	R-6	48
	R-7	45
AGRE West	R-1	51
	R-2	55
	R-3	46
	R-4	48
	R-5	45
	R-6	42
	R-7	39
AGRE West + AGRE East	R-1	51
	R-2	52
	R-3	58
	R-4	59
	R-5	60
	R-6	52
	R-7	50

Substation Facility	Receptor ID	Predicted Sound Pressure Level for Substation Construction Activities (dBA, Leq)
NYPA + AGRE East	R-1	53
	R-2	56
	R-3	56
	R-4	56
	R-5	58
	R-6	50
	R-7	49

Table K.5-18 demonstrates that overall predicted onshore substation facility construction noise levels, inclusive of pile driving activities, are below the general sound level goal of 65 dBA at studied noise-sensitive receiver locations. Therefore, activity-specific mitigation measures are not necessary, as this activity is below the 65 dBA goal. However, Beacon Wind will apply those mitigation measures detailed in **Section K.5.2.4** to further minimize of construction-related noise.

FIGURE K.5-9. PREDICTED NOISE CONTOURS FOR SUBSTATION CONSTRUCTION ACTIVITIES AT NYPA

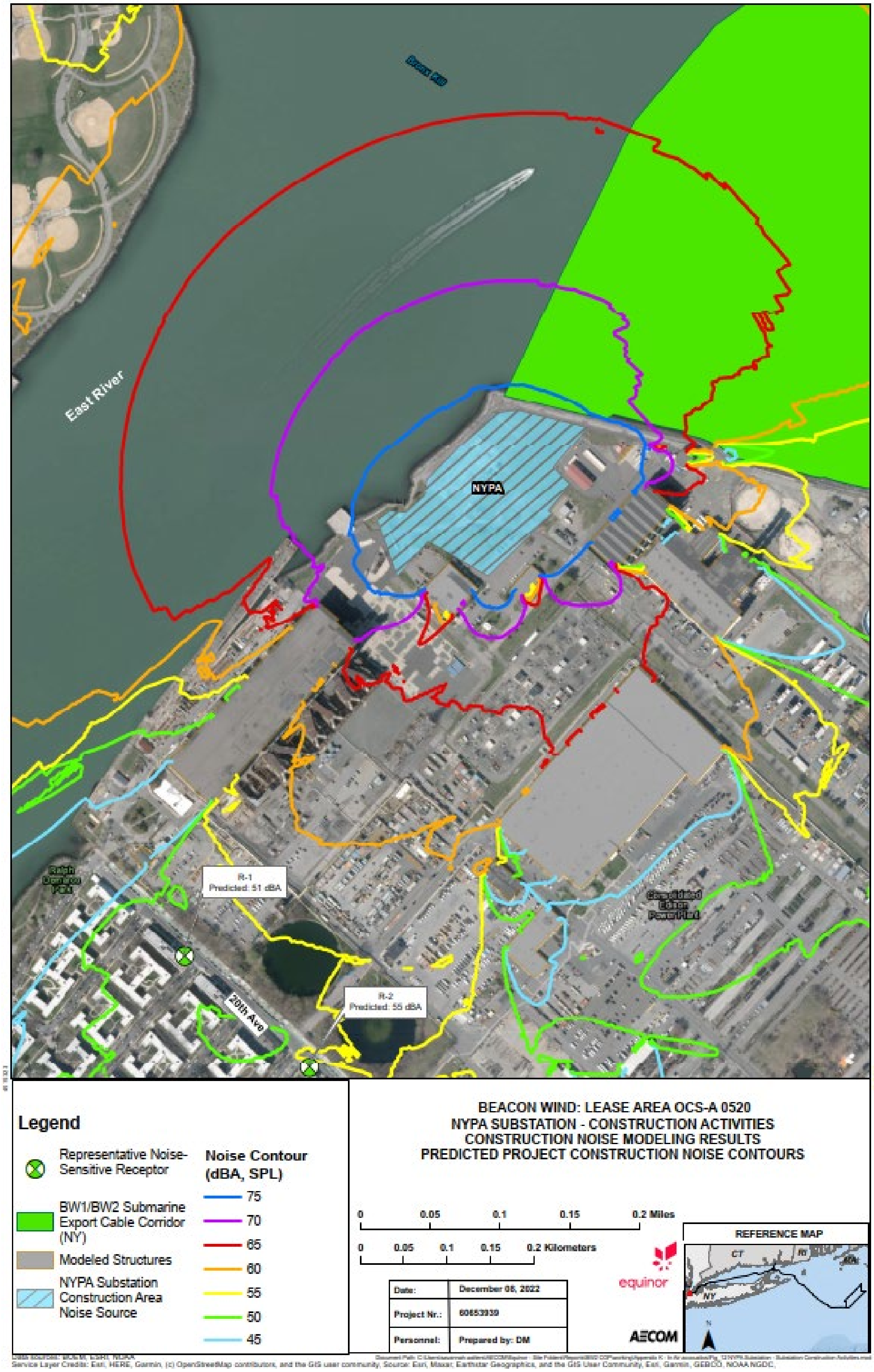


FIGURE K.5-10. PREDICTED NOISE CONTOURS FOR SUBSTATION CONSTRUCTION ACTIVITIES AT AGRE WEST

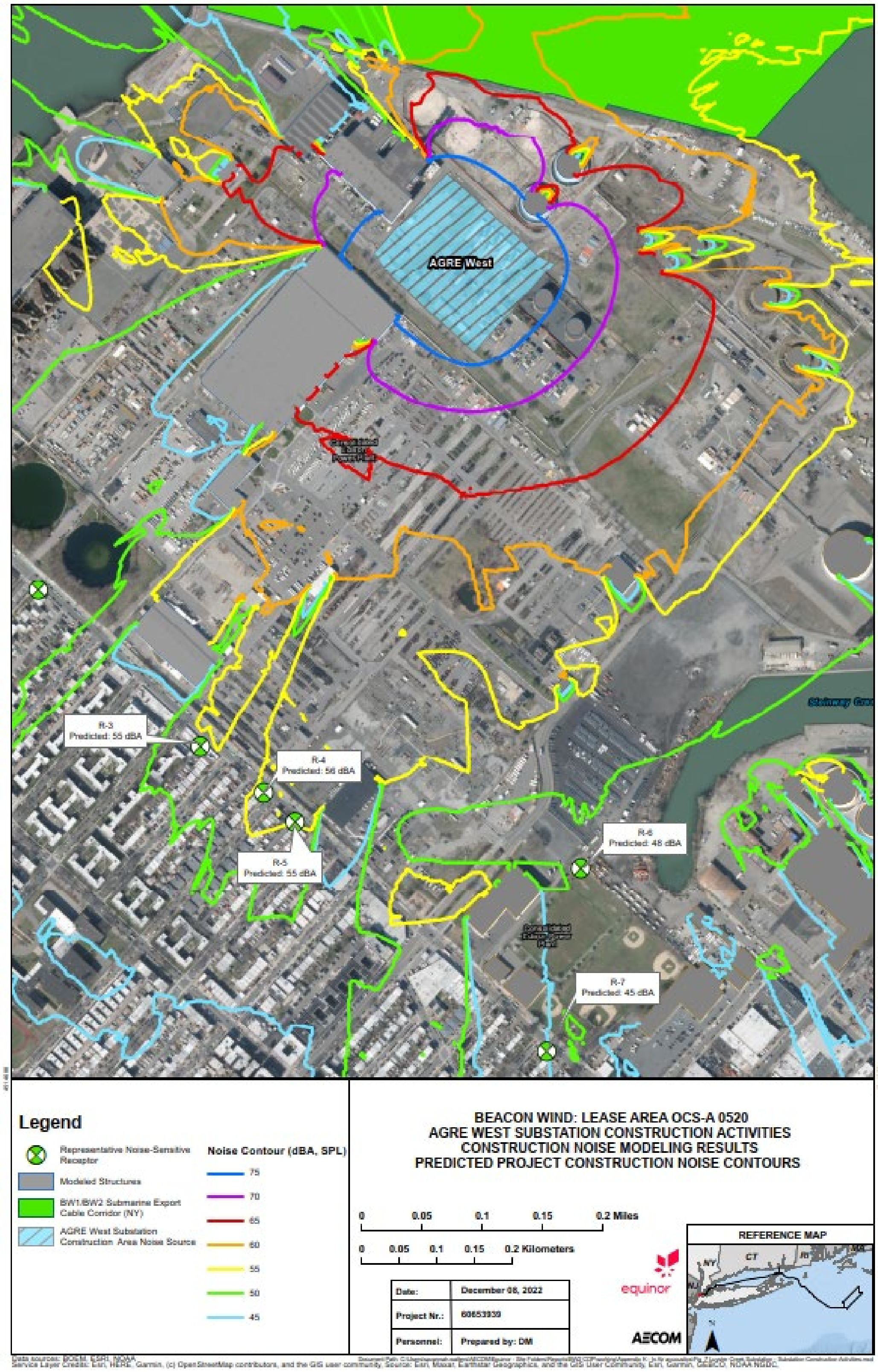


FIGURE K.5-11. PREDICTED NOISE CONTOURS FOR COMBINED SUBSTATION CONSTRUCTION ACTIVITIES AT AGRE WEST AND AGRE EAST

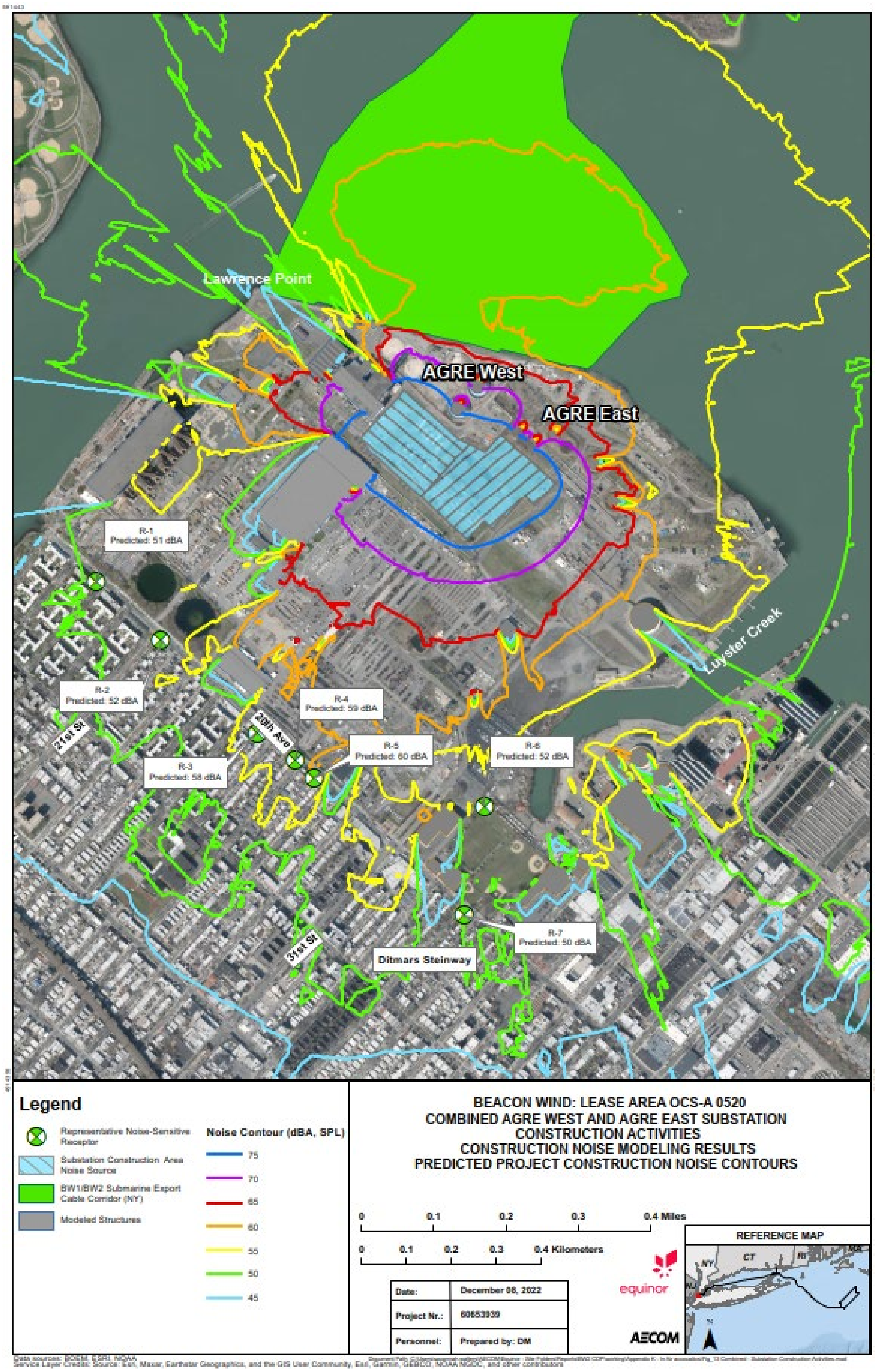
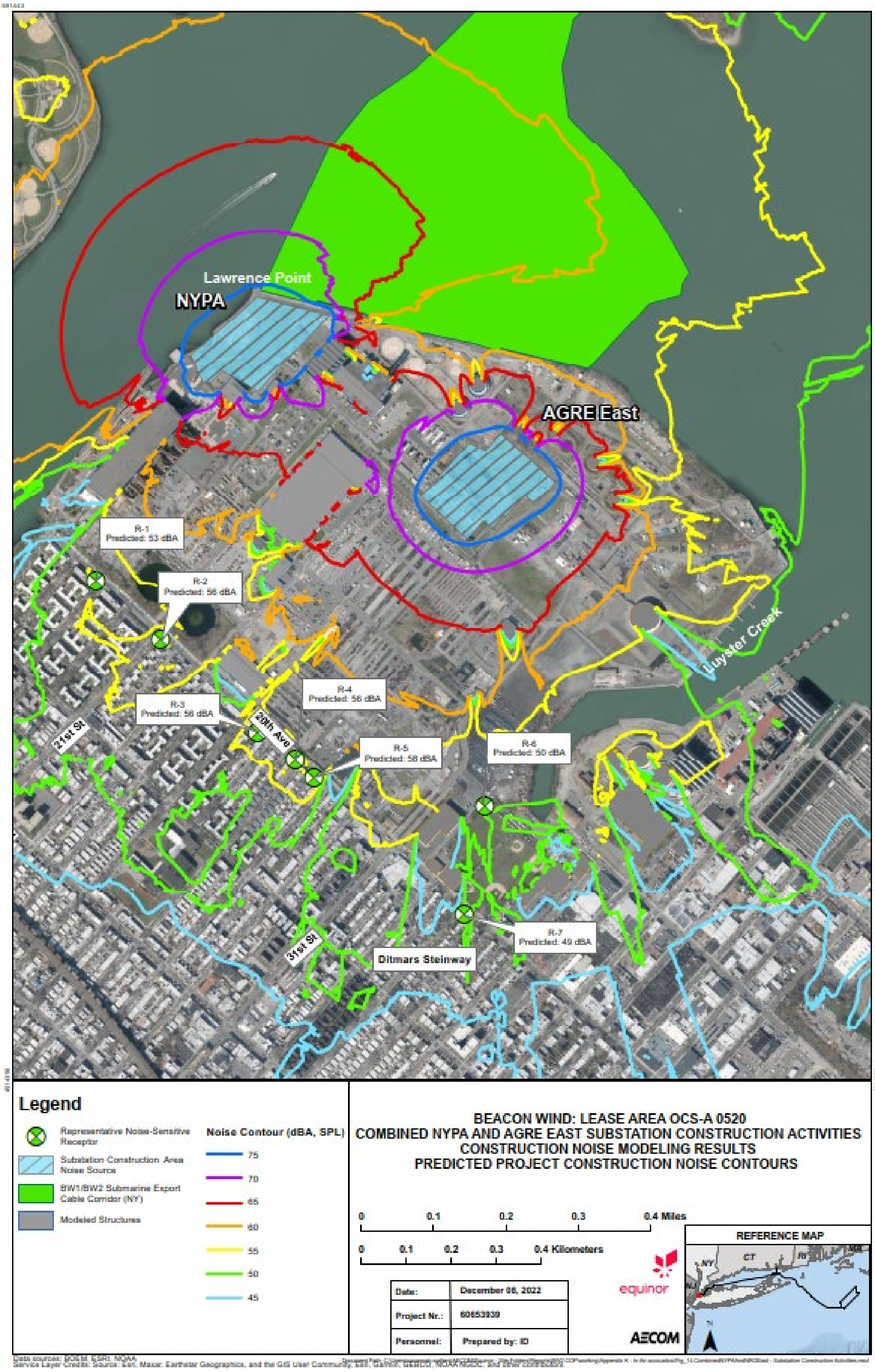


FIGURE K.5-12. PREDICTED NOISE CONTOURS FOR COMBINED SUBSTATION CONSTRUCTION ACTIVITIES AT NYPA AND AGRE EAST



K.5.2.3.2 Waterford, Connecticut

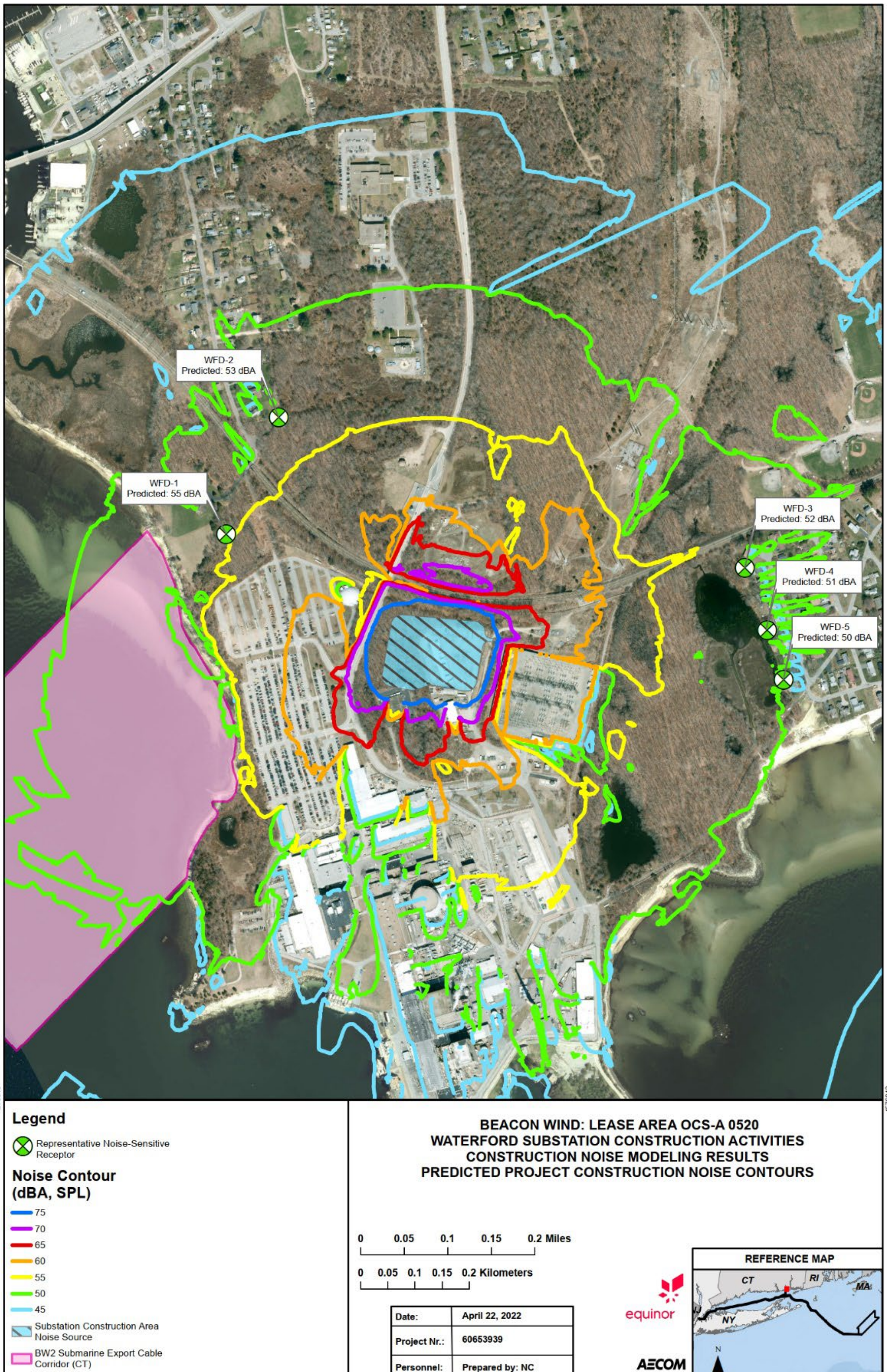
The modeling results for the onshore substation facility construction activities without mitigation are summarized in **Table K.5-19** and shown in **Figure K.5-13** for Waterford, Connecticut.

TABLE K.5-19. SUMMARY OF SUBSTATION CONSTRUCTION NOISE PREDICTION RESULTS– WATERFORD, CONNECTICUT

Receptor ID	Predicted Sound Pressure Level for Substation Construction Activities (dBA, L_{eq})
WFD-1	55
WFD-2	53
WFD-3	52
WFD-4	51
WFD-5	50

Table K.5-19 demonstrates that overall predicted onshore substation facility construction noise levels, inclusive of pile driving activities, are below the general sound level goal of 65 dBA at studied noise-sensitive receiver locations. Therefore, activity-specific mitigation measures are not necessary, as this activity is below the 65 dBA goal. However, Beacon Wind will apply those mitigation measures detailed in **Section K.5.2.4** to further minimize of construction-related noise.

FIGURE K.5-13. PREDICTED NOISE CONTOURS FOR SUBSTATION CONSTRUCTION ACTIVITIES AT WATERFORD, CONNECTICUT



Data sources: BOEM, ESRI, NOAA
Document Path: C:\Users\savannah.walters\AECOM Directory\Equinor - Site Folders\Reports\BW2 COP\working\Appendix K - In Air accoustics\Fig14_Substation_Construction_Activity_Waterford.mxd
Service Layer Credits: Source: Esri, Maxar, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community, Esri, Garmin, GEBCO, NOAA NGDC, and other contributors

K.5.2.4 *Construction Noise Mitigation*

There are no relevant quantitative construction noise policy limits for the Project. Therefore, a generally accepted guideline limit of 65 dBA L_{eq} for daytime noise exposures at residential buildings (based on noise ordinances throughout the country) is being used as the internal design goal for these activities (Cowan 1994).

While intermittent increases in noise levels are expected during construction activities, modeling of those construction activities associated with the onshore components discussed in **Sections K.5.2.2** and **K.5.2.3** will not exceed 65 dBA at any noise-sensitive receptors. Beacon Wind is committed to avoiding, minimizing, or mitigating overall construction noise impacts with the implementation of best management practices. Beacon Wind will require that construction equipment be operated such that construction-related noise levels will comply with applicable sections of the New York City and Town of Waterford Noise Codes.

Noise-reduction measures to avoid, minimize, or mitigate effects that are anticipated to be incorporated into the Project include:

- Equipment will be maintained and, where appropriate, mufflers will be installed;
- Equipment will be used under the lowest operating noise conditions as practical;
- Maintaining construction equipment and using newer models to provide the quietest performance;
- Equipment generating the highest noise levels will be operated as far from noise-sensitive receptors as practical;
- Equipment will only be operating when in-use;
- Hours of construction operations will be minimized to the extent practical, especially if nighttime operations are necessary;
- When possible, use enclosures on continuously-operating equipment such as compressors and generators;
- Where noise levels may be excessive, temporary barriers will be strategically placed between dominant stationary equipment and noise-sensitive receptors where practicable and safe; and
- Affected residential communities will be notified before construction activities and a call-in complaint line will be established.

K.6 Conclusions

A preliminary impact assessment was performed for the airborne noise associated with the construction and operation of the Project associated with onshore components to be located in Queens, New York and/or Waterford, Connecticut. Baseline ambient sound levels were measured to characterize the existing ambient sound levels near the two onshore substation facilities under consideration in Queens, New York and one onshore substation facilities under consideration in Waterford, Connecticut. Future sound levels were then predicted at the nearest sensitive receptors to evaluate noise impacts due to the Project for the onshore substation facilities and their associated HDD landfall locations.

The results of this analysis in Queens, New York demonstrate that, with the proposed locations of the onshore substation facilities, future operational sound level increases due to the Beacon Wind Project components are predicted to be less than the New York City 7 dBA limit ambient level increase at nearby residences but exceed the New York City's octave band Noise Code limits.

Engineered mitigation measures continue to be assessed for incorporation into the design of the onshore substation facilities and will be implemented to bring operations in-line with applicable Noise Code Limits. With implementation of best management practices, Beacon Wind will commit to further minimization of temporary increases in noise from construction.

The results of this analysis in Waterford, Connecticut demonstrate that, with the proposed locations of the onshore substation facility, operational noise will not exceed the State of Connecticut/Town of Waterford noise level limits.

Noise associated with the onshore construction activities for the export and interconnection cables, onshore substation facility construction, casing pipe and goalpost installation, and HDD activities at both the Queens, New York and Waterford, Connecticut Study Areas are predicted to result in sound levels at the closest noise-sensitive properties that are within general 65-dBA guideline limits for acceptable daytime construction noise exposures.

K.7 References

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ATTACHMENT K-1

Noise Monitoring Photo Log

	**Photo 1** **Monitoring Site:** NM-1 **Date Taken:** August 25, 2021 **Camera Facing:** Southwest **Description:** View toward nearest noise-sensitive receptor.
	**Photo 2** **Monitoring Site:** NM-1 **Date Taken:** August 25, 2021 **Camera Facing:** Northeast **Description:** View toward project area.

Photo 3

Monitoring Site:
NM-2

Date Taken:
September 27, 2022

Camera Facing:
Northeast

Description:
View toward project area.

Photo 4

Monitoring Site:
NM-2

Date Taken:
September 27, 2022

Camera Facing:
Southwest

Description:
View toward nearest noise-sensitive receptor.

	**Photo 5** **Monitoring Site:** NM-3 **Date Taken:** August 25, 2021 **Camera Facing:** North **Description:** View toward project area.
	**Photo 6** **Monitoring Site:** NM-3 **Date Taken:** August 25, 2021 **Camera Facing:** South **Description:** View toward nearest noise-sensitive receptor.

	**Photo 7** **Monitoring Site:** WFD NM-1 **Date Taken:** March 31, 2022 **Camera Facing:** Northwest **Description:** View toward nearest noise-sensitive receptor.
	**Photo 8** **Monitoring Site:** WFD NM-1 **Date Taken:** March 31, 2022 **Camera Facing:** Southeast **Description:** View toward Dominion Millstone Power Station and Project area.

	**Photo 9** **Monitoring Site:** WFD NM-2 **Date Taken:** March 31, 2022 **Camera Facing:** West **Description:** View toward nearest noise-sensitive receptor.
	**Photo 10** **Monitoring Site:** WFD NM-2 **Date Taken:** March 31, 2022 **Camera Facing:** South **Description:** View toward Dominion Millstone Power Station and Project area.

Photo 11

Monitoring Site:
WFD NM-3

Date Taken:
March 31, 2022

Camera Facing:
Northeast

Description:
View toward nearest noise-sensitive receptor.

Photo 12

Monitoring Site:
WFD NM-3

Date Taken:
March 31, 2022

Camera Facing:
West

Description:
View toward Dominion Millstone Power Station and Project area.

	**Photo 13** **Monitoring Site:** WFD NM-4 **Date Taken:** March 31, 2022 **Camera Facing:** Northeast **Description:** View toward nearest noise-sensitive receptor.
	**Photo 14** **Monitoring Site:** WFD NM-4 **Date Taken:** March 31, 2022 **Camera Facing:** Southwest **Description:** View toward Dominion Millstone Power Station and Project area.

ATTACHMENT K-2

Octave Band Center Frequency Details

Figure K-2-1
AGRE West Onshore Substation Facility Operations - Detailed Comparison of Octave-Band Center Frequency Sound Pressure Levels (in dB) at Two Worst-Case Receptors

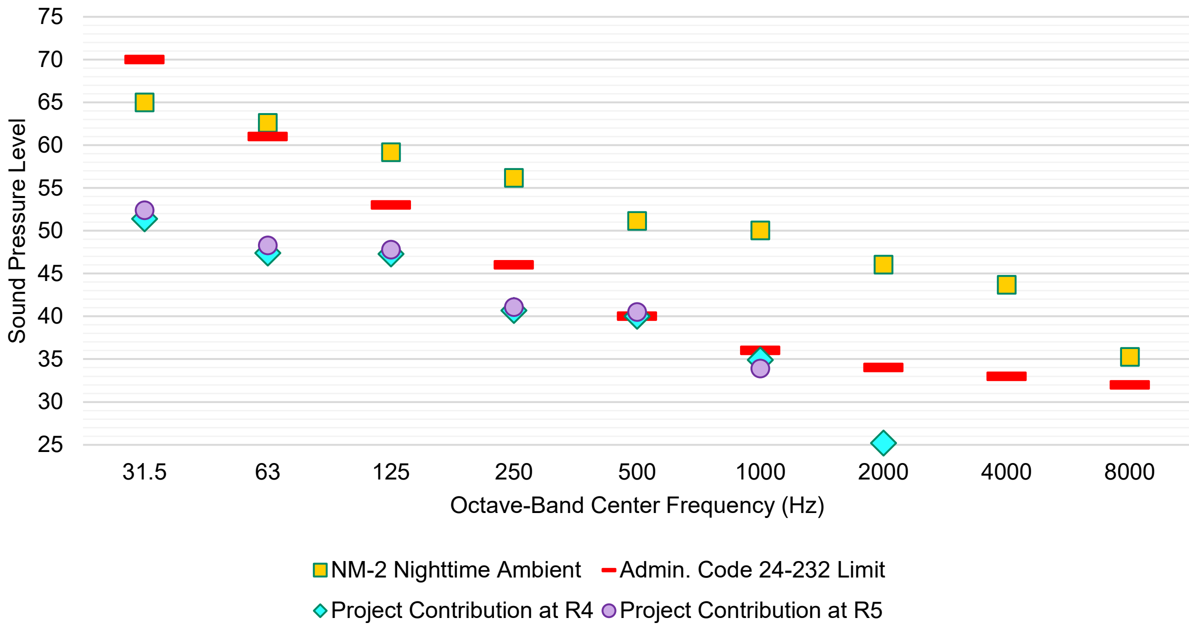

Figure K-2-2
NYPA Onshore Substation Facility Operations - Detailed Comparison of Octave-Band Center Frequency Sound Pressure Levels (in dB) at Two Worst-Case Receptors

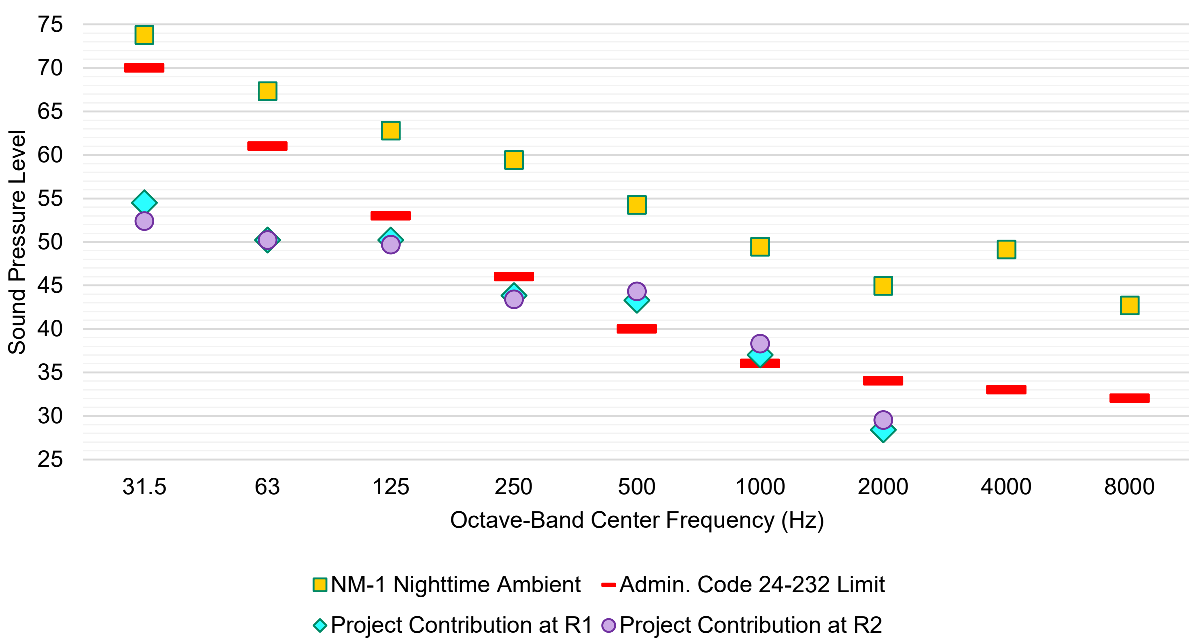

Figure K-2-3

Combined AGRE West + AGRE East Onshore Substation Facility Operations - Detailed Comparison of Octave-Band Center Frequency Sound Pressure Levels (in dB) at Two Worst-Case Receptors

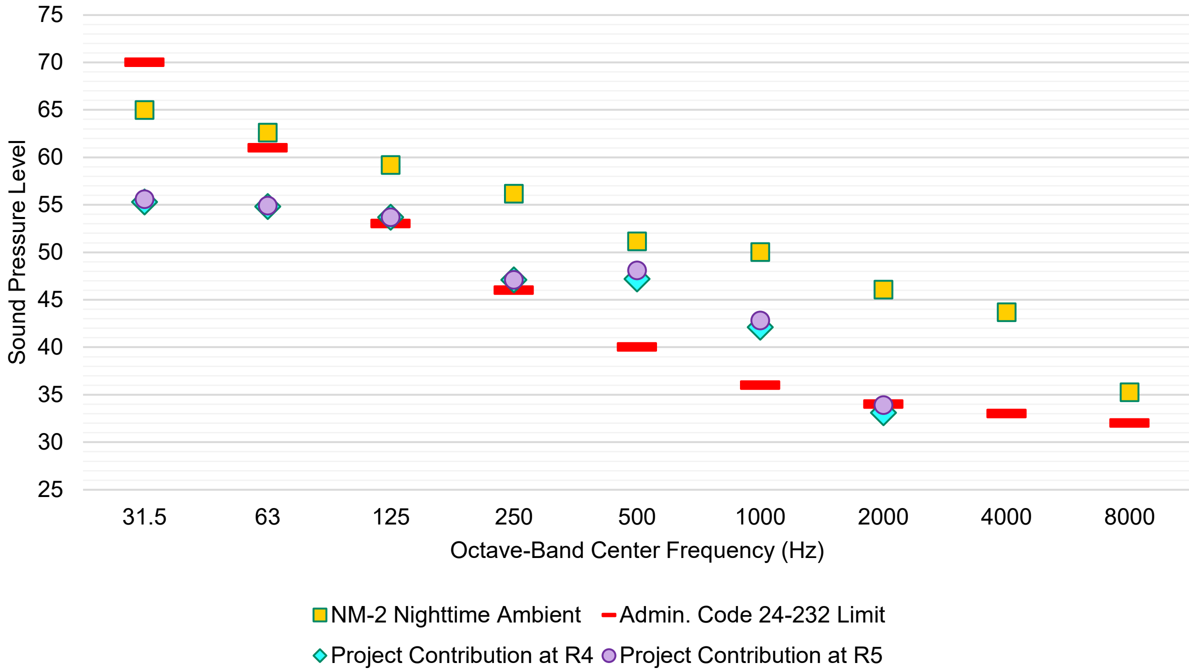

Figure K-2-4
Combined NYPA + AGRE East Onshore Substation Facility Operations - Detailed Comparison of Octave-Band Center Frequency Sound Pressure Levels (in dB) at Two Worst-Case Receptors

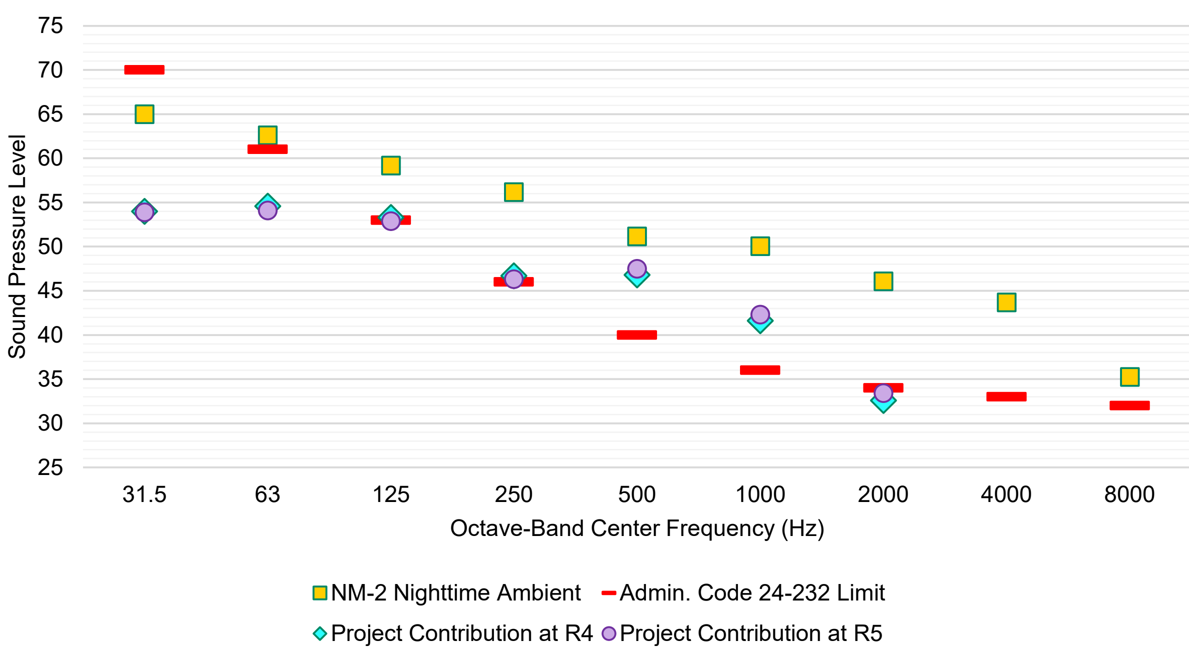

Photo credit: Matt Goldsmith, Equinor